



Since 1881

THE AMERICAN COLLEGE

(An Autonomous Institute affiliated to Madurai Kamaraj University
Re-accredited (3rd cycle) by NAAC with Grade "A+" CGPA – 3.47 (on
a 4-point scale; NIRF - 2025: 59th Rank)

MADURAI



International Multidisciplinary Conference 2026

IMC'26

Innovate, Integrate & Impact

International Multidisciplinary Conference 2026
INNOVATE, INTEGRATE and
IMPACT
IMC'2026

03 and 04 MARCH 2026

BOOK OF ABSTRACTS



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NIRF – 2025: 59th Rank

Title **International Multidisciplinary Conference 2026 –
Innovate, Integrate and Impact (IMC'26)**

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Dr. E. Joy Sharmila

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ABOUT THE COLLEGE

The American College, Madurai, was established in 1881 at Pasumalai by Rev. G. T. Washburn under the auspices of the American Board of Commissioners for Foreign Missions. It is a premier institution of higher education, renowned for its academic excellence, social relevance, and commitment to Christian inclusiveness. Initially affiliated with the University of Madras, the college later came under Madurai Kamaraj University in 1965. In 1978, it attained autonomous status, emerging as a pioneer in college autonomy and the Choice Based Credit System (CBCS) in India. The college moved to its present campus in Madurai in 1909 under the leadership of Rev. W. M. Zumbro, and in 1934 it came under the governance of an independent Governing Council. Its mission is to provide liberal Christian higher education to students of all faiths, preparing them for service to God, humanity, and society. At present, the college offers 32 undergraduate programmes, 20 postgraduate programmes, and 9 Ph.D. programmes, in addition to a range of vocational and community-oriented courses. The Study Centre for Indian Literature and Translation (SCILET) has earned international recognition for its academic contributions. In 2006, the college established a Satellite Campus at Chatrapatti, which became fully functional in 2015 to serve rural communities. Accredited with an 'A+' grade by the NAAC with a CGPA of 3.47 (third cycle) in 2022, and ranked 59th in the NIRF 2025, The American College has consistently nurtured leaders, scientists, administrators, and intellectuals of global repute. Its vibrant campus culture promotes pluralism, aesthetic expression, inclusiveness, and service to the marginalized through initiatives such as NSS, NCC, SLP, GMP, GNS, ACH, and LIB. With a vision to evolve as a Christian higher educational institution of global standards, the college emphasizes responsible global citizenship, knowledge dissemination, and socioeconomic uplift through inclusive Christian values, integrating academic excellence with holistic development.

ABOUT THE CONFERENCE

In an era of rapid technological advancement and growing global interdependence, academic research increasingly demands integrated and cross-disciplinary approaches. IMC'26 aims to bring together researchers, industry innovators, and scholars from Science, Technology, Health Sciences, Social Sciences, Management, Commerce, and Humanities. The conference addresses contemporary challenges such as computer applications, AI ethics, healthcare advancements, economic resilience, environmental sustainability, and behavioural sciences. IMC'26 serves as a dynamic platform for knowledge exchange, innovation, interdisciplinary collaboration, and impactful research dissemination.

Theme: Innovate, Integrate and Impact

- Innovative solutions with emerging technologies
- Integrate multidisciplinary research approaches
- Impact - driven societal and industrial outcomes

Thrust Areas

- Agriculture, Food and Nutritional Sciences
- Commerce, Management and Economics
- Communications, Electronics and Networks
- Computing, Artificial Intelligence and Cyber Technologies
- Environmental Sciences
- Health Sciences and Medical Technology
- Language and Literature across Cultures, Technologies, and Societies
- Life Sciences
- Mathematical Modeling and computational mathematics
- Physical and Chemical Sciences
- Psychology and Behavioural Studies
- Social Sciences

**INTERNATIONAL MULTIDISCIPLINARY CONFERENCE 2026 -
INNOVATE, INTEGRATE and IMPACT (IMC'2026),
3 and 4 MARCH 2026**

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Dr. N. Vivek, Assistant Professor of Commerce
Dr. S. Johnson Raja, Assistant Professor of Chemistry

**INTERNATIONAL MULTIDISCIPLINARY CONFERENCE 2026 -
INNOVATE, INTEGRATE and IMPACT (IMC'2026),
3 and 4 MARCH 2026
PROGRAMME**

Day I - 03/03/2026 - Venue: Main Hall

Time	Schedule
09:00 AM - 10:00 AM	Registration
10:00 AM - 10:45 AM	Inauguration
10:45 AM - 11:00 AM	Photo Session
11:00 AM - 11:30 AM	Tea Break
11.30 AM - 01.00 PM	Dr. Anurag Kumar , Founder, Prex Studio, Bengaluru AI tools for Research
01.00 PM - 02.00 PM	Lunch - Edward Nolting Hall
02.00 PM - 03.30 PM	Dr. Shashi Kad , CEO, SAGE Sustainability, Bengaluru Sustainability for a Healthy Living
03.30 PM - 04.00 PM	Tea Break
04.00 PM - 05.00 PM	Oral Presentation

Day II - 04/03/2026

Time	Schedule
09.30 AM - 01.00 PM	Parallel Session
01.00 PM - 02.00 PM	Lunch - Edward Nolting Hall
02:00 PM - 03:00 PM	Poster Presentation
03:00 PM - 03:30 PM	Tea Break
03.30 PM - 04.30 PM	Valedictory - Main Hall

Day II - Parallel Session - 1 (Physical and Chemical Sciences) - Venue: Physics Smart Class Room

Time	Schedule
09.30 AM - 10.20 AM	Dr. Shanmugaraju Sankarasekaran , Department of Chemistry, IIT Palakkad, Kerala, India Invisible to the Eye, Visible to Light: The World of Fluorescence Sensors
10.20 AM - 11.10 AM	Dr. Krishnakumar Venkateswaran , Founder, IMAI LLC, California, USA For photons to Physicians
11.10 AM - 11.30 AM	Tea Break
11.30 AM - 12.20 PM	Prof. R. Nagarajan , Department of Chemistry, University of Delhi, Delhi Materials discovery through polymorph stabilization
12.20 PM - 01.10 PM	Dr. John Amalraj , Institute of Chemistry, University of Talca, Chile Hydrogel nanocomposites for biomedical applications

Day II - Parallel Session - 2 (Biological Sciences) - Venue: B1 Hall

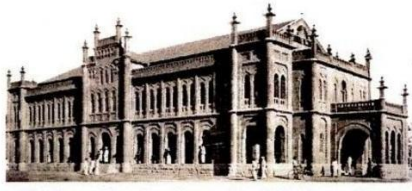
Time	Schedule
09.30 AM - 10.30 AM	Dr. Thirumalaisamy P. Velavan , Molecular Genetics of Infectious Diseases, Institute of Tropical Medicine, Germany Dengue in a Changing Climate: Surveillance, Diagnostics, and Emerging Challenges
10.30 AM - 11.00 AM	Tea Break
11.00 AM - 12.00 PM	Dr. Meiyappan Lakshmanan , Department of Biotechnology, IITM, Chennai Animal cell-based biomanufacturing
12.00 - 01.00 PM	Dr. K. Vatcharavelu , CSIR - Central Food Technological Research Institute, Mysuru Chromatography techniques and its analytical approaches in food analysis

**Day II - Parallel Session - 3 (Mathematics and Computer Applications) - Venue:
PG Math Smart Room**

Time	Schedule
09.30 AM - 10.30 AM	Dr. Sanjeewa Perera , Centre for Mathematical Modeling, Department of Mathematics, University of Colombo, Colombo, Sri Lanka Natural Disaster Modelling: Drought Severity
10.30 AM - 11.00 AM	Tea Break
11.00 AM - 12.00 PM	Dr. Julius Fusic , Department of Mechatronics, Thiagarajar College of Engineering, Madurai Intelligent Mobile Robot Navigation for Warehouse Automation
12.00 - 01.00 PM	Mrs. Vimala Lourduraj , Founder, EverAppTech Solutions, Madurai AI Everywhere: The Convergence of Voice, Vision, Language and Machines

Day II - Parallel Session - 4 (Arts and Behavioural Science) - Venue: PLL Hall

Time	Schedule
09.30 AM - 10.30 AM	Prof. Nagalingam Nagendrakumar , Department of Information Management, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka Applications of Artificial Intelligence in Entrepreneurship Development
10.30 AM - 11.00 AM	Tea Break
11.00 AM - 12.00 PM	Prof. R. Subhashini , Dean, Madras School of Social Work, Chennai Positive Psychology
12.00- 01.00 PM	Dr. J. S. Rohan Savarimuttu , Department of Languages and Communication Studies, Trincomalee Campus of the Eastern University, Sri Lanka Interdisciplinary Perspectives on Human Meaning-Making, Markets, and Social Transformation



Rt.Rev. Dr. D. Jeyasingh Prince Prabhakaran
Bishop - President M.A.,B.D.P.G.D.Th., Ph.D.,



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Date :

Foreword

27 February 2026



*It gives me profound pleasure to greet the organisers, delegates, and distinguished scholars gathered for the **International Conference on Interdisciplinary Research**, hosted by **The American College, Madurai**, on March 3rd and 4th, 2026.*

In today's rapidly changing world, the complex challenges we face can no longer be addressed by a single academic discipline. Issues such as the ethical implications of artificial intelligence, the urgency of climate change, and ongoing social transformations require insights from multiple fields of study. Meaningful solutions and innovation emerge when disciplines work together.

The American College has, for nearly a century and a half, been a pioneer in holistic education. Our commitment to "Purificatus non Consumptus" reminds us that knowledge must be refined by rigorous inquiry and dedicated to the service of humanity. This conference is a testament to that mission. By bringing together minds from the sciences, humanities, and social sciences, we are fostering a "Great Conversation" that is essential for sustainable progress.

This Abstract Book is more than a collection of summaries; it is a map of intellectual courage. Within these pages, you will find scholars daring to cross boundaries, synthesise ideas, and propose solutions that are as multifaceted as the problems they seek to solve.

I commend the Principal, the organising committee, and the various departments for their vision in convening this international forum. To our delegates, especially those who have travelled across borders to be with us in the historic city of Madurai. May your deliberations be fruitful, your connections be lasting, and your research continue to serve the common good. May the light of truth guide your discussions over these two days.

May our sovereign God extend his favour to us. Make our endeavours successful. Yes, make them successful. - Psalm 90:17 (NET)

In His Service,

Rt. Rev. Dr. D. Jeyasingh Prince Prabhakaran
BISHOP-PRESIDENT, The American College

Dr. J. Paul Jayakar M.A., M.Phil., Ph.D., PBDCA.,
Principal & Secretary



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Principal's Message



It gives me immense pleasure to present this message for the Proceedings of the International Multidisciplinary Conference 2026 (IMC'26), organized by The American College, Madurai.

Founded in 1881, The American College has consistently upheld its commitment to academic excellence, Christian inclusiveness, and socially responsible higher education. As an autonomous institution accredited with an 'A+' grade by NAAC (CGPA 3.47, third cycle) and ranked 59th in NIRF 2025, the college continues to foster scholarship that is both globally relevant and locally responsive.

In an era defined by rapid technological advancement, artificial intelligence, environmental concerns, healthcare transformations, economic uncertainties, and complex social dynamics, research can no longer remain confined within disciplinary boundaries. IMC'26, themed "Innovate, Integrate and Impact," is conceived as a vibrant academic platform that brings together scholars, scientists, industry professionals, and young researchers from Science, Technology, Health Sciences, Social Sciences, Commerce, Management, and the Humanities.

The conference seeks to promote interdisciplinary dialogue, foster academia–industry collaboration, and encourage research that addresses real-world challenges. By integrating diverse research approaches and emphasizing innovation-driven solutions, IMC'26 aspires to generate meaningful societal and industrial impact. The thrust areas of the conference—ranging from Artificial Intelligence, Environmental Sciences, and Health Technologies to Language, Literature, Behavioural Studies, and Mathematical Modeling—reflect the comprehensive and inclusive vision of this academic gathering.

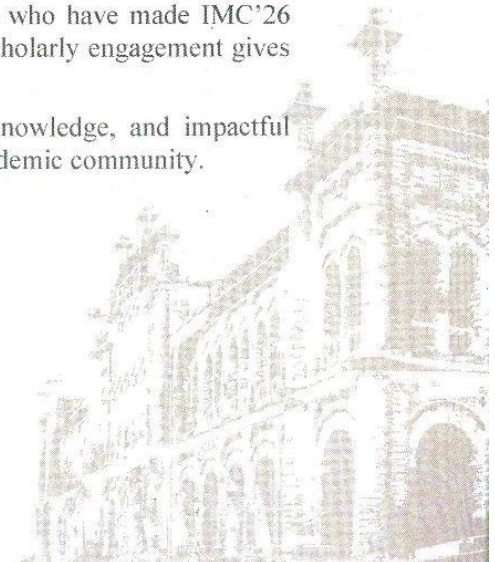
I am particularly pleased that the selected research contributions will be published in this Conference Proceedings with an ISBN, and outstanding papers will be considered for publication in Scopus-indexed journals after peer review. Such initiatives reinforce our commitment to quality research dissemination and long-term national and international collaborations.

I appreciate the dedicated efforts of the Convenor, Co-Convenor, Organising Secretaries, Advisory Committee members, Resource Persons, reviewers, and all contributors who have made IMC'26 possible. I also extend my heartfelt gratitude to the participants whose scholarly engagement gives life and meaning to this conference.

May IMC'26 serve as a catalyst for innovative thinking, integrated knowledge, and impactful research that contributes to the advancement of society and the global academic community.

With my best wishes for a successful and enriching conference.


Principal & Secretary
The American College
Madurai-625 002





Message



International Multidisciplinary Conference – 2026, themed “Innovate, Integrate, and Impact.” Organized by The American College, this conference stands as a testament to our enduring commitment to academic excellence, research advancement, and global collaboration.

In an era marked by rapid technological transformation and complex societal challenges, innovation is no longer optional—it is essential. Integration across disciplines has become the foundation for meaningful research, and the true measure of scholarship lies in its impact on society. This conference provides a vibrant platform for scholars, researchers, academicians, and industry experts from diverse fields to converge, exchange ideas, and generate knowledge that transcends conventional academic boundaries.

The publication of this Abstract Book with an ISBN number reflects the scholarly rigor and academic integrity upheld by the organizing committee. Each abstract represents dedicated research, thoughtful inquiry, and a shared aspiration to contribute to global knowledge systems. I sincerely appreciate the efforts of the editors, reviewers, conveners, and participants whose commitment has made this publication possible.

As Vice Principal of The American College, I am proud to witness our institution fostering interdisciplinary dialogue and nurturing a research culture that bridges theory and practice. I am confident that the deliberations and discussions emerging from this conference will inspire collaborative research, innovative solutions, and sustainable impact.

I extend my appreciations to the organizing committee and best wishes to all contributors. May this conference serve as a milestone in our collective journey towards innovation, integration, and impactful transformation.

Dr. S.C.B.Samuel Anbu Selvan
Vice Principal
The American College
Madurai - 625 002.

Dr.M.Beaula Ruby Kamalam, M.Sc.,M.Phil.,Ph.D.
Bursar
Associate Professor, Department of Physics.



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Message



“Thanks be to God, who gives us this victory through our Lord Jesus Christ!” –1 Corinthians 15:57

It is with a heart full of gratitude and academic pride that I welcome you to the International Conference on Interdisciplinary Research at The American College, Madurai. As we convene on March 3rd and 4th, 2026, we do so not merely as representatives of separate disciplines, but as a cohesive academic fraternity dedicated to the singular pursuit of truth.

The enduring legacy—and the truest "endowment"—of The American College has always been the intellectual and spiritual flourishing of our scholars. This conference stands as a testament to that investment, showcasing the vibrant harvest of our collective curiosity.

By integrating the Physical and Life Sciences, the Humanities, Commerce, and the Social Sciences, we are dismantling the silos that traditionally fragment our understanding. This Abstract Book serves as a profound synthesis of these diverse intellectual pursuits. It demonstrates that whether we are deciphering the intricacies of molecular biology, analyzing the fluctuations of global markets, or interpreting the timeless resonance of literature, we are all participants in a sacred vocation: exploring and honoring the world we have inherited.

As the Scripture reminds us in Proverbs 25:2, "It is the glory of God to conceal a matter; to search out a matter is the glory of kings." This conference is an invitation to share in that noble glory of discovery.

I extend my heartfelt appreciation to the Organizing Committee for their steadfast dedication in bringing this international forum to life. To our delegates from around the world: your presence enriches our historic campus and serves as a powerful reminder that true knowledge recognizes no borders.

May these two days of dialogue in our ancient city of Madurai be marked by profound discovery, lasting friendship, and spiritual inspiration. It is my prayer that your research continues to build a wiser, more enlightened, and more compassionate world. May this conference be a resounding success and inspire meaningful change in how we perceive the journey from farm to fork, and ultimately, to the heart.

Best wishes for a fruitful and enlightening session!

M. Beaula
Dr.M.Beaula Ruby Kamalam

BURSAR
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MADURAI-625 002

Dr. E. Joy Sharmila
Associate Professor & Head
PG & Research Department of Zoology
Dean Curriculum Development & Research



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Message

Distinguished guests, Esteemed scholars, Industry leaders and participants from around the world!

The American College is honoured to host the prestigious **International Multidisciplinary Conference 2026- Innovate, Integrate & Impact** which is a gathering of scientists, scholars & professionals. In an era where there is rapid transformation and global challenges bringing together ideas across disciplines is more essential. Integration bridges institutions, perspectives to address multifaceted problems. Innovation drives development advancements. Innovation alone is not enough. Integration unlocks powerful synergies. Efforts should be made to impact by translating into real world outcomes. It reaches highest value when there is contribution to sustainable development, societal advancement and betterment of communities. The world has pressing challenges which seek integration, innovation and impact. Humanity greatest leaps had not occurred in isolation but at crossroad of disciplines. May the deliberations in this conference evolve into collaborations bring research breakthrough lead to meaningful measurable impact. Multidisciplinary engagement is no longer optional, but essential in bringing together expertise from science, technology, humanities and health. This creates opportunities for transformative research. This conference will provide a wonderful deliberating platform to explore innovation and offer plenty of enriching opportunities.



I express my sincere gratitude to the organizing committee, speakers, sponsors and participants. Wishing a productive, enriching, inspiring conference IMC' 2026. Take time also to enjoy the beauty of Madurai and its surroundings.

Best Wishes


Dr. E. Joy Sharmila
Convener- IMC' 2026



Dr. B. Kirthika Rani
Co-Convenor

It gives me immense pleasure and privilege to present the Foreword for the International Multidisciplinary Conference 2026 - Innovate, Integrate and Impact (IMC'2026). As Co-Convenor, it has been an inspiring journey to see this international forum come to life, bringing together the sharpest minds from different fields.

In an era where knowledge is often fragmented into specialized silos, the importance of multidisciplinary dialogue cannot be overstated. The global challenges we face today are interconnected; therefore, our solutions must be as well. This conference is designed to be a "collision space" where data meets humanism, and where theory meets practice across borders and boundaries.

I want to extend my sincere thanks to the steering committee, invited speakers, and every participant who has travelled – physically or virtually – to be here. Your willingness to share your expertise and listen to unfamiliar perspectives is what makes this event a success. I wish to extend my deepest commendations to the speakers and researchers – whose intellectual contributions form the foundation of this proceedings volume.

It is my sincere hope that the dialogues initiated here will transcend the duration of this conference, leading to enduring international partnerships and innovative solutions that contribute to the global body of knowledge.

I invite you to engage deeply, question boldly, and embrace the unexpected insights that only a gathering of this diversity can provide.



Dr. Thomas K Varghese
Organising Secretary

As one of the Organising Secretaries of the International Multidisciplinary Conference - Innovate, Integrate and Impact (IMC'26), I am delighted to present this scholarly gathering from the perspective of the Arts and Humanities. In an age shaped by rapid technological advancement and global transformation, the Arts and Humanities remain vital in interpreting human experience, nurturing critical inquiry, and fostering ethical reflection. IMC'26 seeks to create a vibrant space where disciplines intersect, dialogues flourish, and ideas evolve into meaningful impact. May this conference inspire collaborative research, deepen understanding, and reaffirm the enduring relevance of humanistic scholarship in shaping a compassionate and sustainable future.



Dr. N. Rajkumar
Organising Secretary

It is a privilege to present the International Multidisciplinary Conference 2026, organized under the theme “Innovate • Integrate • Impact.” This conference brings together researchers, academicians, industry experts, and students from diverse disciplines to share knowledge and foster meaningful collaboration.

In today’s rapidly evolving world, innovation supported by interdisciplinary integration is essential for sustainable progress. IMC’2026 serves as a professional platform for scholarly exchange, constructive dialogue, and the exploration of practical solutions to contemporary global challenges.

Sincere appreciation is extended to the keynote speakers, delegates, reviewers, sponsors, and the organizing committee for their dedicated efforts and valuable contributions in making this conference a reality.

It is hoped that IMC’2026 will promote productive discussions, strengthen academic partnerships, and create a lasting impact. Best wishes to all participants for a successful and enriching conference experience.



Dr. P. Dailiah Roopha
Organizing Secretary

It gives me immense pleasure to welcome scholars, researchers, academicians, industry experts, and students from across the globe to the International Multidisciplinary Conference 2026 – Innovate, Integrate and Impact (IMC'26).

In an era marked by rapid technological advancements, environmental challenges, and evolving societal needs, the importance of multidisciplinary collaboration has never been greater. IMC'26 is envisioned as a dynamic platform that fosters intellectual exchange, encourages innovative thinking, and promotes integrative approaches to address global challenges. IMC'26 places special emphasis on advancing research in biodiversity conservation, ecosystem sustainability, environmental monitoring, climate resilience, biotechnology, and ecological restoration. The conference aims to create a collaborative platform where biologists, environmental scientists, ecologists, technologists, and policy researchers can collectively explore solutions that are innovative, interdisciplinary, and impactful. The theme *"Innovate, Integrate and Impact"* reflects our commitment to nurturing ideas that transcend disciplinary boundaries and translate knowledge into meaningful societal outcomes.

I am confident that IMC'26 will serve as a catalyst for impactful collaborations and sustainable solutions for our planet.

Let us come together to innovate responsibly, integrate knowledge wisely, and create a lasting impact for future generations.



Dr. M. Andrew Pradeep
Organising Secretary

It is my great pleasure to welcome you to the International Multidisciplinary Conference 2026 (IMC'2026), centered on the theme "Innovate, Integrate and Impact."

IMC'2026 provides a dynamic platform for researchers, academicians, industry professionals, and students from diverse disciplines to come together, share insights, and foster meaningful collaborations. In a rapidly evolving world, innovation must be integrated across disciplines to create impactful solutions that address global and societal challenges.

I sincerely thank our keynote speakers, participants, reviewers, sponsors, and the organizing team for their invaluable contributions and dedication in making this conference a success.

May IMC'2026 inspire new ideas, strengthen interdisciplinary partnerships, and create lasting impact.

I wish the conference great success and a memorable scholarly experience for all.



Dr. N. Vivek
Organising Secretary

It is a privilege to present the Proceedings of the International Multidisciplinary Conference 2026 – *Innovate, Integrate and Impact*, organised by The American College, Madurai, Tamil Nadu.

In today's rapidly evolving global landscape, multidisciplinary research plays a vital role in addressing complex challenges. The conference theme highlights innovation as the driver of discovery, integration as the connection across disciplines, and impact as the true measure of scholarly contribution. The conference brought together academicians, researchers, industry experts, and policymakers, fostering meaningful academic exchange. All papers included in this volume have undergone a rigorous peer-review process to ensure quality and relevance.

I extend my sincere gratitude to the respected Principal, Vice Principal, and Bursar for their guidance and support. I also deeply appreciate the efforts of the Convener, Co-Convener, keynote speakers, session chairs, reviewers, contributors, organising committee members, faculty, scholars, students, and staff whose dedication ensured the success of this conference.

It is our hope that this volume will encourage continued interdisciplinary research and inspire impactful academic contributions.



**Dr. S. Johnson Raja,
Organising Secretary**

Greetings! It is a distinct honor to welcome you all to the **International Multidisciplinary Conference (IMC-2026)**, hosted by The American College, Madurai. Under the theme "**INNOVATE, INTEGRATE and IMPACT,**" this conference serves as a premier forum for researchers, industry innovators, and scholars to share their knowledge from the diverse fields of Science, Technology, Health Sciences, Social Sciences, Management, Commerce, and the Humanities. I extend my sincere thanks to our Principal and Secretary, Vice-Principal, Bursar, Convenor, Co-Convenor, Deans, and Heads of Departments. Their unwavering support and meticulous planning at every level have been the cornerstone of this event's success.

The interdisciplinary nature of this conference highlights the complex challenges of the modern world demanding rigorous collaboration across diverse fields of expertise. I extend my sincere appreciation to our distinguished speakers, organizers, sponsors, and participants for their invaluable contributions. I am confident that the discussions initiated here and the professional connections established will spark innovative solutions and contribute meaningfully to our sustainable future. I wish you all a highly productive and inspiring experience. May this conference ignite transformative ideas, spark enduring collaborations, and pave the way for groundbreaking discoveries that will shape the global landscape.

Plenary lectures

Dr. Anurag Kumar
Founder, Prex Studio, Bengaluru



Abstract for Generative AI in Research

Generative AI is rapidly transforming how research is conceived, conducted, and communicated. This session explores practical applications of generative models across literature review, data analysis, experiment design, and scientific writing. We will discuss opportunities to accelerate discovery while maintaining rigour, reproducibility, and ethical integrity.

Dr. Shashi Kad,
CEO, SAGE Sustainability, Bengaluru



Abstract

Healthy living is often framed as an individual responsibility, focused on diet, exercise, sleep, and stress management. However, rapidly changing environmental and social conditions are reshaping the foundations of wellbeing. Heat stress, air pollution, water insecurity, food system disruptions, and widening inequality increasingly act as health determinants, influencing disease risk, productivity, mental wellbeing, and quality of life. This keynote reframes sustainability as a practical public health strategy: not a separate agenda, but part of the operating system for healthy living.

The talk introduces a simple two-circle model linking personal health with public and ecological health, and presents five everyday pathways through which sustainability shapes wellbeing: air, water, food, heat and shelter, and community. Building on the conference theme of Innovate, Integrate, Impact, it highlights how innovation includes redesigning systems and defaults, integration requires cross-disciplinary collaboration, and impact must be measured through health outcomes and equity.

Finally, the keynote drills down into actionable choices at three levels: personal habits, social norms, and institutional design. It concludes with five practical commitments that campuses, organisations, and households can adopt to reduce health risks while improving resilience and fairness. The central message is that health is not only something we do, it is also something we live in, and sustainability is essential to protect it.

Invisible to the Eye, Visible to Light: The World of Fluorescence Sensors

Dr. Shanmugaraju Sankarasekaran,

Associate Professor, Department of Chemistry, IIT Palakkad, Kerala, India



Abstract:

Many chemical and biological processes occur at the molecular level and remain invisible to the naked eye, yet they can be revealed through fluorescence. Fluorescence sensing offers an effective strategy to convert molecular recognition and self-assembly into detectable optical signals. In this context, our research focuses on the rational design of self-assembled supramolecular fluorophores based on amino-1,

8-naphthalimide-derived Tröger's bases (TBNaps).

TBNaps are chiral, V-shaped molecular scaffolds composed of a methano-1,5-diazocine core fused with two orthogonally oriented 1,8-naphthalimide units, creating a well-defined hydrophobic cleft and favorable photophysical properties. The structural information encoded within these molecules drives spontaneous self-assembly and host-guest interactions, enabling efficient transduction of molecular events into fluorescence responses. Their straightforward synthesis, rigid architecture, and tunable emission behavior make TBNaps attractive platforms for the development of fluorescence sensors and functional materials.

Using this design approach, we have constructed a range of supramolecular assemblies, polymers, and hybrid materials for sensing and biomedical applications. Notably, a Tröger's base-p-cymene-Ru(II)-curcumin conjugate was developed as a fluorescent theranostic agent for cervical cancer cells, while a TBNaps-functionalized triazine covalent organic polymer was engineered as a "turn-on" fluorescent sensor for volatile organic pollutants. This talk highlights how self-assembly and fluorophore design allow invisible molecular information to become visible through light.

From Photons to Physicians: A Journey in Optical Innovation

Dr. Krishnakumar Venkateswaran

Founder, IMAI LLC, California, USA



Abstract

The transition of a medical device from high-fidelity optical modeling to a standardized clinical tool is a complex, non-linear process. This lecture presents the "**Innovate, Integrate, Impact**" framework as a methodology for scientists to navigate the technical and regulatory hurdles of modern ophthalmology and medical physics.

For the aspiring scientist, success requires a "super-ager" approach to professional development. This talk provides a roadmap for transforming a higher-level understanding of physics into a scalable medical solution that addresses global visual impairment.

Keywords: *Intraocular Lens (IOL) Design, Modulation Transfer Function (MTF), Clinical Trial Registries, Medical Device Lifecycle, Translational Physics.*

Materials Discovery through Polymorph Stabilization

Prof. R. Nagarajan

Senior Professor, Department of Chemistry, University of Delhi, Delhi



Abstract

There is an endless quest for new materials to meet the demands of advancing technology. Thus, we need new magnetic and metallic/semiconducting materials for spintronics, new low-loss dielectrics for telecommunication, new multiferroic materials that combine both ferroelectricity and ferromagnetism for memory devices, new lithium containing solids for application as cathode/anode/electrolyte in lithium batteries, hydrogen storage materials that will free us from our dependence on fossil fuels for transport applications, and catalyst materials that can convert, for example, methane to higher hydrocarbons, last but not the least, materials that become superconductors at room temperature, and the list is endless!

With the rapid advancement of science and the ease of accessing information at the fingertips, the demand for energy-efficient, simple-to-execute synthetic procedures for the generation of technologically important materials without the use of expensive starting materials is on the rise. This has not only influenced the way we design scientific research problems but also equipped us to explore existing phase relations from a bottom-up approach.

Polymorphism and structure-property relationships in solids are closely intertwined in chemical research and play a pivotal role in determining their eventual use in a given application. In this talk, we will elaborate on how new polymorphs of well-established ternary sulfide, fluoride and oxide systems have been discovered in our laboratory.

Dr. John Amalraj,

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Abstract

The increasing prevalence of antimicrobial resistance has created an urgent demand for advanced materials that can effectively prevent and manage infections. Hydrogels, three-dimensional hydrophilic polymer networks with high water content and excellent biocompatibility, have emerged as promising candidates for antimicrobial applications, particularly in wound healing and biomedical coatings.

This presentation will briefly discuss the preparation of antimicrobial hydrogels using physical and chemical crosslinking methods, including free-radical polymerization and nanocomposite fabrication. Special focus will be placed on the incorporation of antimicrobial agents such as silver nanoparticles, zinc oxide nanoparticles, antibiotics, and antimicrobial peptides to achieve sustained and controlled release.

Key characterization techniques—including FTIR, SEM, swelling analysis, mechanical testing, and antimicrobial assays such as zone of inhibition and MIC—will be highlighted to demonstrate how hydrogel structure and properties influence antimicrobial performance.

Overall, antimicrobial hydrogels offer a versatile and tunable platform for infection control, and continued research in their design and characterization will support the development of next-generation biomedical materials.

Dengue in a Changing Climate: Surveillance, Diagnostics and Emerging Challenges

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Head, Molecular Genetics, of Infectious Diseases, Institute of Tropical Medicine, Germany



Dengue is the fastest-spreading mosquito-borne viral disease globally, with an estimated 390 million infections annually and nearly 3.9 billion people at risk. Over the past two decades, incidence has increased ten-fold, driven by climate change, urbanization, population growth, and intensified global mobility. Recent autochthonous transmission in Europe and recurrent large-scale outbreaks in Southeast Asia highlight the expanding geographic footprint of dengue and the urgent need for strengthened surveillance and preparedness.

All four dengue virus (DENV) serotypes co-circulate in endemic regions, with shifting genotype dynamics contributing to outbreak severity. In Vietnam, a five-fold increase in cases during the 2022 outbreak was associated with DENV-1 and DENV-2 dominance and genotype replacement of DENV-2 (Asian I to Cosmopolitan). Secondary infections and pre-existing flavivirus immunity were strongly associated with severe clinical outcomes, while extensive IgG cross-reactivity with other flaviviruses (e.g., JEV, WNV, TBEV) complicated serological diagnosis.

Diagnostic limitations remain a major challenge, particularly in resource-constrained settings. Comparative evaluation of molecular and serological assays demonstrated variable sensitivity across serotypes, and clinical misclassification was frequent without confirmatory testing. Host biomarker profiling identified soluble delta-like ligand 1 (sDLL1) as a predictor of bleeding complications and neutrophil-to-lymphocyte ratio (NLR) as a correlate of prolonged hospitalization. Machine-learning approaches further highlighted hepatocyte growth factor (HGF) and TNF- β as robust predictors for dengue severity stratification independent of demographic factors.

Given the absence of specific antiviral therapy and the complexity of immune-mediated pathogenesis, an integrated strategy combining robust surveillance, improved diagnostics, biomarker-guided triage, vaccination, and sustained vector control is essential. Addressing unresolved questions in flavivirus cross-reactivity, immune enhancement, and decentralized molecular testing will be critical to advancing equitable dengue management in both endemic and emerging settings.

Systematizing Animal Cell-based Biomanufacturing

Dr. Meiyappan Lakshmanan

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Abstract

Biotherapeutics are large complex drugs produced using live animal/human cells. Mammalian cells, particularly Chinese hamster Ovary (CHO) cells, are typically used as the hosts for manufacturing therapeutic proteins. The complexity of handling mammalian cells and the associated low productivity are the major reasons for the higher cost of biotherapeutic drugs. Therefore, their efficiency can be further enhanced at two different levels: 1) cell-line development and engineering, and 2) bioprocess development by designing optimal cell culture media and feeding. Over the years, I have adopted a multi-omics data-driven approach to achieve a deeper knowledge about the host cell lines, products and bioprocess variations. Apart from multi-omic data driven CHO cell line development, my group also use computational models, built based on first principles as well as statistics/ML to mathematically represent the CHO cell-based bioprocesses. We particularly build models representing the metabolism, post translational machinery and N-glycosylation and deploy these to design/develop cell culture media. We have been using these models to evaluate the effect of media additives such as polyamines, antioxidants and metal elements, and also to optimize cell culture media for industrial projects.

Based on my core experience in handling animal cell culture, we are also working on the cultivated meat as well. Cultivated meat (CM), also known as cellular agriculture. CM is explored globally as a potential source of alternative protein as it avoids the issues with animal farming such as animal cruelty and slaughter, greenhouse gas emissions, inefficient energy conversion to meats, highland requirements, competition for plants that can be also used for human consumption or other uses, etc. In the Indian context, chicken and goat meat occupy more than 90% of the total meat consumed. In my lab, we are establishing computational models representing the chicken and goat cellular metabolism, to effectively utilize them for cell culture media design/optimization and for bioprocess development, so that cultivated meat can be an economically viable option.

Chromatographic Techniques (GC, HPLC, UHPLC) and their Analytical Approaches in Food Analysis

Dr. K. Vatcharavelu

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Abstract

Chromatography technique is a standard technique used to separate, identify and quantify the individual compounds from mixture of food samples, and analyze the food compositions, food contaminations, pesticide residues etc. It is the relative technique where-in the known standards are required for quantification or by other methods such as Spectroscopy to confirm the unknown compounds in samples. The separation, identification and quantification of unknown compounds in a mixture is very crucial process of the Chromatographic techniques. Hence, the understanding of individual modules / components of Chromatography Instruments such as Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Ultra High Performance Liquid Chromatography (UHPLC) is very essential for the researchers / analysts working in academic, research institutions and food industries. Thereby the researchers develop the confidence of handling such sophisticated instruments independently by setting the instruments, performing the basic maintenance, carrying out trouble-free analysis and generation of reliable and accurate analytical data as outcome of the analysis.

The presentation focuses mainly on principles of operation of GC and LC, chromatography separation process, systematic practices during the analysis of samples. Various injection methods, analytical columns, detectors used in GC and LC for different applications in food, especially the modern techniques such as Evaporative Light Scattering Detector (ELSD) and Photodiode Array (PDA) used in LC would be explained. An Illustrative example of standard quantification method adopted in GC and LC analysis to minimize the error in analytical results. The Mass Spectrometer is one of the detectors interfaced to the Chromatography instruments, to identify the compounds based on the molecular weight without the need of standards as an advance technique would be highlighted during the presentation.

Natural Disaster Modelling: Drought Severity

Dr. Sanjeewa Perera

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Drought has emerged as one of the most pressing global environmental challenges, intensifying in both frequency and severity under the influence of climate change. Accurate identification and characterization of drought conditions therefore require analytical frameworks that move beyond precipitation-only indicators and capture the complex interactions among key meteorological variables. In this talk, we present an enhanced drought assessment approach that extends the widely used Standardized Precipitation Index (SPI) by integrating ground temperature data through a copula-based statistical framework.

The proposed methodology explicitly models the dependence structure between precipitation deficits and temperature anomalies, enabling a joint assessment of their combined influence on drought development. By incorporating copulas, the approach effectively captures non-linear dependencies and joint extremes, providing a more comprehensive representation of drought severity. The resulting composite metric evaluates both the intensity and persistence of drought events, offering deeper insight into how prolonged low rainfall coupled with elevated temperatures amplifies drought impacts.

The applicability of the proposed index is demonstrated using data from the major paddy cultivation regions of Sri Lanka, where agricultural productivity is highly sensitive to water stress and thermal conditions. The metric is calibrated and validated against historical drought records to ensure robustness and practical relevance. A comparative analysis with the traditional SPI highlights the advantages of the copula-based framework in identifying severe and prolonged drought episodes that may be underestimated by precipitation-only indices.

Overall, this study underscores the value of multivariate, dependence-based drought metrics for improved drought monitoring and risk assessment. The findings have important implications for agricultural planning, water resource management, and the development of adaptive strategies to mitigate the impacts of future droughts under a changing climate.

Keywords: Drought, Model, Copulas, SPI

Intelligent Mobile Robot Navigation for Warehouse Automation

Dr. Julius Fusic

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This presentation discuss a comprehensive MATLAB-based path planning system for autonomous mobile robots (AMR) with additional trailer attachments operating in industrial warehouse environment. The system features a professional GUI that enables real-time comparison of 10 different path planning algorithms, integrated 3D simulation, and assess various sub station points and its capabilities.

Integrated 3D visualization system featuring realistic robot chassis (0.8m × 0.6m), attached trailer (1.2m length), multiple camera perspectives, and smooth interpolated motion along planned paths. Dynamic obstacle regeneration maintaining station positions, path clearing without environment reset, and support for custom map upload with user-defined start/goal points were discussed.

AI Everywhere: The Convergence of Voice, Vision, Language, and Machines

Mrs. Vimala Lourduraj

Founder, EverAppTech Solutions, Madurai



Multimodal LLMs (MLLMs) are becoming more and more common. They take multiple input types – text, audio, video, images, and data inputs like sensor inputs – and process them in the way humans process. What is more interesting is that the output can also be text, audio, video, and images. MLLMs have given immense power to machines to be like humans. On the one hand, AI models that are able to do programming are mind-blowing; on the other hand, AI models’ ability to accept multiple modalities will help to realize more human-like applications.

Many interesting use cases can be realized because of this multimodal functionality. As described in Google’s list of use cases, for example, Google’s multimodal model, Gemini, can receive a photo of a plate of cookies and generate a written recipe as a response, and vice versa.

Almost all the LLM models available as services (such as Anthropic’s Claude and Google’s Gemini) support multimodality.

Let’s go through what happens during multimodal processing. When an MLLM is asked to answer a question about an image, the image’s features are extracted and encoded into some numerical form; i.e., modality-specific transformation happens. Second, a projection layer maps these modality-specific embeddings into a shared representational space, ensuring that features from text, images, and audio can interact meaningfully. Third, a fusion mechanism integrates the aligned embeddings. Finally, a multimodal output decoder converts the fused representations back into the desired output modality.

MLLM is not without challenges. The inference is computationally very demanding in terms of time, memory, and computational power. It is also prone to hallucinations. In spite of the challenges, continued research will enable machines to roll out significant use cases for humans with their innate human-like capacity.

From Intuition to Intelligence: Applications of Artificial Intelligence in Entrepreneurship Development

Prof. Nagalingam Nagendrakumar

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Sri Lanka Institute of Information Technology, Sri Lanka



Abstract

Entrepreneurship is undergoing a fundamental shift as Artificial Intelligence (AI) moves from a peripheral technology to a central driver of business decision-making. This plenary talk presents AI not as a buzzword, but as a practical and strategic ally that transforms how entrepreneurs discover markets, understand customers, manage operations, and scale sustainably. Through real-world illustrations—from small kirana shops and Micro, Small, and Medium Enterprises (MSMEs) to global digital platforms—the discussion highlights how AI enables entrepreneurs to move beyond intuition toward data-driven strategy. AI-powered market discovery reduces guesswork, customer personalization enhances experience and loyalty, intelligent automation restores time for vision, and predictive financial tools help entrepreneurs anticipate risk rather than react to failure. The narrative emphasizes that geography is no longer destiny and that intelligence has become the new form of capital, particularly for entrepreneurs in emerging regions such as Tamil Nadu. Beyond efficiency and growth, the talk points out responsible AI adoption, underscoring ethics, trust, transparency, and human-centered design as essential foundations for long-term success. Ultimately, the future of entrepreneurship is framed not as humans versus machines, but as human creativity amplified by machine intelligence—lowering barriers, expanding access, and enabling bold, inclusive, and sustainable enterprise creation.

Keywords: Artificial Intelligence, Customer Personalization, Entrepreneurship Development, MSME Responsible Innovation, Sustainability

Positive Psychology

Prof. R. Subhashini

Dean, Madras School of Social Work (MSSW), Chennai



This presentation proposes a transformative framework built on three interconnected principles: Innovate, Integrate, and Impact. Moving beyond rhetoric, it argues that meaningful change requires a dynamic progression from creative thought to collaborative implementation and measurable societal outcomes. Drawing on insights from Francis Bacon, Rudyard Kipling, M.S. Swaminathan, and Jawaharlal Nehru, it emphasises application, systems thinking, and ethical evaluation. Sustainable progress emerges when innovation is integrated effectively and validated through real, lasting impact.

Keywords: Innovation; Integration; Impact; Systems Thinking; Sustainable Transformation

Interdisciplinary Perspectives on Human Meaning-Making, Markets, and Social Transformation

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Trincomalee Campus of the Eastern University, Sri Lanka*



This paper examines the contemporary technological wave—marked by Artificial Intelligence and converging deep technologies—through interdisciplinary lenses of philosophy, economics, ecology, and the humanities. Moving beyond viewing AI as a mere tool, it interrogates its agency, autonomy, and disruptive impact on labour, markets, and social structures. Drawing from historical technological shifts—from the printing press to the digital revolution—and invoking thinkers like Samuel P. Huntington and M. K. Gandhi, the presentation critiques capital-driven development, rising inequality, and ecological risk. It advocates humane governance, democratized control of resources, and revitalized humanities education to re-anchor meaning-making and social transformation in ethical, inclusive, and community-centred paradigms.

Keywords: Artificial Intelligence; Capitalism; Human Meaning-Making; Ecological Justice; Social Transformation

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PREPARATION AND CHARACTERIZATION OF FE-DOPED ZnO THIN FILMS FOR ITS GAS SENSING APPLICATIONS

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ABSTRACT

The fabrication and characterization of transparent conductive Zinc oxide (ZnO) and Fe doped ZnO films were prepared by the spin coating technique, with the objective of enhancing the gas sensing properties of ZnO. by varying the concentrations of Fe doping. In the present extended investigations the structural, morphological, and compositional analyses were done using X-ray diffraction (XRD), Fourier Transform Infrared (FTIR) Spectroscopy, and UV Analysis.

The sharp Bragg diffraction peaks indicating that the fabricated Fe doped ZnO film undergoes a structural transition from highly crystalline to amorphous. The absence of any secondary phase peaks, within these amorphous patterns suggests that the Fe ions are uniformly dispersed throughout the non-crystalline ZnO matrix. The prominent absorption around 470 cm^{-1} represents Zn-O stretching vibrations, confirming the wurtzite structure of ZnO. The shifts slightly toward higher wavenumbers ($480\text{--}495\text{ cm}^{-1}$) in Fe-doped samples, suggesting successful substitution of smaller Fe^{3+} ions (0.64 \AA) for Zn^{2+} ions (0.74 \AA). This blue shift indicates lattice contraction and stronger Zn-O-Fe bond interactions.

The study also investigated the influence of Fe doping concentration on the gas sensing performance. The gas sensing performance to Ammonia was studied thoroughly in a temperature-controlled test chamber. The response intensity increases systematically with increasing gas concentration from 50 to 250 ppm. This demonstrates the sensor's concentration-dependent sensitivity to ammonia. Fe^{3+} ions can act as electron acceptors, modifying the local electronic environment and enhancing the overall sensing response. The 5% Fe-ZnO film shows an even higher current response with well-defined peaks at all tested ammonia concentrations indicating an optimal dopant level where Fe incorporation maximally enhances surface reactivity and charge transfer. Its fast response-recovery time demonstrating good reversibility and repeatability, suggesting a promising avenue for the development of customized gas sensors.

Keywords: *Transparent conductive Fe doped Zinc oxide, doping concentration, Gas sensing performance, Response-recovery time*

PSOP2

INSIGHTS INTO THE STRUCTURAL PHASE TRANSITION OF Bi: HoFe₃(BO₃)₄ FROM CHARGE DENSITY DISTRIBUTION

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ABSTRACT

The temperature-driven phase transition of Bi-doped HoFe₃(BO₃)₄ strongly influences its structural and electronic properties. A transition from the trigonal primitive space group to the rhombohedral R3₂ symmetry is observed around 365 K, as determined from single-crystal X-ray diffraction data. Charge density distributions reconstructed using the Maximum Entropy Method (MEM), along with their two-dimensional and one-dimensional density maps and basin integration analyses, support the occurrence of this phase transition. The evolution of the structure and charge density with respect to temperature is clearly reflected in the three-dimensional (3D), two-dimensional (2D), and one-dimensional (1D) charge density maps. Bonding characteristics across different symmetries during the phase transition are well documented by examining the (3, -1) critical points. This study highlights modifications in the nature of atomic bonding within the crystal structure during the phase transition, offering deeper insight into the microscopic mechanisms underlying the transformation.

Keywords: *Charge density, phase transition, multipole model, MEM model.*

PSOP3

RTOS-BASED MULTI-SENSOR ACCIDENT DETECTION AND EMERGENCY ALERT SYSTEM USING ESP-32

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ABSTRACT

Road accidents require immediate detection and rapid emergency response to reduce fatality rates. This paper presents the design and implementation of a Real-Time Operating System (RTOS)-based accident detection and alert system using the ESP32 microcontroller. The system integrates a gyroscope and accelerometer module to continuously monitor motion parameters such as angular velocity and linear acceleration.

Abnormal readings caused by sudden impact, collision, or vehicle rollover are identified using predefined threshold analysis. In conventional methods, the loop typically reads sensors, processes data, and updates actuators in a set order, offering deterministic, and delayed behaviour. The present proposed system employs an RTOS architecture to achieve deterministic task scheduling and priority-based execution. Separate real-time tasks are allocated for sensor data acquisition, motion analysis, accident decision processing, and GSM communication. This structured multitasking approach improves response time, enhances reliability, and ensures stable performance during concurrent operations. Upon detecting an accident, the integrated GSM module automatically transmits an emergency alert message to predefined contacts. Experimental validation confirms a computing network or system with minimal delay between a user's input and the corresponding response, efficient resource utilization, and reliable real-time performance. The proposed system provides a scalable and cost-effective solution for intelligent transportation safety.

Keywords: *Real-Time Operating System (RTOS), ESP32 Microcontroller, Accident Detection System, Embedded Systems, GSM-Based Emergency Communication*

PSOP4

AN ANALYTICAL INVESTIGATION OF SPATIAL FILTERING TECHNIQUES ACROSS DIVERSE OBJECTS AND WITH ITS APPLICATION IN CANCER CLASSIFICATION

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ABSTRACT

This project explores the use of spatial filtering methods in image processing for enhancing diagnostic accuracy in cancer detection. Spatial filtering, a fundamental operation in digital image processing, is widely used for noise reduction, edge enhancement, and feature extraction. In this study, various spatial filtering techniques such as low-pass filters, high-pass filters, Laplacian filters are analytically investigated for their effectiveness in extracting meaningful features from medical images. The project first evaluates these filters across a range of standard test images and object structures to understand their behaviour in enhancing image characteristics like edges, contrast, and textures. The filters are then applied to histo pathological and radiological cancer image datasets, with a focus on detecting and classifying abnormal regions.

The results demonstrate that specific combinations of spatial filters significantly improve the clarity and diagnostic relevance of cancerous patterns, thereby enhancing classification accuracy. This study concludes that the intelligent integration of spatial filtering in the pre processing pipeline can substantially aid in early cancer detection and pave the way for improved computer-aided diagnostic systems.

Keywords: *Optics, Spatial Filtering, Cancer Classification, Machine Learning.*

PSOP5

SYNERGISTIC ENHANCEMENT OF VISIBLE-LIGHT PHOTOCATALYTIC DYE DEGRADATION USING CNT-INTEGRATED Sr-DOPED ZnO NANOCOMPOSITES

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ABSTRACT

In the present work, pure ZnO, Sr-doped ZnO, and CNT-integrated Sr-ZnO nanocomposites were synthesized via co-precipitation method followed by mechanical ball milling. The prepared samples were systematically characterized to investigate their structural, optical, and morphological properties. X-ray diffraction (XRD) analysis confirmed the formation of a single-phase hexagonal wurtzite ZnO structure in all samples, with slight peak shifts in Sr-doped ZnO indicating successful substitution of Sr²⁺ ions into the ZnO lattice. Fourier Transform Infrared (FTIR) spectroscopy verified the presence of Zn–O stretching vibrations and confirmed the incorporation of CNTs within the composite system.

UV-Visible Diffuse Reflectance Spectroscopy (UV-DRS) revealed a noticeable red shift in the absorption edge upon Sr doping and CNT integration. The estimated optical band gap decreased from 3.4 eV for pure ZnO to 3.2 eV for Sr-ZnO and further to 2.2 eV for CNT-Sr-ZnO, demonstrating enhanced visible-light absorption. Photoluminescence (PL) studies showed reduced emission intensity in the CNT-Sr-ZnO sample, indicating effective suppression of electron-hole recombination. Scanning Electron Microscopy (SEM) analysis revealed improved particle dispersion and strong interfacial contact between CNTs and Sr-ZnO nanoparticles.

The photocatalytic activity of the synthesized materials was evaluated through the degradation of methylene blue (MB) under visible-light irradiation. Among the prepared samples, the CNT-Sr-ZnO nanocomposite exhibited the highest photocatalytic efficiency due to enhanced light absorption, improved charge separation, and increased surface-active sites.

The synergistic effect of Sr-induced defect formation and CNT-mediated electron transport significantly improved the visible-light-driven photocatalytic performance. These results suggest that CNT-integrated Sr-doped ZnO nanocomposites are promising materials for efficient and sustainable wastewater treatment applications.

Keywords: *ZnO nanocomposites, Sr doping, Carbon nanotubes, Visible-light photocatalysis, Band gap narrowing, Methylene blue degradation.*

PSOP6

NISE AS EFFICIENT NON-NOBLE-METAL BIFUNCTIONAL ELECTROCATALYST FOR HER AND OER APPLICATIONS

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ABSTRACT

The efficient production of hydrogen via the electrocatalytic splitting of water has recently attracted considerable attention. Even though low-cost effective electrocatalysts remain a significant challenge for scalable hydrogen production. Here we synthesize the Nickel selenide (NiSe) via the hydrothermal method that can acts as a bifunctional electrocatalyst under alkaline conditions to split water at very low potential by catalyzing both hydrogen evolution reaction and oxygen evolution reaction at cathode and anode, respectively. Nickel serves as a primary active center, providing numerous edge sites for adsorbing reactions like H^* , OH^* and OOH^* . Nickel optimizes H^* adsorption energy in hydrogen evolution reaction. Selenium enhances the electrical conductivity due to its metallic behavior and narrow bandgap. Also, selenium acts to improve conductivity, surface effect and stability for both HER and OER. Nickel selenide is a highly efficient, non-precious bifunctional electrocatalyst for overall water splitting, with activity comparable to that of precious-metal electrocatalysts.

Keywords: *Efficient electrocatalyst, HER, Overall Water splitting.*

PSOP7

SIMULATION OF MICROWAVE BROADBAND METAMATERIAL ABSORBER

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ABSTRACT

A wideband meta material absorber covering the C, X, Ku and K bands is designed and numerically simulated. The proposed structure consists of patterned metallic resonators printed on FR-4 dielectric substrates arranged in a multilayer configuration, backed by a continuous metal ground plane. Two different resonator geometries are incorporated in each layer to enhance the absorption bandwidth. The unit cell has dimensions of $12.5 \times 12.5 \text{ mm}^2$ with an overall thickness of 8.7 mm.

Simulation results show that the proposed absorber achieves greater than 90% absorptivity over a broad frequency range from 4 GHz to 28 GHz, also the reflection reduction rate in more than 10dB, The absorption mechanism is analysed using an equivalent circuit model based on lumped RLC elements, which explains the resonance characteristics and impedance matching behaviour.

Due to its wideband and high-efficiency performance, the proposed absorber is a promising candidate for applications such as radar cross-section (RCS) reduction, stealth technology, antenna performance enhancement, electromagnetic interference (EMI) suppression, electromagnetic compatibility (EMC) improvement, microwave shielding, wireless communication systems, aerospace and defence electronics protection, and high-frequency sensing applications.

Keywords: *Dielectric Substrates, Impedance Matching Behaviour, radar cross-section (RCS) reduction, Microwave Shielding*

PSOP8

QUANTUM CHEMICAL INVESTIGATIONS AND MOLECULAR DOCKING STUDIES OF QUINOLINE DERIVATIVES

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ABSTRACT

Quinoline derivatives are important heterocyclic aromatic compound with broad applications in medicinal chemistry, coordination chemistry, and materials science.

In this study, density functional theory (DFT) calculations were performed to investigate the structural stability and electronic properties of substituted quinoline derivatives: 4-hydroxy-trifluoromethylquinoline-2-carboxylic acid, 2-ethyl-4-hydroxy-8quinoline-3-carboxylic acid, 5-fluoro-4-hydroxy-8-quinoline-3-carboxylic acid, 6-bromo-4-hydroxy-8-quinoline-3-carboxylic acid, and 5-bromo-4-hydroxy-8-quinoline-3-carboxylic acid. All the molecular geometries were optimized using the B3LYP/6-311-G(d,p) basis set within the Gaussian 09 package. The energy gap can be calculated from HOMO – LUMO energy levels. The calculated energy gap values are 4.50 eV, 4.39 eV, 4.30 eV, 4.33 eV (6-bromo derivative), and 4.32 eV (5-bromo derivative). The molecular electrostatic potential surface and Mulliken atomic charges reveal the charge transfer interactions in the molecule. The molecular docking analysis was carried out to explore the inhibitory nature of the Quinoline molecule against lung cancer causing VEGF receptor.

Keywords: *Quinoline, DFT, FMO analysis, Molecular docking*

PSOP9

MULTI PARAMETER SIMULATION STUDY ABOUT ACCRETION DISK AROUND ROTATING BLACK HOLE

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ABSTRACT

The Black holes are region of space-time curvature region where escape speed velocity exceed the Speed of Light (c). Depending upon the black hole (spin and mass) and interstellar environment, accretion disk around black hole evolves differently along time with the properties of the surrounding magnetized plasma, the resulting accretion disks evolve into complex structures. This research project aims to investigate the evolution of accretion disks around rotating (Kerr) black holes through the framework of General Relativistic Magneto hydrodynamics (GRMHD). The primary computational tool utilized for this study is the Black Hole Accretion Code (BHAC). As initial simulations were performed on non-rotating (Schwarzschild) Black Holes, while contemporary astrophysical observations suggest that nearly all black holes possess at least a minimal rate of spin due to the conservation of angular momentum during stellar collapse. This study focuses on the Kerr black hole, the super massive black hole at the centre of the M87 galaxy as the primary subject. Utilizing the Kerr space time, we simulate the long-term evolution of the accretion flow to observe the dynamical variations in key physical quantities: plasma density, gas pressure, magnetic flux, and the Lorentz factor (γ).

A significant aspect of this project is the temporal analysis of these variables over a simulated period equivalent to 10 years. This duration allows for the observation of the Magneto-rotational Instability (MRI) as it saturates and drives the turbulent transport of angular momentum.

Keywords: BHAC, GRMHD, Kerr and Schwarzschild Black Hole, MRI

PCSOP10

PALLADIUM-CATALYZED FORMAL [3+2] CYCLOADDITION TO UNLOCK THE STEREOSELECTIVE ASSEMBLY OF SPIROCYCLOPENTANE-2-OXINDOLE FUSED CHROMANONES

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ABSTRACT

We reported a novel and efficient strategy for the synthesis of Spirocyclopentane-2-oxindole frameworks. This synthetic protocol is a Pd-catalyzed [3+2] cycloaddition strategy between spirovinylcyclopropyl-2-oxindoles and coumarins, enabling the efficient synthesis of spirooxindole-fused cyclopentanechromanone. The protocol, optimized with inexpensive 2,2'-bipyridyl ligand and green solvent EtOH, delivers products up to 97% yield and >99:1 diastereoselectivity, constructing architectures with four continuous stereocenters. The methodology demonstrates broad substrate scope, functional group tolerance and scalability to gram quantities. Structural elucidation by single-crystal X-ray crystallography confirmed stereochemical outcomes. Furthermore, asymmetric variants using BiOx ligands achieved promising enantioselectivity, while downstream synthetic transformations highlight the versatility of the cycloadducts. This work establishes a robust and sustainable annulation platform for accessing metabolically stable, nonplanar spirocyclic frameworks and has potential applications in drug discovery and natural product synthesis.

Keywords: cycloaddition, coumarins, enantioselectivity, drug discovery, bipyridyl ligand

PSOP11

SODIUM LAURYL ETHER SULPHATE SOLUTION (SLES) AN ANIONIC SURFACTANT AS CORROSION INHIBITION OF CARBON STEEL SURFACE

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ABSTRACT

The present study deals with the corrosion inhibition of carbon steel in ground water by a natural surfactant Sodium Lauryl Ether Sulphate. The corrosion inhibition action of Sodium Lauryl Ether Sulphate in combination with zinc sulphate on the deterioration of carbon steel in bore well water have been studied by mass loss method. The formation of Sodium Lauryl Ether Sulphate protective coating on the metal surface have been studied by UV-Visible, Fluorescence and IR spectroscopic methods, The type of shielding of the metal surface have been established by Impedance and Tafel studies. The results propose that Sodium Lauryl Ether Sulphate can essentially be used as a green corrosion inhibitor for dropping rate of corrosion of mild steel dipped in bore well water.

Keywords: *Sodium Lauryl Ether Sulphate, Zinc sulphate, Carbon steel, Impedance and Tafel studies*

PSOP12

SODIUM PHOSPHORE FLUORIDATE SOLUTION (SPF) AN ANIONIC SURFACTANT AS CORROSION INHIBITION OF CARBON STEEL SURFACE

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ABSTRACT

The present study deals with the corrosion inhibition of carbon steel in ground water by a natural surfactant Sodium phosphore flouridate. The corrosion inhibition action of Sodium phosphore flouridate in combination with zinc sulphate on the deterioration of carbon steel in bore well water have been studied by mass loss method. The formation of Sodium phosphore flouridate protective coating on the metal surface have been studied by UV visible, Fluorescence and IR spectroscopic methods.

The type of shielding of the metal surface have been established by Impedance and Tafel studies. The results propose that Sodium phosphore flouridate can essentially be used as a green corrosion inhibitor for dropping rate of corrosion of mild steel dipped in bore well water.

Keywords: *Sodium phosphore flouridate, zinc sulphate, carbon steel, Impedance and Tafel studies*

BSOP1

ASSESSMENT OF LECTIN ACTIVITY UNDER THE INFLUENCE OF VARIOUS EXPERIMENTAL CONDITIONS IN THE GRUB SERUM OF DARKLING BEETLE, *ZOPHOBASMORIO*

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ABSTRACT

The efficient innate immune system makes the insects evolutionarily successful group of organism on earth. Lectins, in addition to their well-known role in the immune system, also play a significant part in the physiological functions of insects. In this study, we have explored the physiological impact on lectin in *Zophobas morio* under various treatment conditions, including temperature, starvation, ligation, and pyriproxyfen treatment through hemagglutination (HA) and gene expression studies. The starvation group and heat shock treatment group showed the highest HA titer values at both 24 and 48 hours. Also, a noticeable increase in HA titer was documented after successive hours of the pyriproxyfen treatment. HA inhibition assay of serum lectin using D-fucose and lactose (200 mM) showed a reduction in lectin concentration in certain treatments due to the imposed stress conditions, while in other cases, the treatment totally reduced the binding capacity of lectin to the carbohydrates. The protein profile of crude grub serum of *Z. morio* across various treatment groups was performed under the denaturing conditions (12% SDS-PAGE). A considerable increase in the concentration of D-fucose binding lectin sub units was observed in comparison to the control. The RT-qPCR results revealed that the highest expression of lectin was observed in the fat body of 25 µg pyriproxyfen and heat shock treatment groups in comparison to the control. Understanding the physiological role of lectin in the various treatment conditions paves the way to new pest management strategies in the future.

Keywords: *Zophobas morio, lectin, D-fucose, treatment, expression, pest management*

EVALUATION OF LARVICIDAL POTENTIAL OF SELECTED MEDICINAL PLANTS AND SEAWEEDS FOR THE CONTROL OF THE DENGUE VECTOR *Aedes Aegypti*(L.)

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ABSTRACT

Mosquito-borne diseases remain a major global public health concern, demanding eco-friendly control measures. The objective of the present study was to evaluate the larvicidal efficacy of selected medicinal plants (*Phyllanthus amarus*, *Sterculia foetida* and *Aegle marmelos*) and seaweeds (*Turbinaria ornata* and *Sargassum wightii*) against *Aedes aegypti*. Among the tested samples, the hexane extract of *A. marmelos* exhibited the highest larvicidal activity, causing 100% mortality, followed by ethyl acetate (80.67%) and methanol (62.45%) extracts. *P. amarus* showed moderate activity, whereas the remaining plant and seaweed extracts showed minimal to no effect. Probit analysis of the hexane extract of *A. marmelos* revealed LC₅₀ and LC₉₀ values of 401.55 and 638.49 ppm, respectively. Based on the preliminary screening, the hexane extract of *A. marmelos* was subjected to further fractionation. A total of forty fractions were obtained and pooled into thirteen fractions based on their TLC profiles, which were subsequently evaluated for larvicidal activity. Among these, fractions 5 and 6 showed significant toxicity against *Ae. aegypti* larvae. Phytochemical screening of the hexane extract revealed the presence of bioactive secondary metabolites such as steroids, coumarins, glycosides, terpenoids, and quinones. Biochemical analysis indicated a significant reduction in protein content in treated larvae compared to controls. Carboxylesterase enzyme assays showed elevated α - and β -carboxylesterase activity, indicating metabolic stress. Histopathological examination revealed severe midgut epithelial damage and vacuolization, leading to larval death. GC-MS analysis of fraction 5 revealed six potential bioactive compounds. The results suggest that *A. marmelos* is a promising plant-based larvicidal agent.

Keywords: *Aedes aegypti*, *Aegle marmelos*, hexane extract, bioactive compounds, larvicidal activity

BSOP3

MOLECULAR AND INSILICO INVESTIGATION OF GALECTIN-8 FROM *ORYCTES RHINOCEROS* AND ITS ANTIVIRAL ACTIVITY AGAINST DENGUE VIRUS

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ABSTRACT

Galectin-8 expression in various tissues of the grub of *Oryctes rhinoceros* was assessed and characterised using molecular and *insilico* analyses. The higher level of expression of galectin-8, analysed through RT-qPCR, was reported in the fat body and hemocytes. Amplification, sequencing, prediction of amino acid sequence, identification of functional domains, N-glycosylation sites and phylogenetic analysis for galectin-8 with related species of insects were carried out to confirm its molecular nature. The homology modelling and structure prediction of galectin-8 were then done and validated. Molecular docking of galectin-8 with the specific ligand lactose revealed a binding energy of -8.5 kcal/mol, which was then subjected to molecular dynamics simulation. Both analyses disclosed the precise binding of lactose to galectin-8 from *O. rhinoceros*. The conceivable antiviral property was later verified by protein-protein docking between galectin-8 and dengue viral non-structural proteins (NS1 and NS5). This study confirmed that galectin-8 is a multifaceted molecule with roles in cellular activities and immunity.

Keywords: *Oryctes rhinoceros*, galectin-8, molecular characterization, *insilico* analyses, antiviral activity

BSOP4

THE RISE IN INCIDENCE OF VECTOR-BORNE DISEASES IN INDIA: PERSPECTIVES AND PREVENTION

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ABSTRACT

Vector-borne diseases (VBDs), including malaria, dengue, chikungunya, and Japanese encephalitis, continue to pose a significant public health challenge in India, accounting for a substantial portion of the global disease burden.

Recent data indicates a concerning surge in the incidence of certain VBDs, most notably dengue and chikungunya, alongside regional outbreaks of emerging threats like the Chandipura virus. This rise is primarily driven by a complex interplay of rapid, unplanned urbanization, high population density, and inadequate waste and water management systems. Furthermore, climate change – characterized by erratic rainfall patterns and rising temperatures – has expanded the geographical range and breeding windows for vectors such as *Aedes aegypti* and Anopheles mosquitoes. From a preventive perspective, India has shifted toward a more integrated and technology-driven approach under the National Center for Vector Borne Diseases Control (NCVBDC). Current strategies emphasize Integrated Vector Management (IVM), which combines traditional methods like Indoor Residual Spraying (IRS) and Long-Lasting Insecticidal Nets (LLINs) with innovative tools such as GIS-based mapping, AI-driven outbreak prediction, and biological controls like larvivorous fish. Despite successes in moving toward the elimination of visceral leishmaniasis and lymphatic filariasis, maintaining momentum requires strengthening community-led sanitation drives and enhancing primary healthcare surveillance. This paper evaluates the socio-ecological drivers of VBDs in India and advocates for a multifaceted prevention framework that integrates climate-resilient urban planning with robust public-private partnerships to mitigate future epidemics.

Keywords: *Vector-borne diseases, Public health, India, Climate change, Integrated Vector Management (IVM), Urbanization*

BSOP5

GREEN SUPPLY CHAIN MANAGEMENT IN HEALTHCARE SECTOR

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ABSTRACT

Green supply chain management (GSCM) is an environmental sustainable environmental process built into conventional supply chains. The aim of this management process is to reduce the impact of factors such as pollutants, ozone depletion and global warming affecting the environment. It incorporates the principle of 4R1D (reduce, reuse, recycle, reclaim and degradable). The healthcare sector is one of the significant sources to global greenhouse gas emissions and medical waste. Thus, it is necessary to make sustainability a critical concern. GSCM involves green logistics, supplier collaboration, sustainable product life cycles, energy management, and waste reduction.

Strategies such as circular supply chains, green procurement, eco-friendly healthcare design, collaboration with regulatory bodies, and sustainability training enhance sustainability. Despite its importance, additional research is required to better understand the financial impact of adopting GSCM in healthcare settings and its direct or indirect effect on organizational profitability. The implementation of GSCM is guided by reactive, proactive, and value-seeking approaches, which balance environmental objectives with financial priorities. Integrating AI into Green Supply Chain Management (GSCM) enhances sustainability by optimizing logistics, reducing waste, and improving decisions. AI enables reactive compliance, proactive resource planning, and value-seeking financial assessments. This empowers the healthcare sector to achieve eco-friendly, efficient, and cost-effective supply chains.

Keywords: *Green supply chain management, Sustainable environmental process, 4R1D, medical waste.*

BSOP6

STUDIES ON QUALITY OF HONEY OF STINGLESS BEE

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ABSTRACT

Honey bees are essential pollinators that play a critical role in agricultural productivity, biodiversity conservation, and ecosystem stability. Belonging to the family Apidae, honey bees and stingless bees contribute significantly to pollination and honey production, particularly in tropical and subtropical regions. Honey has been traditionally valued for its nutritional, medicinal, preservative, and therapeutic properties since ancient civilizations, including India, Egypt, China, and Greece. With the rise of antibiotic-resistant pathogens, honey has regained importance as a natural, non-toxic antibacterial agent. Stingless bee honey, distinct from Apis honey in its physicochemical and sensorial properties, is highly valued for its medicinal applications. In India, species such as *Tetragonula iridipennis* play a vital ecological role despite producing smaller quantities of honey. The quality of honey depends on floral sources, environmental conditions, and beekeeping practices, and is determined by parameters such as pH, moisture content, sugar composition, acidity, enzymatic activity, and phenolic compounds. Various components of stingless bee honey was analysed.

Keywords: *Honey bees, Stingless bee, Beekeeping, Pollination*

BSOP7

STUDY ON MOTH DIVERSITY IN THE AMERICAN COLLEGE CAMPUS, TAMIL NADU

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ABSTRACT

Moths are used as biological indicators of biodiversity assessment of and documentations because they show sensitivity towards environmental changes due to their habitat. Moths are mainly phytophagous leaf feeder larval stage and some of the caterpillars also belong to other guilds such as detritivores of plant and animal material, flowers, fruit and seed predators, stem borer, lichen and alga browser and fungal feeders as well as insectivores. This study was carried out to generate base line data on moth diversity at The American college campus (latitude 9.929740 and longitude 78.132103). Moth diversity was recorded in five different moths, sampling of moth was carried out at the collection site using light traps board with the wings pinned and pulled forward. Mathematical indices of biological diversity were used to quantify diversity. A total of twenty-four species was recorded. Both micro and macro moths were recorded. The largest wing span among the records was Indian owl moth of the family *Erebidae* with the wing span of 130mm. The species belonged to the families *Arctidae*, *Erebidae*, *Crambidae*, *Geometridae*, *Noctuidae*, *Sphingidae*, *Eupterotidae*, *Limacodidae*, *Nolida*.

Keywords: Moth diversity, Biodiversity assessment, Indian owl moth, Phytophagous

BSOP8

DIGITAL MENTAL HEALTH ASSESSMENT FOR PSYCHIATRIC COMORBIDITY IN EPILEPSY: A CLINICAL VALIDATION STUDY

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ABSTRACT

Objectives: Cognitive symptoms, anxiety, and depression are psychiatric comorbidities frequently linked to epilepsy that negatively impact clinical results and quality of life. Despite their common occurrence, these illnesses are frequently underdiagnosed because of time constraints, a lack of specialists, and reliance on resource-intensive interviews.

This study aimed to verify a digital mental health screening instrument that promotes scalable, technology-assisted psychiatric care and ensures diagnostic integrity while detecting psychiatric comorbidities in patients with epilepsy. Methods: A digital mental health platform incorporating adaptive assessment algorithms and established psychometric measures was used to evaluate individuals with a confirmed diagnosis of epilepsy in this clinical validation study. Gold-standard structured clinical interviews were administered to each participant separately by qualified psychiatrists. Analysis was done on The diagnostic agreement, sensitivity, specificity, and accuracy between the clinical and digital evaluations were analyzed. To determine real-world application, feasibility and patient acceptability were assessed. Findings: The digital mental health evaluation showed excellent concordance with structured interviews conducted by clinicians in identifying frequent psychiatric comorbidities among people with epilepsy. Strong diagnostic performance across mood and anxiety disorders was demonstrated by sensitivity and specificity values. Patients embraced the digital method, which greatly shortened the assessment time and showed great promise for regular clinical use in the future. Summary: The validated digital assessment instrument provides a dependable and effective approach for screening psychiatric comorbidities in patients with epilepsy. Its integration into clinical practice may enhance early identification, enable scalable delivery of mental health care, and improve the management of epilepsy. While maintaining clinical standards. This strategy is beneficial for healthcare environments with low resources worldwide.

Keywords: *Epilepsy, Psychiatric Comorbidity, Digital Mental Health, Clinical Validation.*

BSOP9

EFFICACY OF JACKFRUIT SEED BASED LOZENGE IN THE MANAGEMENT OF XEROSTOMIA

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ABSTRACT

Xerostomia is a clinically significant oral condition characterized by persistent dryness of the mouth due to reduced salivary secretion, leading to impaired mastication, swallowing, speech, and increased susceptibility to oral infections and dental caries. The limitations of conventional salivary substitutes highlight the need for safe and functionally effective natural alternatives.

The present study aimed to formulate and evaluate a plant-based medicated hard lozenge incorporating jackfruit (*Artocarpusheterophyllus*) seed powder for xerostomia management. Shade-dried jackfruit seeds, including the white seed coat, were powdered and formulated with xylitol, stevia, and isomalt to obtain a sugar-free, non-cariogenic lozenge suitable for prolonged oral retention. Phytochemical screening confirmed the presence of phenolic compounds, saponins, carbohydrates, and free amino acids through characteristic colorimetric reactions. Proximate analysis revealed a moisture content of 10.85% and an ash value of 2.93%, indicating acceptable physicochemical properties of the seed powder. Analytical characterization using FTIR, UV-Visible spectrophotometry, and HPLC was performed to assess functional groups and analytical suitability. The formulated lozenges were further evaluated for hardness, swelling capacity, stability, and acceptability to determine mechanical strength and hydration potential. Cytotoxicity assessment using animal models is currently under investigation to establish biocompatibility. The findings suggest that jackfruit seed-based medicated hard lozenges possess promising functional characteristics and may serve as a natural formulation for xerostomia management.

Keywords: *Xerostomia, Jackfruit seed, Proximate analysis, Cytotoxicity, Oral mucosal hydration.*

BSOP10

INTEGRATED PHYTOCHEMICAL PROFILING, GREEN NANOFABRICATION, AND IN SILICO VALIDATION OF *CORALLOCARPUS EPIGAEUS* REVEALS POTENT COX-2-TARGETED ANTI-INFLAMMATORY AGENTS

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ABSTRACT

The present study provides an integrated evaluation of the methanolic leaf extract of *Corallocarpus epigaeus* through phytochemical profiling, biological assays, green nanotechnology, and in silico molecular docking approaches. Preliminary phytochemical screening confirmed the presence of alkaloids, flavonoids, phenols, tannins, steroids, cardiac glycosides, coumarins, saponins, and terpenoids. GC-MS analysis enabled the dereplication of twenty major metabolites, among which 1, 2-benzenedicarboxylic acid bis(2-methylpropyl) ester, phytol, hexadecanoic acid, neophytadiene, and squalene were identified as dominant constituents.

The methanolic leaf extract exhibited significant antibacterial activity, Antioxidant potential evaluated using DPPH and H₂O₂ scavenging assays demonstrated strong free-radical inhibition at 300 mg/L, comparable to ascorbic acid, with IC₅₀ values ranging between 149–150 mg/L. Anti-inflammatory activity assessed using heat-induced membrane stabilization, hypotonicity-induced human red blood cell membrane stabilization, and egg albumin denaturation assays revealed concentration-dependent inhibition. At 500 mg/L, the crude extract exhibited 71.9% membrane stabilization, 36% inhibition of hemolysis, and 59% inhibition of protein denaturation. To enhance biological efficacy, chitosan nanoparticles were green-synthesized using the methanolic leaf extract as a reducing and stabilizing agent. UV-visible spectroscopy confirmed nanoparticle formation with characteristic absorption peaks at 274 nm and 276 nm. FTIR analysis revealed functional groups associated with O-H, N-H, C=O, and amide linkages, indicating phytochemical–chitosan interactions that stabilized the nanoparticles. Ce-CsNPs demonstrated enhanced antibacterial activity. Additionally, Ce-CsNPs showed superior anti-inflammatory activity compared to the crude extract. In silico molecular docking studies of twenty phytochemicals against the catalytic sites of DNA gyrase, FabI, and β -lactamase suggests inhibition of bacterial DNA replication, fatty acid biosynthesis, and β -lactam resistance mechanisms-target proteins (PDB IDs: 5IWM, 1REV, 2HE3, and 6COX) revealed binding energies ranging from -2.8 to -7.8 kcal/mol. Among the evaluated ligands, squalene, diethyl phthalate, neophytadiene, and dibutyl phthalate exhibited strong binding affinity toward the COX-2 active site, suggesting their potential role as selective COX-2 inhibitors and providing a mechanistic basis for the observed in vitro anti-inflammatory effects. Overall, this integrated study demonstrates that *Corallocarpus epigaeus* methanolic leaf extract and its green-synthesized chitosan nanoparticles are promising sources of bioactive compounds with potent antibacterial, antioxidant, and anti-inflammatory properties, supporting their potential application in natural drug development and nanomedicine.

Keywords: Antibacterial, anti-oxidant, anti-inflammatory, *Corallocarpus epigaeus*, Chitosan, In-silico molecular docking, 6COX

BSOP11

EVALUATION OF *COCCULUS HIRSUTUS* LEAF AND FORMULATION OF A FUNCTIONAL CHEWABLE LOZENGE FOR XEROSTOMIA

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ABSTRACT

Xerostomia, or the subjective sensation of dry mouth, is a common condition arising from reduced salivary secretion or alterations in saliva composition. It significantly affects oral health, comfort, and quality of life. Conventional treatments often offer only temporary relief, highlighting the need for alternative therapies such as herbal nutraceuticals. The present study aims to evaluate the potential of *Cocculus hirsutus* leaf extract as a natural therapeutic agent for the management of xerostomia. This research investigates the analysis of dried *Cocculus hirsutus* leaves which underwent qualitative analyses including phytochemical screening, Fourier Transform Infrared Spectroscopy (FTIR), Ultraviolet Spectroscopy (UV) and High-Performance Liquid Chromatography (HPLC). Phytochemical screening indicated the presence of biologically active compounds such as phenols, flavonoids, terpenoids, saponins and tannins. FTIR analysis showed characteristic peaks corresponding to alcoholic hydroxyl group (O-H stretch), alkenyl (C=C stretch) and aliphatic bromo compounds (C-Br stretch), indicating the presence of hydroxyl, alkene and organohalogen compounds. HPLC analysis of the leaf extract at 254 nm revealed the presence of prominent peaks at varying retention times indicating the presence of isoquinoline alkaloids, which are reported to exhibit pharmacological activities that may contribute to salivary gland stimulation in xerostomia. Ongoing studies include cytotoxicity studies to evaluate the safety profile of the formulation and assessment of sialagogue activity in animal models to determine its effectiveness in stimulating salivary secretion. The findings of this study may provide scientific validation for the development of plant-based nutraceutical formulations for supportive management of xerostomia.

Keywords: *Cocculus hirsutus* (L.) W.Theob, Xerostomia, Cytotoxicity, Sialagogue activity, Chewable Lozenges

BSOP12

SPICE AND HERBAL JELLY DEVELOPMENT USING JAGGERY AS A NATURAL SWEETENER: A FUNCTIONAL CONFECTIONERY PRODUCT

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ABSTRACT

The present study aimed to develop a spice and herbal jelly using jaggery as a natural sweetener and agar-agar as a plant-based gelling agent. The formulation was standardized to maintain consistency in ingredient composition and processing conditions. Jaggery was used as a healthier alternative to refined sugar, while selected spices and herbal ingredients such as ginger, cinnamon, mint, and black pepper were incorporated to enhance flavour, functional properties, and antioxidant potential. The jelly was prepared by dissolving agar-agar at elevated temperature, followed by the addition of clarified jaggery syrup and controlled incorporation of spice extracts. Acid (lemon juice) was added at a lower temperature to avoid weakening of the gel network and to ensure proper gel setting. The developed jelly exhibited acceptable gel consistency, a dark brown colour, and a pleasant sweet-spicy flavour with mild herbal notes. The study demonstrates the feasibility of producing a functional confectionery product using traditional spices, herbs, and natural sweeteners, thereby supporting the development of clean-label and health-oriented food products.

Keywords: *Jaggery, Agar-agar, Ginger, Cinnamon, Mint, Black pepper, Functional confectionery, Natural ingredients*

BSOP13

VALUE-ADDED FUNCTIONAL CUBES FROM MEDICINAL SPICES AND NATURAL SWEETENERS

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ABSTRACT

Spice Enriched Cubes are a functional, ready-to-consume product developed using selected natural ingredients such as ginger, turmeric, cinnamon, black pepper, jaggery, and dates. The preparation process begins with the selection and cleaning of raw materials including spices and dates. The spices are lightly roasted for about 5 minutes to enhance aroma, reduce moisture, and improve flavour.

Roasting is followed by grinding to obtain a fine powder, ensuring uniform texture and proper blending. A binding syrup is prepared separately using jaggery, heated to 90–110°C for 8–12 minutes until a suitable syrup consistency is achieved. The ground spice mixture is then incorporated into the syrup at 60–70°C to preserve the bioactive compounds and natural flavour. The mixture is thoroughly blended to form a uniform dough-like mass. While still warm (40–50°C), the mass is moulded into cube shapes. The formed cubes are cooled either at room temperature (around 25°C for 30 minutes) or under refrigeration (4–8°C for 20–30 minutes) to achieve firmness and structural stability. Finally, the cubes are cut uniformly and packed in moisture-proof packaging materials. The product is rich in natural antioxidants and exhibits antimicrobial and antifungal properties due to the presence of bioactive compounds in spices. These cubes serve as convenient immunity-supporting supplements with extended shelf life and enhanced sensory appeal. The developed process ensures product safety, nutritional value, and consumer acceptability, making Spice Enriched Cubes a promising value-added functional food product.

Keywords: *Spice enriched cubes, functional food, immunity support, natural sweeteners, nutraceutical product.*

BSOP14

EFFECTS OF PUNICALAGIN AND RESVERATOL AGAINST CERVICAL CANCER

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ABSTRACT

Cervical cancer, primarily caused by persistent infection with high-risk human papillomavirus (HPV) types 16 and 18, remains a significant global health burden, especially in advanced stages. Conventional treatment modalities such as surgery, radiotherapy, and chemotherapy are widely used; however, recurrence, systemic toxicity, and chemoresistance limit their long-term effectiveness. These challenges necessitate the exploration of safer and more effective alternative or adjunct therapeutic strategies. Natural polyphenols such as resveratrol and punicalagin have emerged as promising multi-targeted anti-cancer agents.

Molecular docking (Auto Dock Vina) revealed a binding affinity of -4.1 kcal/mol for resveratrol, indicating moderate target interaction. In silico ADMET analysis demonstrated favorable drug-like properties for resveratrol (MW 228.24 g/mol, LogP 2.48, TPSA 60.69 Å²), high predicted GI absorption, BBB permeability, zero Lipinski violations, and acceptable bioavailability (0.55), with moderate water solubility.

Comparative docking with punicalagin also demonstrated effective binding within the active site, suggesting potential target engagement. Resveratrol and punicalagin suppresses HPV E6/E7 oncoproteins, restores p53/Rb tumor suppressor pathways, thereby inhibits STAT3 signaling, and modulates PI3K/Akt and NF- κ B pathways, leading to reduced proliferation and enhanced apoptosis. Collectively, molecular docking, ADMET profiling, and mechanistic evidence suggest that resveratrol and punicalagin may serve as a promising adjunctive therapeutic candidate for HPV-driven cervical cancer, warranting further experimental and clinical validation.

Keywords: *Cervical cancer, Resveratrol, Punicalagin, Molecular docking, ADMET analysis, E6/E7 oncoproteins, Apoptosis.*

BSOP15

INVESTIGATING THE EFFECTS OF TRABECTEDIN AS A POTENTIAL THERAPEUTIC AGENT AGAINST CERVICAL CANCER

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ABSTRACT

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. Cervical cancer remains one of the leading causes of cancer-related mortality among women worldwide, necessitating the exploration of novel therapeutic agents. Trabectedin, a marine-derived antineoplastic compound, has demonstrated promising anticancer activity through DNA minor-groove binding and transcription regulation. The present study aims to evaluate the potential inhibitory effect of trabectedin against cervical cancer target proteins using molecular docking analysis. 3-D structures of selected cervical cancer-associated proteins were retrieved from protein databases and ligand preparation was performed. Docking simulations were conducted to assess binding affinity, interaction energy, and molecular interactions between trabectedin and target proteins.

The results revealed strong binding affinities, supported by favorable hydrogen bonding, hydrophobic interactions, and stable binding conformations within the active sites of the selected proteins. In silico ADMET properties analysis demonstrated favorable drug like properties for trabectedin (MW 761.84 g/mol) (TPSA194.02 Å²) (Log S (ESOL) -6.68) (Log S (SILICOS-IT)) (GI absorption Low) (P-gp substrate Yes) (Log Kp (skin permeation) -8.55 cm/s) (Bioavailability Score0.17). The pathway studies shows that trabectedin suppress HPV E6/E7 oncoproteins, restore p53 and Rb tumor suppressor pathways, thereby it might inhibit STAT3 signaling, and

modulate PI3K/Akt and NF- κ B pathways, leading to reduced proliferation and enhanced apoptosis. These findings suggests that trabectedin exhibits significant inhibitory potential at the molecular level and can be speculated as a promising therapeutic candidate for cervical cancer, warranting further in vitro and in vivo investigations.

Keywords: Cervical cancer; Molecular docking; Anticancer activity; Binding affinity; Protein–ligand interaction; In silico analysis; Drug discovery.

BSOP16

STUDY ON BODY WEIGHT DYNAMICS AND MORPHOMETRIC GROWTH RESPONSES OF ROSS 308 BROILERS TO YEAST B-GLUCAN SUPPLEMENTATION UNDER FEED STRESS

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ABSTRACT

Rapid genetic selection in Ross 308 broilers has enhanced growth potential; however, feed restriction can adversely affect body weight and structural development. This study evaluated the influence of Yeast β -glucan supplementation on body weight and morphometric traits of male Ross 308 broilers under controlled feed stress conditions. 54-day-old chicks were randomly assigned to three dietary treatments (18 birds per pen): Pen-1 (commercial feed), Pen-2 (formulated feed), and Pen-3 (formulated feed supplemented with Yeast β -glucan). Birds were maintained under restricted feeding for seven weeks. Eighteen morphometric parameters, including body weight, wingspan, skull dimensions, comb traits, ocular measurements, beak dimensions, back length, tail length, thigh length, tarsus length, and tarsus diameter, were recorded periodically using a digital balance and Vernier caliper.

Data were analysed using ANOVA and Pearson's correlation ($p \leq 0.05$). Significant differences were observed among treatments throughout the study. Broilers supplemented with yeast β -glucan demonstrated improved morphometric progression compared to the unsupplemented formulated feed group, particularly in comb length, wingspan, back length, and tarsus traits. Body weight showed significant variation across several weeks, with β -glucan supplementation partially mitigating the effects of feed stress. Strong positive correlations ($r \geq 0.5$) were detected between body weight and most morphometric characteristics, indicating reliable

prediction of growth performance through structural measurements. These findings suggest that yeast β -glucan supplementation supports body weight maintenance and morphometric development under feed-restricted conditions, highlighting its potential as a functional feed additive in sustainable, antibiotic-free broiler production systems.

Keywords: *Yeast β -glucan, morphometrics, feed stress, broiler nutrition*

BSOP17

ARTIFICIAL INTELLIGENCE IN CANCER METABOLOMICS: ADVANCING PRECISION ONCOLOGY

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ABSTRACT

Cancer is characterized by profound metabolic reprogramming that supports uncontrolled proliferation, survival, and metastasis. Alterations such as enhanced glycolysis (Warburg effect), glutamine dependency, lipid remodelling, and oxidative stress imbalance generate distinct metabolic signatures that can serve as diagnostic and therapeutic biomarkers. Cancer metabolomics, which involves large-scale profiling of metabolites using advanced analytical platforms, produces complex high-dimensional datasets that require sophisticated computational tools for meaningful interpretation.

Artificial Intelligence (AI), particularly machine learning and deep learning algorithms, has emerged as a powerful approach for analysing metabolomic data. AI-driven models enable pattern recognition, classification of cancer subtypes, biomarker discovery, and prediction of treatment response by integrating metabolomic profiles with genomic and proteomic data.

These computational approaches enhance early cancer detection through identification of subtle metabolic alterations in biofluids and tissues. Furthermore, AI-assisted pathway analysis facilitates understanding of dysregulated biochemical networks and supports the development of targeted metabolic therapies.

The integration of AI in cancer metabolomics represents a significant advancement in precision oncology, enabling personalized treatment strategies based on individual metabolic phenotypes. Despite its transformative potential, challenges including data standardization, model interpretability, and clinical validation remain critical barriers. This presentation highlights recent advances in AI-driven metabolomic research and underscores its role in improving cancer diagnosis, prognosis, and therapeutic innovation.

Keywords: Cancer metabolomics; Artificial intelligence; Machine learning; Precision oncology; Metabolic reprogramming; Biomarker discovery; Warburg effect; multi-omics integration; Predictive modelling; Targeted therapy.

BSOP18

DEVELOPMENT OF HERBAL SPICED PANEER

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ABSTRACT

Paneer is a highly consumed fresh acid-coagulated dairy product valued for its high protein content and neutral flavour. The present study aimed to develop a value-added functional paneer infused with selected spices and fresh herbs by incorporating them directly into milk prior to coagulation. Black pepper (*Piper nigrum*), red chilli (*Capsicum annuum*), and cumin (*Cuminum cyminum*) were dry-roasted to enhance flavour development and improve aroma release, then ground and sieved for uniform particle size and even dispersion. The spice blend was added to heated milk to ensure homogeneity, while freshly ground coriander (*Coriandrum sativum*) and mint (*Mentha spicata*) leaves were incorporated to enhance aroma, colour, and functional bioactive properties. Citric acid was used for coagulation, followed by pressing and cooling. The developed paneer was evaluated for sensory attributes including appearance, colour, texture, flavour, taste, and overall acceptability using a sensory panel. Cooking quality tests such as frying behaviour, moisture retention, texture stability, and shape integrity were also assessed to determine product performance under thermal processing.

Results indicated improved sensory scores, desirable cooking stability, uniform spice distribution, and a distinctive spicy-herbal flavour profile. The incorporation of roasted spices and herbs enhanced antioxidant potential and consumer appeal, demonstrating the feasibility of developing a functional paneer with improved sensory and cooking qualities suitable for commercial diversification.

Keywords: Paneer, Spices, Herbs, Black pepper, Red chilli, Cumin, Coriander, Mint, Citric acid, Antioxidant, Antimicrobial, Sensory quality, Functional food, Value addition

PROPHYLACTIC PROPERTIES OF GREEN-SYNTHEZIZED SILVER NANOPARTICLES FROM *PADINA GYMNOSPORA* AND *SARGASSUM MYRIOCYSTUM*

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ABSTRACT

There has been a wide opening in sustainable aquaculture with the intersection of marine biology and nanotechnology. Biogenic silver nanoparticles (AgNPs) made from macroalgae use algal biomolecules to reduce and stabilize silver, yield well-characterized nanoscale particles, and show broad antimicrobial activity while modulating fish immune markers and increasing survival in challenged aquaculture species. Formation of AgNPs from the methanol extract of *Padina gymnospora* and *Sargassum myriocystum* were tracked by a surface plasmon resonance band and parameters such as Solvent Extract ratio, and hours-long incubation to produce stable nanoparticles were optimized. The constituents of the algal extract were characterized using FTIR, while TEM was employed to ascertain the morphology and arrangement of the particles. The polycrystalline characteristics of the particles were analyzed through SAED, and DLS demonstrated that the particles had a monodisperse quality. The prophylactic properties of the AgNPs synthesised from the proven immunostimulants were analysed by measuring the Relative Percentage Survival (RPS) using *Oreochromis niloticus* as study animal. The study revealed that AgNP synthesized from methanolic extract *Padina gymnospora* had a 75% RPS against *Aeromonas hydrophila*, whereas *Sargassum myriocystum* had 60% RPS.

The study has proved that AgNP from methanolic extract of *Padina gymnospora* has better disease resistance properties compared to AgNP from *Sargassum myriocystum* making it a possible eco-friendly prophylaxis in the fish industry.

Keywords: SPR, FTIR, TEM, SAED, DLS, RPS

STUDY ON MOTH DIVERSITY IN FOREST OF SIRUMALAI HILLS, EASTERN GHATS, DINDIGUL DISTRICT

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ABSTRACT

Moths (Lepidoptera) are widely employed as bioindicators of habitat quality and environmental change due to their strong coupling with vegetation structure, microclimatic conditions, and sensitivity to anthropogenic disturbance. As predominantly nocturnal, phytophagous insects, moths play integral roles in forest ecosystems through trophic interactions and nocturnal pollination, while exhibiting rapid demographic and behavioural responses to even minor environmental perturbations. Consequently, spatiotemporal patterns in moth assemblages provide valuable insight into ongoing ecological processes.

This study investigated the composition and temporal dynamics of moth assemblages in a dry deciduous forest of the Sirumalai Hills (10.19551°N, 77.98371°E), Eastern Ghats, India, across an elevational gradient of 1,200–1,800 m above mean sea level. The study area is subjected to anthropogenic pressure, primarily resource extraction, and is characterised by extensive ground layer modification, with approximately 70% of the forest floor dominated by *Cymbopogon sp.* introduced for economic purposes. Additionally, rapid regional development has increased artificial light at night, a growing ecological stressor known to disrupt nocturnal insect orientation, activity rhythms, and population viability.

Moth sampling was conducted from October 2024 to April 2025 using standardised nocturnal light-trap surveys operated between 6.00 PM to 6.00 AM. Individuals were documented photographically and identified using standard taxonomic keys and online reference databases.

A total of approximately 925 individuals were recorded during the sampling period. Moth abundance exhibited pronounced temporal structuring, with October yielding the highest monthly abundance followed by a consistent decline toward April. Seasonal aggregation indicated that the post-monsoon period supported the greatest abundance (≈ 494 individuals), exceeding winter and summer assemblages. These patterns underscore the dominant influence of post-monsoon climatic conditions and vegetation phenology on moth population dynamics.

The present study establishes baseline quantitative data for moth assemblages in an under represented forest system of the Eastern Ghats and highlights the utility of standardised long-term monitoring for assessing anthropogenic impacts on nocturnal Lepidopteran communities

Keywords: *Moth assemblages, Seasonal variation, Anthropogenic disturbance*

BSOP21

NUTRITIONAL CONTENT AND SENSORY EVALUATION OF FUNCTIONAL COOKIES ENRICHED WITH DANDELION (TARAXACUM OFFICINALE) ROOT AND PUMPKIN SEED POWDERS"

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ABSTRACT

Enhancing nutritional quality and promoting sustainable food systems can be accomplished through the creation of functional bakery goods made with plant-based ingredients. In this study, the nutritional and sensory qualities of cookies enriched with pumpkin seed and dandelion (*Taraxacum officinale*) root powders were evaluated. Proximate composition such as moisture, ash, energy, fat, carbohydrate, protein, and crude fiber were determined using standard analytical techniques. Sensory evaluation was done using the sensory parameters namely appearance, texture, flavour, taste, and overall acceptability using 9-point hedonic rating scale. The findings showed that adding powdered dandelion root and pumpkin seed improved the nutritional qualities of cookies, especially in terms of protein and dietary fiber, while keeping moisture and ash levels within reasonable bounds. The sensory evaluation revealed favourable ratings for overall quality and palatability, indicating good consumer acceptability. The results imply that sensory qualities were not compromised by functional enrichment. With sustainable ingredient use and health-focused product development, this study supports Sustainable Development Goals 3 (Good Health and Well-Being) and 12 (Responsible Consumption and Production) by highlighting the potential of cookies made with dandelion root and pumpkin seeds as functional foods that are both aesthetically pleasing and nutritionally enhanced.

Key Words: *Dandelion root powder; Pumpkin seed powder; Functional cookies; Proximate composition; Sensory evaluation; Sustainable nutrition*

NUTRITIOUS SPICED WHEY DRINK ENRICHED WITH NATURAL SPICES

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ABSTRACT

The present study aimed to formulate and develop a value-added spiced whey beverage by incorporating selected traditional Indian spices to enhance its sensory, nutritional, and functional properties. Whey, a by-product of dairy processing, was used as the base ingredient due to its high nutritional value, rich whey protein content, and refreshing characteristics. Instead of being discarded as waste, whey was effectively utilized to create a functional beverage with improved consumer appeal. The beverage was prepared by blending fresh whey with optimized concentrations of spices such as ginger, cumin, black pepper, and cardamom. Salt and natural flavoring agents were also added to increase taste and palatability. The selected spices not only imparted a pleasant aroma and characteristic spicy flavour but also contributed additional health benefits, including digestive stimulation and antioxidant activity. The developed product was evaluated for physicochemical properties and sensory attributes, including flavour, taste, colour, appearance, and overall acceptability. Sensory evaluation results revealed that the incorporation of an appropriate concentration of spice mix significantly improved the overall sensory profile of the beverage. It offers a sustainable approach for effective whey utilization while meeting the growing consumer demand for healthy, flavourful, and functional beverages.

Keywords: *Whey beverage, Functional drink, Indian spices, Value added dairy by-product utilization.*

BSOP23

INFLUENCE OF ZOO VISITOR PRESENCE ON THE BEHAVIOUR AND FAECAL CORTISOL LEVELS IN CAPTIVE LION-TAILED MACAQUES (*MACACA SILENUS*)

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ABSTRACT

The Lion-tailed Macaque (*Macaca silenus*) is an endangered Old World monkey endemic to the Western Ghats of Southern India. Due to its rarity and the severe threats it faces in the wild, the species is of high conservation priority. In captive environments, previous research indicates that various factors specifically visitor presence can induce physiological stress. Based on these concerns, the present study aimed to investigate whether zoo visitor density affects the well-being of the LTM. Specifically, this study evaluated the impact of varying visitor densities (zero, low, high, and extremely high) on the behavioral activities and faecal cortisol levels of eight individually identified macaques. Behavioural categories monitored included affiliation, aggression, abnormal, foraging, olfactory, self-directed, locomotion, resting, infant-related, and visitor-directed behaviours. Observations were compared between a public-access enclosure and a restricted-access breeding centre. Behaviours were recorded every 5 minutes over 6 hours per day for each condition using the scan sampling method. Faecal cortisol levels were analyzed via enzyme immunoassay (EIA). Results showed significant differences ($p < 0.05$) in the time allocated to locomotion, resting, aggression, reproductive, self-directed, and visitor-directed behaviours during periods of high and extremely high visitor density in the public enclosure compared to the restricted breeding centre. ANOVA with Duncan's Multiple Range Test confirmed that faecal cortisol concentrations were significantly higher ($p < 0.05$) during periods of high and extremely high visitor density in the public enclosure compared to the restricted breeding centre. These findings suggest that high visitor density negatively impacts the behaviour and adrenocortical secretion of Lion-tailed Macaques, indicating a potential welfare concern. Consequently, it is recommended that zoological parks maintain a sufficient buffer distance between visitor viewing areas and animal enclosures to enhance animal welfare.

Keywords: Lion-tailed Macaque, *Macaca silenus*, Zoo visitor effect, Faecal cortisol, Animal welfare, Captive behavior, Stress physiology.

CLINICAL PRESENTATION AND MANAGEMENT OF TYPE 2 DIABETES MELLITUS WITH ISCHEMIC HEART DISEASE AND NON-ALCOHOLIC FATTY LIVER DISEASE: A CASE REPORT

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) is a major chronic metabolic disease caused by reduced insulin sensitivity and gradual failure of pancreatic β -cell function, leading to long-term elevation of blood glucose. It is commonly linked with obesity, physical inactivity, unhealthy dietary habits, and hereditary factors. Poorly controlled diabetes significantly increases the risk of cardiovascular and other systemic complications. **Case Presentation:** This study describes a 52-year-old South Indian male from Tamil Nadu who presented in 2011 with progressive weight gain of approximately 10 kg over the previous decade. At the time of clinical assessment, his body weight was 131 kg and his body mass index (BMI) was 35.09 kg/m², indicating obesity. Although he was already receiving metformin and sulfonylurea therapy, laboratory evaluation showed poor glycemic control with an HbA1c of 8.4%. The patient had several associated comorbidities, including ischemic heart disease treated with Isosorbide dinitrate (5 mg), peripheral vascular disease managed with Atorvastatin (10mg) and (Aspirin 75 mg), non-alcoholic fatty liver disease treated with Fenofibrate(2.6mg), and a mild ulcer for which lactobacillus sachets were prescribed. A strong family history was present, as both parents and his brother were diagnosed with T2DM. **Management:** The treatment approach focused on strengthening glycemic control and reducing metabolic risk through structured lifestyle interventions such as dietary modification, weight management, regular physical exercise, and strict adherence to oral antidiabetic medications such as Metformin, SGLT2 inhibitors (Jardiance 10mg), Sulfonylureas (Amaryl 2mg), Ischemic heart disease was managed with aspirin, along with CABG, Non alcoholic fatty liver disease was managed with Atorvastatin and diet modification. The patient was also educated about glucose monitoring and prevention of long-term diabetic complications. **Conclusion:** This case emphasizes that obesity, sedentary lifestyle, and genetic predisposition contribute significantly to persistent hyperglycemia and progression of T2DM, even when oral therapy is initiated.

Early metabolic screening, intensive lifestyle correction, and continuous monitoring are essential to prevent further complications and improve patient outcomes.

Keywords: *Type 2 Diabetes Mellitus, Obesity, HbA1c, Insulin Resistance, Cardiovascular Disease, Lifestyle Intervention*

BSOP25

COMPARATIVE PREVALENCE OF KETOACIDOSIS AMONG TYPE 2 DIABETES MELLITUS PATIENTS RECEIVING DIFFERENT ANTIHYPERTGLYCEMIC DRUGS

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ABSTRACT

Purpose: Type 2 diabetes mellitus (T2DM) is managed with various antihyperglycemic drugs to achieve glycemic control and prevent complications. Common agents included metformin, gliclazide, DPP-4 inhibitors such as linagliptin, sitagliptin and vildagliptin, SGLT2 inhibitors such as empagliflozin and fixed-dose combinations like empagliflozin with linagliptin. These agents may predispose patients to ketoacidosis under certain conditions. This present study is framed to compare the prevalence of ketoacidosis among type 2 diabetic mellitus patients with different classes of antihyperglycemic drugs and to identify associated clinical risk factors. **Methods:** This study included n = 350 T2DM patients receiving one or more antihyperglycemic drugs. Demographic data, clinical history, duration of diabetes, comorbidities, dehydration status, and lifestyle factors were recorded. Biochemical parameters including fasting and postprandial glucose, HbA1c, lipid profile, serum creatinine, and electrolytes were documented. Urine samples were analyzed for ketone bodies, and the prevalence of ketoacidosis was evaluated in relation to drug classes and clinical risk factors. **Results:** The overall prevalence of ketoacidosis in type 2 diabetic patients receiving antihyperglycemic therapy was observed 1.5% of the studied population. Ketone positivity was higher among patients on SGLT2 inhibitor therapy, especially empagliflozin. Minimal ketosis occurred with metformin, sulfonylureas, DPP-4 inhibitors, and appropriately managed insulin therapy.

There are also clinical risk factors like ischemic heart disease (IHD), hypertension (HT), early nephropathy (EN), and cardiovascular disease (CVD) in patients receiving antihyperglycemic drugs. **Conclusion:** Ketoacidosis prevalence in T2DM patients receiving antihyperglycemic therapy was very low (1.5%), with a comparatively higher occurrence observed among patients receiving SGLT2 inhibitor therapy.

Early ketone screening and clinical monitoring can reduce adverse outcomes. Comparative evaluation of antihyperglycemic therapies supports safer prescribing and improved management of T2DM.

Keywords: Type 2 diabetes mellitus; Diabetic ketoacidosis; Antihyperglycemic therapy; SGLT2 inhibitors; Empagliflozin

BSOP26

STUDIES ON *FUSARIUM SEMITECTUM* CAUSING LEAF SPOT DISEASE IN *JASMINUM GRANDIFLORUM* L

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ABSTRACT

Jasmine is found throughout the tropical and sub-tropical regions of the world and commercially grown for fresh blossoms in India, China, Sri Lanka and the Philippines. *Jasminum grandiflorum* L. belongs to the family Oleaceae is extensively cultivated for concrete extraction. Tamil Nadu, the leading producer of Jasmine, has an average production of 77,247 tons from a cultivated area of 9,360 hectares. Jasmine being a perennial crop is prone to attack by many pests and diseases. The present study focused on a survey of major diseases of Jasmine in Madurai district, known as 'City of Jasmine'. Leaf spot disease was found to be common in all the selected fields and the fungal pathogen was isolated and documented. The fungal pathogen was characterised by observing the colony morphology and conidial characteristics. The fungal pathogen was identified as *Fusarium semitectum* based on morphometric features. Earlier *Fusarium solani* was reported as a pathogen in Jasmine, this is the first report of *Fusarium semitectum* causing leaf spots in Jasmine. Carbon and nitrogen source preferences of the isolated fungi were studied; fructose and urea were found to be the preferred carbon and nitrogen sources. Biocontrol agents and chemical fungicides (systemic and contact) were screened against the fungal pathogen.

In antagonistic studies, *Trichoderma* overgrew the pathogen and found to be effective. Among fungicides screened, systemic fungicides Carbendazim and Hexaconazole were found to be effective.

Keywords: *Jasminum*; *Fusarium*; Hexaconazole; *Trichoderma*.

ISOLATION, SCREENING AND IDENTIFICATION OF EXOPOLYSACCHARIDE PRODUCING BACTERIA FROM ENVIRONMENTAL SAMPLES FOR SEED COATING APPLICATION

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ABSTRACT

Semi-arid regions like Madurai face significant challenges in the agricultural sector due to water scarcity and unpredictable climatic variations. The present study aimed to isolate, screen and identify exopolysaccharide-producing bacteria from diverse environmental samples to develop and evaluate a novel bacterial exopolysaccharide-based seed coating formulation. Exopolysaccharides (EPS) produced by bacteria have gained significant attention due to their biodegradable, biocompatible and moisture-retentive properties, making them promising candidates for sustainable agricultural applications. Soil and rhizosphere samples were collected from agricultural fields in Madurai region to obtain a wide diversity of microbial populations. Serial dilution and plating techniques were employed for bacterial isolation, followed by screening on selective media for mucoid colony morphology indicative of EPS production. The EPS producing capability of the isolates was further confirmed by secondary screening techniques such as the tube test and Congo red agar method. Quantitative estimation of EPS was performed using precipitation and gravimetric analysis. High-yielding isolates were selected for further characterization. The selected bacterial strains were subjected to molecular identification using 16S rRNA gene sequencing. Preliminary seed germination assays were conducted to examine the influence of EPS-based coating on germination rate and seed vigour under controlled conditions. The study helps to identify efficient EPS-producing bacterial strains with desirable biopolymer characteristics suitable for agricultural seed coating. Such bio-based coatings may enhance seed performance, improve drought tolerance and reduce dependency on synthetic polymers.

The findings contribute to the development of eco-friendly and sustainable strategies for improving crop productivity, particularly in water-limited environments.

Keywords: *Exopolysaccharide, Seed coating, 16S rRNA, Sustainable agriculture*

BSOP28

INTEGRATED BIOREFINERY APPROACH FOR PECTIN RECOVERY AND BIOETHANOL PRODUCTION FROM WILD BANANA PEEL

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ABSTRACT

The study focuses on the extraction of pectin from the peels of wild bananas. The byproduct generated during this extraction process was repurposed for bioethanol production. Ultrasonic-assisted pectin extraction was conducted separately, and both methods were optimized using Response Surface Methodology (RSM). The optimized yield of pectin achieved was 15.3% through Ultrasonic Extraction (UAE) under the following conditions: a liquid-to-solid ratio of 17.13 mL/g, a pH of 1.77, a sonication time of 17 minutes, and a temperature range of 42 to 59°C. The pectin extracted via UAE was analyzed for its physiochemical and thermal properties, as well as its anti-nutritional characteristics. The carbohydrate composition of both the hydrolysate and the residue was analyzed using ultrafast liquid chromatography. Subsequently, these sugars were fermented with *Saccharomyces cerevisiae*. The resulting ethanol was quantified and confirmed using gas chromatography, yielding an ethanol concentration of 35.98 g/L from the hydrolysate and 17.03 g/L from the residue.

Keywords: Wild banana, Pectin, Microwave assisted extraction, Bioethanol

BSOP29

IMPROVING THE THERMAL STABILITY OF PHYCOCYANIN FROM SPIRULINA PLATENSIS FOR INDUSTRIAL APPLICATIONS

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ABSTRACT

Food grade phycocyanin is derived from *Spirulina platensis*, a widely distributed cyanobacterium. Due to its sensitivity to elevated temperatures, phycocyanin cannot be easily utilized in the food industry as a natural colorant. To address the issue of insufficient thermal stability, various edible additives are selected to enhance the thermal stability of phycocyanin. The stability of the phycocyanin extract was assessed at different temperatures in the presence of various edible stabilizing agents, including sugars and salts, using fluorescence spectrophotometry. The extraction process involved homogenization and centrifugation.

The extract was subjected to varying temperatures ranging from room temperature to a maximum of 60°C, beyond which the color significantly fades. Treatments with and without additives were conducted for a fixed duration of 30 minutes, which is a typical cooking time. After 30 minutes, the treated samples were analyzed using a fluorescence spectrophotometer. The Excitation Emission Matrix values were recorded, with excitation set at 580 nm and emission measured. Fluorescence intensity was plotted against wavelength using ORIGIN software, and the resulting curves were further analyzed. Based on the graphs obtained, the most effective thermo-protectant was identified, and the concentration of the preservative for the specific temperature treatment was optimized.

Keywords: *Spirulina platensis, Thermo-protectants, Origin Phycocyanin, Spectrophotometry*

BSOP30

DEVELOPMENT OF HALIM SEED-BASED FUNCTIONAL FOODS FOR HOLISTIC MANAGEMENT OF POLYCYSTIC OVARY SYNDROME (PCOS)

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting women of reproductive age and is characterized by hormonal imbalance, insulin resistance, and metabolic disturbances. Dietary intervention plays a crucial role in the effective management of PCOS symptoms. The present study focuses on the development of Halim seed-based functional foods aimed at providing holistic nutritional support for individuals with PCOS. Halim seeds (*Lepidium sativum*), commonly known as garden cress seeds, are rich in iron, calcium, dietary fiber, essential fatty acids, and bioactive compounds that contribute to metabolic regulation and hormonal balance. In this study, Halim seed-enriched health drink powder and functional cookies were formulated to meet the specific dietary requirements and preferences of PCOS patients. The developed products offer a nutritious and palatable alternative to conventional snacks and supplements. Incorporation of Halim seeds is anticipated to support improved insulin sensitivity, enhanced metabolic activity, and hormonal regulation, thereby contributing to overall reproductive and metabolic health. This work highlights the potential of Halim seeds as a functional ingredient in nutraceutical food products and emphasizes their role in dietary strategies for holistic PCOS management.

Keywords: *PCOD, Dietary intervention, Halim seeds, Product development*

A BIOREFINERY APPROACH FOR SIMULTANEOUS WASTEWATER TREATMENT AND BIODIESEL PRODUCTION USING *DICTYOCOCCUS SP.*

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ABSTRACT

The global energy used for transportation relies approximately 70% on fossil fuels, which are limited in availability. Their extensive use poses significant risks to the environment and humanity, including pollution and global warming. Biofuels represent a sustainable, renewable alternative energy source. This study focuses on the production of biodiesel from the green algae *Dictyococcus sp.* by utilizing domestic wastewater as a nutrient source, combining phycoremediation with biofuel production. The collected wastewater underwent analysis for its physico-chemical properties. This microalga was cultivated in varying concentrations of domestic wastewater. The stationary phase was reached on the 16th day, during which the maximum biomass was recorded. It measured 36.68 mg/L/D in BGII medium and 42.5 mg/L/D in 100% wastewater, respectively. The species effectively removed 67.28% of ammonia, 45.45% of calcium, 83.32% of chloride, 76% of magnesium, 77.19% of nitrate, 93.14% of sulphate, 70% of alkalinity, 80% of phosphorus, 82.57% of COD, and 84.92% of BOD from the wastewater, facilitating biorefining. Lipid extraction yielded 14.87 mg/L/D. The extracted lipid was characterized using Thin Layer Chromatography, FT-IR, and GC-MS. FAME conversion was achieved through transesterification, with characterization performed via FT-IR and GC-MS. **Keywords:** *Phycoremediation, Biodiesel, Microalgae, Biorefinery, Wastewater treatment*

IMMUNO INFORMATIC PRIORITIZATION OF PUTATIVE SURFACE-EXPOSED ANTIGENS IN THE EMERGING PATHOGEN *COMAMONAS KERSTERSII*

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ABSTRACT

Comamonas kerstersii is an emerging multidrug-resistant pathogen increasingly implicated in severe intra-abdominal infections and bacteremia. This study aimed to identify novel surface-exposed antigens from the complete proteome of the reference strain *C. kerstersii* 8943 using reverse vaccinology approach. The complete proteome was retrieved from the NCBI RefSeq database, and a subtractive proteomics pipeline was employed to screen for vaccine candidates. Subcellular localization was predicted using PSORTb v3.0 to prioritize outer membrane and extracellular proteins. Candidates were then filtered for antigenicity (VaxiJen > 0.5), allergenicity (AllerTOP v2.0), and toxicity (ToxinPred 2.0). To ensure host safety, a BLASTp search against the *Homo sapiens* proteome confirmed no significant sequence homology, minimizing autoimmune risks. The most promising candidate was subjected to immune mapping using IEDB tools. The initial screening of 3,194 proteins identified 47 putative surface-exposed proteins. Further filtration yielded three highly antigenic and non-allergenic candidates. A TolC family outer membrane protein (WP_054065280.1) was prioritized as the lead antigen due to its antigenic score (0.6311) and safety profile (Non-Toxin). Epitope mapping revealed four linear B-cell epitopes and high-affinity T-cell epitopes, including a critical overlapping region (residues 125–145) capable of stimulating both antibody-mediated and cell-mediated immunity. Coverage analysis indicated that the identified epitopes interact strongly with major alleles such as HLA-A*02:01 and HLA-DRB1, offering a predicted global population coverage of 98.05%. This study successfully prioritized a novel TolC family antigen as a promising vaccine target, providing a foundation for future *in vitro* and *in vivo* validation to combat this emerging threat.

Keywords: *Comamonas kerstersii*; Reverse vaccinology; Immuno-informatics; Surface Antigen.

BSOP33

**POPULATION DYNAMICS AND SPECIES DIVERSITY OF
MEALYBUGS (HEMIPTERA: PSEUDOCOCCIDAE) IN THE
AGRO-ECOSYSTEMS OF MADURAI DISTRICT, TAMIL NADU, INDIA**

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ABSTRACT

Mealybugs (Hemiptera: Pseudococcidae) are economically important sap-sucking pests that infest a wide range of agricultural and horticultural crops in tropical and subtropical regions. Their polyphagous nature, wax-coated body surface, rapid reproductive potential, and association with mutualistic ants contribute to frequent outbreaks and invasive spread. The present study aims to assess the population dynamics and species diversity of mealybugs in Madurai District, Tamil Nadu, India with emphasis on distribution, seasonal incidence, host plant associations, and relation to environmental factors. Findings from this research are expected to provide a comprehensive understanding of mealybug diversity and distribution in Madurai District. In study areas, environmental parameters were observed concurrently, Canonical Correspondence Analysis (CCA) were made to study the correlation between the mealybug species and environmental variables (Temperature, Humidity and Wind speed).

Keywords: *Host plant associations, Mealybugs, Population dynamics, Seasonal abundance.*

BSOP34

**ETHNOBOTANICAL STUDIES OF PALIYAR TRIBES IN THENI
AND DINDIGUL DISTRICT**

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ABSTRACT

Ethnobotanical knowledge represents a vital interface between indigenous communities and plant biodiversity. The present study documents the ethnomedicinal practices of the Paliyar tribe inhabiting Theppampatti (Theni district)

and Moolaiyar (Dindigul district), Tamil Nadu, India. Field surveys were conducted using structured questionnaires and interviews with key informants aged 40–60 years. Plant specimens were photographed, collected, and authenticated through herbarium preparation. Data on botanical name, vernacular name, plant parts used, preparation methods, and therapeutic applications were systematically recorded. A total of medicinal plants belonging to 14 families were documented, with most species represented by herbs predominantly from the family Lamiaceae. Leaves were the most frequently utilized plant part, prepared as decoctions, infusions, and pastes. Hyperthermia and respiratory ailments were the most commonly treated conditions across both sites. Informant Consensus Factor (ICF) analysis revealed strong agreement for respiratory ailments (ICF = 1.00) in Theppampatti. Hyperthermia and psoriasis (ICF = 1.00) in Moolaiyar, while haemorrhoids, dyspepsia, and related disorders showed high consensus (ICF = 0.75). Moderate consensus (ICF = 0.66) was observed for diabetes and arthritis. The findings highlight a well-structured traditional knowledge system with strong intra-community agreement for specific ailments. Given increasing socio-environmental pressures, systematic documentation and conservation of these medicinal resources are essential. The study underscores the pharmacological potential of these plants and provides a foundation for future phytochemical and drug discovery research.

Keywords: *Ethnobotany, Informant consensus factor, Paliyar tribes, Medicinal plants.*

BSOP35

PHYSIOLOGICAL AND ANTIOXIDANT RESPONSES DURING DESICCATION AND RESURRECTION OF *ACTINIOPTERIS RADIATA*

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ABSTRACT

Desiccation tolerance enables certain plants to survive extreme water loss and rapidly resume metabolic activity upon rehydration. Resurrection plants serve as valuable models for understanding drought resilience, particularly among early land plant lineages. *Actiniopteris radiata*, a xerophytic fern inhabiting arid rocky terrains such as Alagar Kovil Hills in Madurai District, exhibited classical resurrection characteristics.

The present study investigated the morphological, anatomical, physiological, and antioxidant responses of *A. radiata* under three states: Fresh, Desiccated, and Resurrected. Anatomical observations revealed cellular shrinkage and compact tissue

organization during dehydration, which were largely restored upon rehydration, indicating structural plasticity and membrane resilience. Physiological evaluation demonstrated a significant decline in Photosystem II (PSII) efficiency and Cell Membrane Stability Index (CMSI) in desiccated fronds, reflecting stress-induced impairment of photosynthetic machinery and membrane destabilization. Both parameters showed substantial recovery following rehydration, confirming effective repair and restoration of photosynthetic function. Biochemical analyses revealed variations in total protein content across the three states, suggesting induction of stress-associated proteins. Antioxidant enzymes, particularly catalase and peroxidase, showed elevated activity during desiccation, indicating activation of reactive oxygen species scavenging mechanisms. Enzyme activities moderated upon rehydration, reflecting re-establishment of redox balance. LC-MS profiling has been done to identify the stress-associated metabolites that contribute to cellular protection during dehydration-rehydration cycles. *Actiniopteris radiata* rapid recovery and efficient redox regulation highlighted its ecological resilience and reinforced its potential as a model system for investigating drought tolerance mechanisms in pteridophytes.

Keywords: *Desiccation tolerance, Actiniopteris radiata, Photosystem II, Cell Membrane Stability Index.*

BSOP36

PHYTOCHEMICAL EXTRACTION AND NANO FORMULATION OF ALOE VERA FOR ANTIMICROBIAL SUSCEPTIBILITY TESTING AND MEDICINAL PRODUCT DEVELOPMENT

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ABSTRACT

Aloe vera is widely recognized for its therapeutic properties due to the presence of bioactive compounds such as flavonoids, saponins, anthraquinones, and polysaccharides. This study focuses on the extraction, separation, nanoformulation, antimicrobial susceptibility testing, and development of medicinal products from Aloe vera. Fresh leaf gel was subjected to solvent extraction to obtain crude phytochemical extracts.

Separation and identification of active constituents were performed using techniques such as thin-layer chromatography. The bioactive extract was further formulated into nanoparticles to enhance stability, bioavailability, and antimicrobial efficiency. The antimicrobial activity of both crude and nanoformulated extracts was evaluated against selected bacterial and fungal strains using the agar well diffusion

method. Results indicated improved antimicrobial activity in nanoformulated extracts compared to crude extracts. Based on these findings, Aloe vera extract was incorporated into herbal soap and oil formulations. The developed products demonstrated promising antimicrobial potential, supporting their application in natural and effective medicinal skincare preparations.

Keywords: *Aloe vera, Nano formulation, Nanoparticles, Natural skincare products*

BSOP37

DEVELOPMENT OF A FERMENTED HORSE-GRAM BASED FUNCTIONAL FOOD PRODUCT

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ABSTRACT

Protein powders are widely available in the market, but very few are produced using fermentation. This project aims to develop two fermentation-based, value-added protein powders using underutilized plant resources: (i) a horse gram-pearl millet blend and (ii) a horse gram-jackfruit seed blend. Horse gram is a protein-rich legume limited by anti-nutritional factors such as phytates, tannins, and protease inhibitors. In the first formulation, it will be combined with Pearl millet to improve amino acid balance and overall nutritional quality through controlled fermentation. The second formulation targets the valorisation of starch-rich Jackfruit seeds, which are often discarded as waste. The objective is to convert excess starch into microbial biomass protein in the presence of nitrogen supplementation, thereby increasing total protein content and nutrient density. Fermentation will be conducted using *Lactiplantibacillus plantarum*, isolated from sauerkraut, and *Aspergillus oryzae*, selected for strong amylolytic and proteolytic activity. Amylases will hydrolyse starch into fermentable sugars, while proteases and microbial growth will enhance protein content and digestibility. Additional protease- and amylase-positive strains from natural fermentations will be screened for improved anti-nutrient degradation. The study will optimize substrate ratios, nitrogen levels, moisture, inoculum composition, and fermentation time.

Outcomes will include reduced anti-nutrient levels, improved mineral bioavailability, enhanced in vitro protein digestibility, and increased overall protein content. This approach integrates microbial biotechnology with sustainable crop utilization to develop affordable, fermentation-based functional protein powders.

Keywords: *Fermentation, Horse gram, Pearl millet, functional foods.*

BSOP38

CHARACTERIZATION OF PYRENACANTHA VOLUBILIS A MAGICAL PLANT FOR ITS ANTICANCER PROPERTIES

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ABSTRACT

The magical plant *Pyrenacantha volubilis* is a perennial woody climber which belongs to the family Icacinaceae. This plant is distributed in the Western Ghats, Eastern Ghats, and some parts of Central India. The plant is a rich source for anticancer drug Camptothecin (CPT). Decade old report suggests the potentiality of this plant to supply secondary metabolite for the synthesis of CPT which could be commercially exploited at the industrial scale. The present study also includes the synthesis of silver nanoparticle with an eco-friendly approach using *Pyrenacantha volubilis* extract with potent secondary metabolites. Characterization of the green synthesized AgNPs was carried out through techniques such as UV- Visible spectroscopy, spectrofluorometer, FTIR, SEM and TEM. The synthesized AgNPs exhibited remarkable antifungal, antibacterial and anticancer properties. An academia – pharma collaboration would further explore the holistic potential present in the plant.

Keywords: *Pyrenacantha volubilis, Camptothecin, Nanoparticle, Anticancer Drug*

BSOP39

SUSTAINABLE CO-PRODUCTION OF BIO HYDROGEN AND BIOFILM FROM SAWDUST THROUGH MICROBIAL BIOPROCESSING

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ABSTRACT

The growing depletion of fossil fuel reserves and escalating environmental concerns have intensified the demand for sustainable and renewable energy alternatives. Among emerging solutions, biohydrogen and biodiesel are recognized as clean fuels with high energy efficiency and reduced carbon emissions. This study presents an integrated and sustainable approach for the simultaneous production of biohydrogen and biodiesel using sawdust, an abundant lignocellulosic waste, as the primary substrate. Hydrogen-producing bacteria were isolated from environmental water samples using heat-shock pretreatment and anaerobic cultivation techniques.

The most efficient isolate was identified through gas chromatography and 16S rRNA gene sequencing as *Bacillus pumilus*. Sawdust was subjected to steam explosion pretreatment to generate fermentable hydrolysate, which successfully supported biohydrogen production under dark fermentation conditions. Hydrogen generation was confirmed and quantified using gas chromatography with a thermal conductivity detector. Following hydrogen production, microbial lipids were extracted from the residual bacterial biomass using the Folch method and characterized through FT-IR and GC-MS analyses, revealing the presence of fatty acid components suitable for biodiesel production. The results demonstrate the feasibility of converting a single low-cost lignocellulosic waste into two valuable biofuels through a microbial biorefinery approach. This integrated strategy highlights an efficient waste-to-energy pathway, offering significant potential for sustainable bioenergy production and contributing to the advancement of circular bioeconomy practices.

Keywords: *Biohydrogen; Dark fermentation; Bacillus pumilus; Lignocellulosic waste; Biodiesel*

BSOP40

IMPACT OF CHEWING GUM CONSUMPTION ON HUMAN HEALTH AND ENVIRONMENT

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ABSTRACT

Chewing gum, a ubiquitous product consumed globally for its sensory appeal and perceived oral health benefits, presents a complex interplay of health and environmental concerns. This study critically examines the dual dimensions of chewing gum consumption: its physiological effects on human health and its ecological footprint. On the health front, while certain sugar-free gums may aid in oral hygiene and stress reduction, excessive consumption can lead to gastrointestinal disturbances, exposure to synthetic additives, and potential allergic reactions. Ecologically, the non-biodegradable nature of conventional gum bases – often derived from synthetic polymers – contributes significantly to urban litter and environmental degradation. Improper disposal leads to persistent pollution, requiring costly cleanup efforts and posing threats to wildlife and soil quality. The research also explores emerging sustainable alternatives, such as biodegradable gum bases and improved waste management strategies. By integrating public health data, environmental impact assessments, and consumer behavior analysis, this paper underscores the

urgent need for regulatory oversight and public awareness to mitigate the adverse effects of chewing gum on both human health and the planet.

Chewing gum is a common part of daily routines, providing momentary pleasure for fresh breath, stress relief, or habit. While the act might seem insignificant, its widespread use raises questions about its broader environmental implications. This article explores chewing gum's journey from ingredients to disposal, examining its environmental impact.

Keywords- *polymers, synthetic additives, gastrointestinal, chicle, bloating, bruxism.*

BSOP41

MICROPROPAGATION AND BIOACTIVE POTENTIAL ANALYSIS OF *ARISTOLOCHIA INDICA* L.

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ABSTRACT

Aristolochia indica L. is a medicinally significant plant species recognized for its wide range of therapeutic applications. Due to indiscriminate harvesting and overexploitation from natural habitats, this species has become rare and is presently threatened with extinction. Therefore, the development of effective conservation strategies is essential for its sustainable utilization and long-term survival. In the present study, an *in vitro* propagation protocol was established as a conservation approach. Micropropagation and subsequent acclimatization (hardening) of regenerated plantlets were performed under aseptic laboratory conditions. Among the various growth regulator combinations tested, maximum shoot induction was achieved on culture medium supplemented with 1.5 mg/L 6-benzylaminopurine (BAP) and 0.5 mg/L kinetin (KIN) in combination with 0.2 mg/L α -naphthaleneacetic acid (NAA) and 0.2 mg/L indole-3-acetic acid (IAA), along with activated charcoal (1000 mg/L). The regenerated plantlets were successfully acclimatized, showing a survival rate of 93.5% under natural environmental conditions. Comparative phytochemical analyses were carried out using ethanolic and methanolic leaf extracts obtained from both *in vitro* and *in vivo* grown plants. Qualitative screening revealed the presence of various secondary metabolites. Antioxidant potential was evaluated using the DPPH free radical scavenging assay, confirming significant antioxidant activity in the extracts. Considering its extensive pharmaceutical applications— including use as an abortifacient, emmenagogue, sedative, analgesic, and in the treatment of stomach disorders, abdominal pain, wounds, and venomous bites— an

efficient regeneration system through direct organogenesis was standardized. This protocol can serve as a reliable method for germplasm conservation as well as for enhanced production of bioactive secondary metabolites.

Keywords: *Aristolochia indica* L., micropropagation, nodal explants, phytochemicals, antioxidant activity.

BSOP42

DEVELOPMENT OF HERBAL SPICED PANEER

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ABSTRACT

Paneer is a highly consumed fresh acid-coagulated dairy product valued for its high protein content and neutral flavour. The present study aimed to develop a value-added functional paneer infused with selected spices and fresh herbs by incorporating them directly into milk prior to coagulation. Black pepper (*Piper nigrum*), red chilli (*Capsicum annuum*), and cumin (*Cuminum cyminum*) were dry-roasted to enhance flavour development and improve aroma release, then ground and sieved for uniform particle size and even dispersion. The spice blend was added to heated milk to ensure homogeneity, while freshly ground coriander (*Coriandrum sativum*) and mint (*Mentha spicata*) leaves were incorporated to enhance aroma, colour, and functional bioactive properties. Citric acid was used for coagulation, followed by pressing and cooling. The developed paneer was evaluated for sensory attributes including appearance, colour, texture, flavour, taste, and overall acceptability using a sensory panel. Cooking quality tests such as frying behaviour, moisture retention, texture stability, and shape integrity were also assessed to determine product performance under thermal processing. Results indicated improved sensory scores, desirable cooking stability, uniform spice distribution, and a distinctive spicy-herbal flavour profile. The incorporation of roasted spices and herbs enhanced antioxidant potential and consumer appeal, demonstrating the feasibility of developing a functional paneer with improved sensory and cooking qualities suitable for commercial diversification.

Keywords: *Paneer, Spices, Herbs, Black pepper, Red chilli, Cumin, Coriander, Mint, Citric acid, Antioxidant, Antimicrobial, Sensory quality, Functional food, Value addition*

BSOP43

NUTRITIOUS SPICED WHEY DRINK ENRICHED WITH NATURAL SPICES

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ABSTRACT

The present study aimed to formulate and develop a value-added spiced whey beverage by incorporating selected traditional Indian spices to enhance its sensory, nutritional, and functional properties. Whey, a by-product of dairy processing, was used as the base ingredient due to its high nutritional value, rich whey protein content, and refreshing characteristics. Instead of being discarded as waste, whey was effectively utilized to create a functional beverage with improved consumer appeal. The beverage was prepared by blending fresh whey with optimized concentrations of spices such as ginger, cumin, black pepper, and cardamom. Salt and natural flavoring agents were also added to increase taste and palatability. The selected spices not only imparted a pleasant aroma and characteristic spicy flavour but also contributed additional health benefits, including digestive stimulation and antioxidant activity. The developed product was evaluated for physicochemical properties and sensory attributes, including flavour, taste, colour, appearance, and overall acceptability. Sensory evaluation results revealed that the incorporation of an appropriate concentration of spice mix significantly improved the overall sensory profile of the beverage. It offers a sustainable approach for effective whey utilization while meeting the growing consumer demand for healthy, flavourful, and functional beverages.

Keywords: *Whey beverage, Functional drink, Indian spices, Value added dairy by-product utilization.*

BSOP44

EFFECTS OF CURCUMIN AND PUNICALGIN AGAINST CERVICAL CANCER

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ABSTRACT

Cancer in general is a group of diseases characterized by uncontrolled cell growth. This can lead to the spread of malignant cells to other parts of the body, making it one of the most dangerous and life-threatening condition. Cervical cancer is the fourth most

common cancer among women. Occasionally, traditional treatments like surgery, radiation, and chemotherapy shows some adverse effects, leading researchers to look for natural compound with anticancer properties. Curcumin and punicalagin, bioactive polyphenolic compounds found from turmeric and pomegranate peel respectively, have shown anticancer potential in various studies. This study aims to evaluate the binding efficiency of curcumin and punicalagin with key proteins like HPV 16, HPV 18 and EBNA1, and to investigate the key pathways involve in the pathogenesis of cervical cancer. Molecular docking using pyrX and discovery studio showing the good binding efficiency (ie >2) between protein (HPV 16, HPV 18 and EBNA1) and ligand (curcumin and punicalagin). ADMET property analysis showed its drug-like properties for curcumin. The pathway studies showed that curcumin and punicalagin suppress HPV E6/E7 oncoprotein, restore p53 and Rb tumor suppressor pathway. Thereby it might inhibit STAT-3 signaling and modulated P13K/AKT and NF- KB pathways leading to reduced proliferation and enhanced apoptosis. This work suggests that these compound can be extrapolated as a potential therapeutic target against cervical cancer.

Keywords: Cervical cancer, HPV 16, HPV 18, EBNA1, Curcumin, Punicalagin, Molecular docking.

BSOP45

NECTAR RESOURCES FOR BUTTERFLIES IN ALAGAR HILLS

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ABSTRACT

Butterflies are ecologically significant insects whose distribution and abundance are strongly influenced by the availability of nectar resources during the adult stage. The present study was conducted to document the relationship between butterfly diversity and adult nectar plants in Alagar Hills, Tamil Nadu, and to develop a database of butterfly nectar resources in the region. Field observations were carried out over an eight-month period from August 2012 to March 2013 across three habitats: Walker's Path, Garudathertham, and Murugan Temple. A total of 27 butterfly species belonging to four families were observed feeding on nectar plants. Nymphalidae and Pieridae were the dominant families, followed by Papilionidae and Lycaenidae. Butterflies utilized 22 nectar plant species belonging to 15 plant families, with visits occurring more frequently on herbs and shrubs than on trees. Among the nectar plants, *Lantana camara* attracted the highest number of nectaring butterfly species, while *Tridax procumbens* and *Lantana camara* flowered throughout the year, serving as

key nectar sources. The findings highlight the importance of nectar plant diversity in sustaining butterfly populations and provide essential baseline data for resource-based butterfly conservation in Alagar Hills.

Keywords: *Butterfly diversity, Nectar plants, Alagar Hills, Pollination ecology*

BSOP46

ORGANIC MANURE FROM VEGETABLE WASTE BY COMPOST BIN METHOD

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ABSTRACT

Vegetable waste disposal is a major challenge in urban solid waste management, leading to environmental pollution and health hazards. This study evaluates the efficiency of aerobic bin composting of vegetable waste using cow dung and sawdust in different proportions with microbial inoculum. Vegetable waste collected from a local market was composted in four ratios (4:5:1, 5:4:1, 6:3:1, and 7:2:1) and compared with a control containing only vegetable waste. Physico-chemical parameters such as temperature, pH, and nutrient content (N, P, and K) were analyzed. The results showed that composting was completed within 20 days in the 4:5:1 and 5:4:1 ratios, whereas the control required 32 days. The final compost was stable, nutrient-rich, and dark brown in appearance. Bioassay studies using *Cicer arietinum* indicated enhanced seed germination and plant growth, particularly at 25% compost application. The study demonstrates that aerobic composting is an effective, eco-friendly approach for converting vegetable waste into valuable organic manure.

Keywords: *Vegetable waste, aerobic composting, organic manure, solid waste management,*

BSOP47

ISOLATION OF SECONDARY METABOLIC PIGMENTS OF SEAWEED (*ACANTHOPHORA SPICIFARA*) FOR ANTI-DIABETIC ACTIVITY

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia and associated complications, creating a growing demand for safe and effective natural therapeutics.

Marine red seaweeds have gained significant attention as promising sources of bioactive secondary metabolites with antidiabetic potential. The present study focuses on the isolation of secondary metabolic components from *Acanthophora spicifera*, a widely distributed red seaweed, and evaluates their applicability in the remediation of diabetes mellitus in the form of organic seaweed-based products. Secondary metabolites such as sulfated polysaccharides, phenolic compounds, flavonoids, terpenoids, and brominated compounds were isolated using solvent extraction and fractionation techniques. These compounds are known to exhibit antidiabetic activities including inhibition of carbohydrate- hydrolyzing enzymes, enhancement of insulin sensitivity, antioxidant activity, and protection against oxidative stress-induced pancreatic damage. The utilization of organic seaweed products derived from *A. spicifera* offers several advantages, such as (natural origin, biocompatibility, eco-friendly production, and the presence of multiple synergistic bioactive compounds with minimal side effects). Additionally, seaweed- based products may provide nutritional benefits along with therapeutic effects. However, certain disadvantages limit their (large-scale application, including variability in metabolite composition due to seasonal and environmental factors, challenges in standardization and dosage formulation, possible heavy metal accumulation, and limited clinical validation in humans). Despite these limitations, *A. spicifera* represents a valuable marine resource for the development of novel, sustainable, and organic antidiabetic agents. Further pharmacological studies, toxicity assessments, and clinical trials are essential to validate its efficacy and ensure safe incorporation into diabetes management strategies.

Keywords: *Diabetes mellitus, Acanthophora spicifera, Secondary metabolites, Bioactive compounds*

BSOP48

IN VITRO BIOACTIVITIES OF *PSORALEA CORYLIFOLIA* EXTRACTS/AgNPs AND ISOPSORALEN-P2Y12 TARGETING FOR CARDIOVASCULAR THERAPY

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ABSTRACT

This research investigates the multifaceted in vitro therapeutic potentials of methanol and ethanol extracts derived from *Psoralea corylifolia* L. (babchi) seeds—a prominent Ayurvedic medicinal plant—alongside green-synthesized silver nanoparticles (AgNPs), evaluating their antimicrobial, antifungal, antioxidant, anti-

inflammatory, hemolytic, and larvicidal activities, complemented by in silico molecular docking analysis of isopsoralen A against the human P2Y₁₂ receptor for cardiovascular disease management. Seeds procured from a Madurai Ayurvedic shop were cleaned, shade-dried, powdered, and subjected to successive Soxhlet extraction (25 g powder/250 mL solvent at respective boiling points), followed by qualitative phytochemical screening per Harborne (1998) protocols, which confirmed the presence of bioactive secondary metabolites including alkaloids (Mayer's test: cream precipitate), flavonoids (alkaline reagent: yellow coloration), tannins (gelatin: white precipitate), saponins (froth test: persistent foam), phytosterols (Salkowski's: reddish-brown ring), phenols (FeCl₃: bluish-black), carbohydrates (Benedict's: red precipitate), and proteins (Biuret: violet) across both extracts. AgNP biosynthesis was evidenced by black precipitate formation, UV-Vis spectral peak at 420 nm (200-600 nm scan), and FTIR analysis (400-4000 cm⁻¹) revealing stabilizing functional groups such as O-H stretches (phenolics/alcohols), C=O (carbonyls), and C-H (alkanes/aromatics). Bioassays demonstrated dose-dependent (25-100 µL) agar well diffusion inhibition against *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, and *Candida albicans*; superior DPPH radical scavenging (%RSA) by methanolic extract over ethanolic and ascorbic acid; potent HRBC membrane stabilization comparable to diclofenac sodium; negligible hemolytic zones; and up to 75% larvicidal mortality (*Culex quinquefasciatus*)/33% (*Anopheles stephensi*) 3rd instar larvae via methanolic AgNPs. In silico docking affirmed isopsoralen A's strong P2Y₁₂ binding for antiplatelet activity. These findings position *P. corylifolia* extracts/AgNPs as promising low-toxicity biotherapeutics for infection control, oxidative stress mitigation, inflammation, vector management, and cardioprotection.

Keywords: *Psoralea corylifolia*, silver nanoparticles, hemolytic assay, P2Y₁₂ receptor, isopsoralen A, cardiovascular disease.

BSOP49

SCREENING FOR ANTI-CANDIDAL POTENTIAL OF EPIPHYTIC ISOLATES FROM *TURBINARIA CONOIDES* (BROWN SEAWEED) THROUGH *IN VITRO* AND *IN SILICO* APPROACHES

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ABSTRACT

The rise of multidrug-resistant (MDR) fungal pathogens, particularly *Candida albicans*, presents a significant challenge to global health and clinical practice. This study investigates the anti-candidal potential of epiphytic microorganisms associated

with the brown seaweed *Turbinaria conoides*, collected from the Mandapam coastal region. Epiphytic bacteria, including the identified strain *Cobetia marina* (ORG 02), and actinomycetes were isolated and characterized through biochemical and molecular (16S rRNA sequencing) methods. Secondary metabolites were extracted using ethyl acetate and structurally characterized via FTIR and GC-MS. GC-MS analysis identified several bioactive compounds, including 2,4-Di-tert-butylphenol, Diethyl Phthalate, and L-Carnosine. Antimicrobial assays demonstrated that these crude extracts possess notable inhibitory activity against clinical pathogens like *Staphylococcus sp.* and *Pseudomonas sp.*, and promising anti-candidal activity against drug-resistant clinical isolates of *C. albicans* in a concentration-dependent manner. Furthermore, *in silico* molecular docking using CB-DOCK2 was performed to evaluate the binding efficiency of the identified ligands against fungal targets CYP51 and 2-Enoyl-CoA hydratase 2. The results revealed that 2,4-Di-tert-butylphenol exhibited a Vina score of -7.3, comparable to the commercial antifungal Clotrimazole (-8.8). Additionally, egg denaturation assays indicated anti-inflammatory properties through protein stabilization. This multidisciplinary study underscores the potential of seaweed-associated epiphytes as a sustainable source for developing novel therapeutic agents to combat antifungal resistance.

Keywords: *Anti-Candidal activity, Turbinaria conoides, Epiphytic bacteria, In silico docking, Drug-resistant Candida*

BSOP50

BIOPROSPECTING OF GUT MICROBIOTA FROM *OREOCHROMIS MOSSAMBICUS* AND *CHANNA STRIATA*: EVALUATING PROBIOTIC, THERAPEUTIC, AND PSYCHOBIOLOGIC POTENTIALS

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ABSTRACT

Fish gut microbiota serve as a "novel metabolic organ" essential for immune regulation and nutrient absorption. This study isolated and evaluated probiotic bacteria from *O. mossambicus* and *C. striata* for multi-functional therapeutic applications. Isolates were screened for probiotic traits, including tolerance to low pH, phenol, and NaCl. The lead isolate, identified via 16S rRNA sequencing as *Pseudomonas aeruginosa* strain KH26 (T-Pa), was used for secondary metabolite extraction via ethyl acetate. Potentials were assessed through antimicrobial assays, antioxidant scavenging, and *in silico* molecular docking. *P. aeruginosa* KH26 exhibited high auto-aggregation (78%), significant hydrophobicity, and non-hemolytic safety. Secondary metabolites showed

inhibitory zones (8–10 mm) against *E. coli* and *S. aureus*. Molecular docking of the metabolite Phenol, 3,5-bis(1,1-dimethylethyl)- demonstrated strong binding to GLUT1 (-5.30 kcal/mol) for anticancer potential and Glutamate decarboxylase (-5.27 kcal/mol) for psychobiotic potential. In vivo trials confirmed that a 12 mg/ml probiotic concentration significantly enhanced intestinal microvilli length and goblet cell counts in Nile tilapia. *P. aeruginosa* KH26 is a robust probiotic candidate with the potential to stabilize gut dysbiosis and serve as a source for novel pharmacological agents.

Keywords: *Pseudomonas aeruginosa*, Secondary Metabolites, Molecular Docking, Nile Tilapia, Psychobiotics.

BSOP51

BIOPROSPECTING THE EPIPHYTIC MICRO-BIODIVERSITY OF *STOECHOSPERMUM POLYPODIOIDES* FOR NOVEL THERAPEUTIC SECONDARY METABOLITES

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ABSTRACT

This study explores the bioactive potential of epiphytic bacteria and actinomycetes isolated from the brown seaweed *Stoechospermum polypodioides*. The research aimed to isolate, identify and evaluate the therapeutic efficacy of secondary metabolites produced by three primary epiphytic isolates were obtained and characterized using microscopic, macroscopic and biochemical analyses. Fourier Transform Infrared (FT-IR) spectroscopy indicated the presence of diverse functional groups, including alcohols, alkanes, aldehydes, aliphatic fluoro compounds and cyclohexane ring vibrations. The isolate *Bacillus vietnamensis* showed significant enzymatic activity and further chemical characterization was conducted via Gas Chromatography-Mass Spectrometry (GC-MS) on methanolic extracts. The pharmacological potential of these metabolites was evaluated through, anti-diabetic activity, anti-microbial activity using the Kirby-Bauer method against *Staphylococcus aureus* and *E. Coli*, with *B. Vietnamensis*, anti-inflammatory activity using the HBRC method and anti-mastitis activity against mastitis-causative pathogens, showed strong antagonistic potential. These findings suggest that marine epiphytes hold significant promise for the development of novel anti-microbial, anti-diabetic and anti-inflammatory agents, specifically in the treatment of bovine mastitis and human bacterial infections.

Keywords: Epiphytes, secondary metabolites, bovine mastitis.

BSOP52

OPTIMIZATION OF NUTRIENT INPUTS THROUGH INTEGRATED NUTRIENT MANAGEMENT IN GREEN GRAM (*VIGNA RADIATA*)

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ABSTRACT

Integrated Nutrient Management (INM) represents a sustainable agricultural strategy that integrates inorganic fertilizers, organic manures, and bio-fertilizers to optimize soil fertility, enhance crop productivity, and minimize environmental pollution hazards. The present study evaluates the impact of different INM schedules on growth, physiological performance, and yield attributes of green gram (*Vigna radiata* L.) under field condition. A field experiment was conducted using various combinations of reduced level of inorganic fertilizers, organic manures, and bio fertilizers to assess their synergistic effects on biometric parameters, chlorophyll content, protein content, nutrient use efficiency, and overall crop vigor. Observations were recorded on plant height, number of branches, leaf area, biomass accumulation, and yield performance. Results demonstrated that the integrated application of reduced levels of inorganic fertilizers along with organic manures and bio-fertilizers significantly improved plant growth, chlorophyll concentration, protein accumulation, and yield compared to sole chemical fertilizer application and control treatments. The combined nutrient approach enhanced nutrient availability, improved soil biological activity, and promoted better physiological efficiency in green gram. The findings highlight the potential of INM to enhance crop productivity while sustaining soil health and reducing dependence on synthetic chemical inputs. Although INM offers considerable agronomic and environmental advantages, its large-scale adoption remains constrained by socio-economic limitations, limited farmer awareness, and policy-related challenges. This study underscores the role of INM as a viable strategy for sustainable intensification and provides practical insights for farmers, researchers, and policymakers seeking to promote resilient and eco-friendly practice of green gram farming.

Keywords: *Crop Yield, Soil Fertility, Green, Integrated Nutrient Management.*

STUDY ON THE BIOLOGY OF CATOPSILIA POMONA AND EUREMA HECABE

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ABSTRACT

Butterflies (Order: Lepidoptera) are ecologically significant insects widely recognized as sensitive bioindicators of climatic variation, habitat quality, and anthropogenic disturbance. Their strict seasonal occurrence, host plant specificity during the larval stage, and dependence on nectar resources as adults make them valuable models for studying population dynamics, community structure, and ecosystem stability. The present study was undertaken to investigate the life cycle biology of *Catopsilia pomona* and *Eurema hecabe*, two commonly distributed pierid butterflies. Field observations and laboratory rearing were conducted to document the developmental stages including egg, larval instars, pupa, and adult emergence, along with host plant association, developmental duration, and seasonal abundance. Both species exhibited complete metamorphosis, with observable differences in larval morphology, pupation behavior, and duration of developmental stages. The study also examined their feeding relationships, habitat preference, and response to environmental conditions. As butterflies are highly responsive to changes in temperature, precipitation, vegetation composition, and urbanization, fluctuations in their population and distribution patterns can reflect broader ecological shifts. Understanding the biology and ecological interactions of these species contributes to biodiversity assessment and provides baseline information for conservation planning. The findings emphasize the importance of butterflies not only as pollinators and contributors to ecosystem functioning but also as practical indicators for monitoring environmental change and evaluating the potential impacts of climate variability on insect populations.

ANTIMICROBIAL AND ANTIBIOFILM POTENTIAL OF MYCOCIN EXTRACTED FROM YEAST ISOLATES AGAINST POLYMICROBIAL BIOFILMS

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ABSTRACT

Fungal-bacterial polymicrobial biofilms, particularly those formed by *Candida albicans* and *Staphylococcus aureus*, are major contributors to chronic wound infections such as diabetic foot ulcers and exhibit high resistance to conventional antimicrobial therapies. This study aimed to explore yeast-derived mycocin as a natural antibiofilm agent against such resilient microbial communities. Yeasts were isolated from black grapes and identified through morphological analysis and 18S rRNA sequencing. Mycocin-producing strains were screened, and the toxin was extracted using ammonium sulfate precipitation and characterized by FTIR analysis. The antimicrobial activity of the extracted mycocin was evaluated against *S. aureus* and *C. albicans* using agar well diffusion. A polymicrobial biofilm model mimicking diabetic wound conditions was established in microtiter plates using glucose-enriched media and bovine serum albumin, and biofilm inhibition and eradication were quantified using crystal violet assay and scanning electron microscopy. The extracted mycocin exhibited significant antibacterial and antifungal activity, producing inhibition zones of 12–18 mm against *S. aureus* and reducing polymicrobial biofilm biomass in both prevention and eradication assays. SEM analysis confirmed disruption of biofilm architecture and reduction of extracellular matrix. FTIR results validated the proteinaceous nature of the mycocin. These findings demonstrate that mycocin from yeast isolates possesses strong antimicrobial and antibiofilm properties, highlighting its potential as a novel, natural therapeutic agent for managing biofilm-associated infections in diabetic wounds.

Keywords: Mycocin, Killer yeast, *Candida albicans*, *Staphylococcus aureus*, Polymicrobial biofilm, Diabetic wound

BSOP55

THE BIOACTIVE BENEFITS OF EDIBLE SEAWEED IN INTESTINAL FLORA

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ABSTRACT

Marine seaweed is a large marine algae that grows in oceans and coastal regions. It is a nutrient-rich natural resource containing vitamins, minerals, dietary fiber, proteins, antioxidants, and omega-3 fatty acids. Seaweed also contains important bioactive compounds such as fucoidan, laminarin, alginate, polyphenols, and carotenoids, which provide antioxidant and anti-inflammatory properties. The dietary fiber present in marine seaweed is not completely digested in the stomach. It reaches the large intestine and acts as a natural prebiotic by promoting the growth of beneficial gut bacteria. This helps maintain healthy intestinal flora, improve digestion, enhance nutrient absorption, and strengthen immunity. Due to its nutritional, medicinal, and industrial value, marine seaweed has gained importance in the food, pharmaceutical, biotechnology, and agricultural sectors. Therefore, marine seaweed is considered a valuable functional food that supports gut health and overall well-being.

BSOP56

3C CURATIVE FOR CANCER

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ABSTRACT

Cancer remains one of the most challenging diseases to treat due to uncontrolled cell proliferation, resistance to apoptosis, and metastasis. Conventional chemotherapy and radiotherapy often cause systemic toxicity and damage to healthy tissues, highlighting the need for safer, targeted therapeutic strategies. Natural bioactive compounds such as carotenoids and curcumin possess well-documented antioxidant, anti-inflammatory, and anticancer properties, while collagen offers a biocompatible scaffold for drug delivery and tissue repair. This work explores a novel therapeutic approach based on a carotenoids–curcumin–collagen (3C) mixture as a multifunctional system for cancer management.

Keywords: *Cancer, Bioactive compound, Carotenoids, curcumin, collagen, Antioxidant, Anti-cancer Properties.*

BSOP57

BRAIN EVOLUTION: FROM INSTINCT TO INTELLIGENCE

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ABSTRACT

The evolution of the human brain represents a remarkable journey from primitive survival mechanisms to complex cognitive and social intelligence. Over millions of years, structural and functional modifications in brain regions such as the brainstem, limbic system, and neocortex have progressively shaped human behavior. Early vertebrates relied primarily on instinct-driven responses regulated by the brainstem, ensuring survival through reflex actions and aggression. With the emergence of mammals, the expansion of the limbic system enabled emotional processing, memory formation, and social bonding. In primates and early humans, significant enlargement of the neocortex and prefrontal cortex facilitated language development, abstract reasoning, moral judgment, and advanced problem-solving. These neuroanatomical changes supported the rise of culture, cooperation, and technological innovation. In the modern era, rapid environmental and digital transformations interact with ancient neural circuits, influencing attention, stress responses, and reward pathways. Understanding brain evolution provides insight into contemporary human behaviors, psychological adaptations, and emerging mental health challenges. This evolutionary perspective bridges biology, behavior, and society, highlighting how ancient neural foundations continue to shape modern human life.

Keywords: *Brain evolution; Human behavior; Neocortex; Limbic system; Prefrontal cortex; Neuroplasticity; Social intelligence; Cognitive development; Ancient to modern transition.*

MCSOP1

PERISTALTIC MOTION OF FRACTIONAL SECOND-GRADE NANO FLUID IN A CONVERGENT/DIVERGENT CHANNEL WITH COMPLEX WAVE PROPAGATION WITH IMPACT OF SURFACE ROUGHNESS, JOULE HEATING AND PERIODIC MAGNETIC FIELD

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ABSTRACT

This research focuses on examining the surface roughness and Joule heating on periodic magnetic field in peristaltic transport of fractional Second-Grade (S-G)

nanofluid through a convergent/divergent channel with complex wave propagation with assumption of long wavelength and Renold's number conditions. The governing equations are converted from dimensional to non-dimension by using a suitable dimensionless parameter. Caputo's formulation offers analytical insights into the problem. The influence of physical boundary conditions on the flow characteristics is quantified and visualized through graphical plots. The HAM is utilized to solve momentum, energy, and mass equations, yielding analytical solutions. Results demonstrate that heat transfer in the system is predominantly driven by the Joule heating effect, and a higher magnetic parameter corresponds to a decrease in fluid's velocity. The outcomes of this investigation hold significant relevance for biomedical applications, such as modeling chyme transport in the gastrointestinal tract and optimizing blood flow regulation during surgical interventions. Furthermore, the study advances the theoretical understanding of complex fluid dynamics and contributes valuable insights for industrial processes, particularly in enhancing thermal management and heat transfer efficiency in engineering systems.

Keywords: *Joule Heating, Surface Roughness, Periodic Magnetic Field, Peristaltic Transport, Fractional Second-Grade Nanofluid, Convergent/Divergent Channel, Complex Wave Propagation.*

MCSOP2

STABILITY OF IMPULSIVE HILFER FRACTIONAL INTEGRODIFFERENTIAL STOCHASTIC SYSTEMS WITH POISSON JUMP

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ABSTRACT

In this paper, the existence of solutions and the stability results are derived for impulsive Hilfer fractional integrodifferential stochastic systems (IDSSs) with Poisson jumps in R^n space. The main results are obtained by using fractional calculus, stochastic analysis approach, and measure of non-compactness (MNC) via Mo'inch fixed point technique for the first time in the literature to the finite dimensional space. For the stability result, boundedness properties of Mittag-leffler (M-L) function is effectively used. Two numerical examples are given for verification of theoretical results.

Keywords: *Hilfer fractional derivative, Measure of non-compactness, Mo'inch fixed point, Stochastic differential equations, Poisson jump.*

MCSOP3

A STUDY ON EAR DECOMPOSITION IN FUZZY GRAPHS

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ABSTRACT

Fuzzy graph theory provides a mathematical framework for modeling systems with uncertainty and partial relationships. Connectivity analysis in fuzzy graphs has been significantly developed through the concepts of strong arcs and strong paths. However, structural decomposition methods analogous to classical ear decomposition have not yet been systematically formulated in the fuzzy setting. In this paper, we introduce the notion of fuzzy ear and fuzzy ear decomposition using strong paths and arc classifications including α -strong, β -strong, and δ -arcs. Necessary and sufficient conditions for the existence of fuzzy ear decomposition are established. This work extends classical decomposition techniques into fuzzy graph theory and opens new directions for connectivity-based structural analysis.

Keyword: *Fuzzy graph, Fuzzy Ear decomposition, Strong path, α -strong arc, β -strong arc, Connectivity.*

MCSOP4

COMPUTATIONAL SOLUTION OF FRACTIONAL ORDER DIFFERENTIAL EQUATIONS USING FINITE DIFFERENCE METHOD IN MATLAB

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ABSTRACT

In this paper, a computational study of fractional-order differential equations is carried out using the finite difference method. The fractional derivative is considered in the Caputo sense, and suitable discretization techniques are applied to convert the problem into an algebraic system. The numerical implementation is performed using MATLAB to analyze the behavior of the solution for different fractional orders $0 < \alpha \leq 1$. Several test problems with known analytical solutions are considered to evaluate the accuracy and efficiency of the method. Error analysis using maximum norm demonstrates the reliability and effectiveness of the proposed approach.

This study highlights the effectiveness of the method and its potential for application in various scientific and engineering models.

Keywords: *Fractional order differential equations, Numerical methods.*

MCSOP5

AN APPROACH OF USING KATZ'S AND PETROSIAN'S FRACTAL DIMENSION TO PREDICT THE SEVERITY OF ALPHA THALASSEMIA AND BETA THALASSEMIA

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ABSTRACT

Mutations in the genome in the HBA along with HBB loci induce alpha and beta thalassemia, hereditary haemoglobin ailments characterized by inadequate or insufficient α - and β -globin chain production, respectively. The clinical severity of these ailments differs significantly based on the specific type of variation, its frequency, and the structural disruption within the genome.

The study suggests a nonlinear mathematical structure to facilitate fractal dimension analysis-based illness severity prediction. Using Katz's Fractal Dimension (KFD) and Petrosian's Fractal Dimension (PFD), genomic DNA sequences linked to α - and β -thalassemia are numerically encoded and evaluated. Petrosian's approach leverages derivative sign changes to determine local signal variations, whereas Katz's algorithm assesses global geometric complexity based on curve length and diameter. The computation of the fractal dimensions is depicted. According to comparative study, larger fractal dimension values are associated with more structural complexity and mutation-induced irregularity, both of which are correlated with higher clinical severity. As a result of more varied mutation patterns and functional disruption, β -thalassemia sequences often show better FD values than α -thalassemia sequences. The hypothesized fractal-based prediction model shows potential as an early-stage genetic screening and severity assessment computational diagnostics. This method provides a comprehensive and accurate approach for determining the development of mutation-driven ailments by spanning the disparity between mathematical signal processing and DNA sequencing.

Keywords: *α Thalassemia, β Thalassemia, Katz's Fractal Dimension (KFD), Petrosian's Fractal Dimension (PFD), genomic.*

MCSOP6

FAMILIES OF TERNARY QUADRATIC DIOPHANTINE EQUATIONS: EXISTENCE AND PARAMETRIC METHODS

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ABSTRACT

This study examines a class of non-homogeneous quadratic Diophantine equations in three variables. By employing suitable algebraic transformations and analytical techniques, various structural characteristics of their non-zero integer solutions are established. The investigation reveals important properties governing the existence and behavior of these solutions. Furthermore, the results uncover noteworthy connections between the obtained solutions and certain polygonal number patterns, thereby providing additional insight into their underlying number-theoretic structure.

Keywords: *Integral solutions, Figurate numbers, Quadratic equation with three unknowns*

MCSOP7

QSAR ANALYSIS FOR SOME UNICYCLIC NITRATED POLYCYCLIC AROMATIC HYDROCARBONS USING SOME ZAGREB INDICES AND NON-NEIGHBOR ZAGREB INDICES

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ABSTRACT

A topological index is a numerical value for the correlation of chemical structure with various physical properties, chemical reactivity, or biological activity. Nitrated polycyclic aromatic hydrocarbons (Nitro-PAHs) are widespread environmental pollutants found in the exhaust fumes of gasoline and diesel combustion engines, in certain food products as a result of incomplete combustion, and in general, in combustion source emissions. In both drug discovery and environmental toxicology, QSAR models are now regarded as scientifically credible tools for predicting and classifying the biological activities of untested chemicals.

In this work, we are carrying out QSAR analysis for some unicyclic nitrated polycyclic aromatic hydrocarbons with their mutagenic activity (logTA100) using some Zagreb indices and Non-Neighbor Zagreb indices.

Keywords: QSAR analysis, Zagreb indices, Non-Neighbor Zagreb indices.

MCSOP8

FUZZY INTRINSIC EDGE MAGIC GRAPHS: INFERENCES ON FUZZY STRONG AND FUZZY WEAK GRAPHS WITH ABSTRACT PROPERTIES

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ABSTRACT

Fuzzy graph theory has emerged as a powerful tool for modeling uncertain relationships. A fuzzy graph $G=(\beta,\gamma)$ is said to be intrinsic edge-magic if it satisfies the intrinsic edge-magic labeling with intrinsic constant $\lambda_c = \beta(u) + \gamma(uv) + \beta(v)$, for all $u, v \in V$. In this article, we exploring fuzzy paths, stars and cycles can exhibit interesting properties under fuzzy strong and fuzzy weak graphs specifically through the lens of fuzzy intrinsic edge magic graphs with some abstract properties.

Keywords: Fuzzy graphs, fuzzy magic graphs, fuzzy intrinsic edge magic labeling, intrinsic constant, intrinsic edge magic graphs, fuzzy strong and fuzzy weak graphs.

MCSOP9

RELATION OF LINEAR DIFFERENTIAL POLYNOMIALS AND DIFFERENTIAL-DIFFERENCE POLYNOMIALS WITH A MEROMORPHIC FUNCTION

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ABSTRACT

In this paper, we prove that a finite-order transcendental meromorphic function (z) in the complex plane cannot share a Borel exceptional value β counting multiplicities (CM) with a differential-difference polynomial generated by f . Furthermore, we show that if a meromorphic function (z) of hyper-order strictly less than one and its associated linear differential polynomial (f) share the values a and ∞ counting multiplicities (CM), then

$$f(z) \equiv L(f).$$

Math. Subj. Classification 2020: 30D20, 30D30 30D35.

Keywords: Meromorphic function, linear, differential-difference polynomial, sharing, exceptional value.

MCSOP10

MATHEMATICAL MODELING AND FORECASTING OF STUDENTS' ACADEMIC PERFORMANCE

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ABSTRACT

Academic performance is a key indicator of students' learning outcomes and long-term educational development. Analyzing existing performance patterns can provide valuable insights into future academic trends. This study focuses on the mathematical modeling of students' academic performance using examination records collected from college students. Marks obtained across five core subjects from multiple assessment periods are examined to understand subject-wise performance behavior and overall academic consistency.

The study adopts a quantitative research approach in which mathematical measures are employed to identify relationships among subject scores and to analyze variations in student performance across assessments. Based on the observed patterns, a mathematical framework is developed to project future academic performance trends over a five-year horizon under consistent academic conditions. The model aims to estimate long-term performance behavior rather than exact future outcomes. The findings demonstrate the potential of mathematical modeling as a predictive tool in educational assessment. By utilizing existing academic records, the proposed approach offers a structured method for forecasting performance trends, which may assist educators and institutions in academic planning and performance evaluation.

Keywords: *Academic Performance, Mathematical Modeling, Predictive Analysis, Educational Assessment, Performance Forecasting.*

MCSOP11

HANDWRITTEN TAMIL CHARACTER CLASSIFICATION USING CNN

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ABSTRACT

Tamil Character Recognition using Convolutional Neural Networks (CNN) involves designing a system that can automatically identify and classify Tamil characters from handwritten text. By using a CNN, which is a type of deep learning model, the system learns patterns and features in images of Tamil characters. CNNs are particularly effective because they can automatically detect important visual features such as edges, shapes, and textures, which are crucial for recognizing different characters. This method is typically trained on a large dataset of labeled Tamil characters and, once trained, the model can accurately predict the character. The goal is to create a reliable and efficient system for Tamil script recognition, which can be used in various applications like optical character recognition (OCR) systems for digitizing documents or in automated language processing tools.

This paper presents a novel approach for recognizing handwritten Tamil characters, a vital task in preserving and promoting the rich heritage of the Tamil language. Leveraging the power of deep learning, specifically Convolutional Neural Networks (CNNs), our system achieves remarkable accuracy in recognizing Tamil characters with diverse writing styles. CNNs proved to be highly effective in handling the complexity of Tamil script, achieving impressive accuracy in recognizing and differentiating between various characters.

The model demonstrated its ability to learn key features from a dataset, making it a strong candidate for applications like Tamil Optical Character Recognition (OCR) and digitization of hand written content.

As a future enhancement, the proposed system can be extended to recognize complete Tamil words by integrating Recurrent Neural Networks (RNNs) with Convolutional Neural Networks (CNNs). While CNNs extract character features, RNNs can learn the sequence of characters, enabling accurate handwritten Tamil word recognition. The system can also be improved using larger datasets and integrated into real-time OCR applications for digitizing handwritten documents.

MCSOP12

INNOVATIVE SOLUTIONS THROUGH EMERGING TECHNOLOGIES: COMPUTING, ARTIFICIAL INTELLIGENCE AND CYBER TECHNOLOGY

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ABSTRACT

Emerging technologies such as advanced computing, artificial intelligence (AI), and cyber technology are reshaping the way we live, work, and solve everyday problems. These technologies are no longer limited to technical fields; they are now widely used in healthcare, banking, education, agriculture, and business to improve efficiency, accuracy, and decision-making. Artificial intelligence helps automate tasks, analyse large amounts of data, and provide predictive insights, while modern computing technologies enable faster processing and smarter digital systems. At the same time, cyber technology plays a vital role in protecting sensitive data, ensuring privacy, and safeguarding digital platforms from growing cyber threats.

This paper explores how the combination of computing, AI, and cyber technologies can provide innovative solutions to real-world challenges.

Examples include AI-based fraud detection in digital banking, smart healthcare monitoring systems, intelligent customer service chatbots, and stronger cybersecurity frameworks for businesses and individuals. The paper also discusses recent developments such as cloud computing, machine learning, blockchain security, and the increasing need for ethical AI practices.

However, the rapid growth of these technologies also brings challenges, including data privacy concerns, ethical questions, cybersecurity risks, and the need for skilled professionals. Overall, emerging technologies have the potential to drive innovation, improve quality of life, and support sustainable development when used thoughtfully and responsibly.

A HYBRID YOLO–FASTER R-CNN NETWORK FOR AUTOMATED TRAP- BASED PEST DETECTION IN VEGETABLE CROPS

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ABSTRACT

Timely monitoring of insect pest populations is essential for effective Integrated Pest Management (IPM) in vegetable crops. Manual insect counting on sticky and pheromone traps is labor-intensive, error-prone, and unsuited for real-time decisions. This study introduces HYBRID-TRAPNet, a hybrid deep learning model that merges YOLO's real-time detection with Faster R-CNN's precise region refinement for automated pest detection on traps. The proposed system collects images from yellow sticky and pheromone traps in tomato and cucumber fields. HYBRID-TRAPNet uses a YOLO backbone for rapid candidate region detection, then applies a Faster R-CNN module to accurately classify and localize small insects, such as whiteflies, thrips, aphids, and moths. The architecture is optimized for detecting small objects in challenging field conditions, including insect occlusion, overlap, lighting variation, and trap contamination. Experimental results demonstrate improved mean Average Precision (mAP) compared to standalone YOLO and Faster R-CNN models, while maintaining near real-time performance.

The system provides automated pest population counts to support threshold-based IPM decisions. This research contributes toward scalable, intelligent pest surveillance systems for precision vegetable agriculture.

Keywords: *Automated Pest Monitoring, Sticky Traps, Deep Learning, YOLO, Faster R-CNN, Hybrid Detection Network, Small Object Detection, Precision Agriculture, Integrated Pest Management, Vegetable Crops.*

ENGAGEMENT-DRIVEN ATTENDANCE VALIDATION SYSTEM USING AI MODELS

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ABSTRACT

Traditional attendance systems evaluate only physical presence and do not account for student engagement or conceptual understanding, limiting their academic participation. This paper presents E-DAV (Engagement-Driven Attendance Validation System), an Artificial Intelligence based web application designed to validate attendance based on cognitive engagement demonstrated through handwritten lecture notes. Students submit handwritten notes after each lecture, which are processed using Optical Character Recognition (OCR) to extract textual content. The extracted text is converted into embedding vectors using nomic-embed-text-v1.5 and analyzed using Artificial intelligence models such as llama-4-maverick-17b-128e-instruct, Gemini flash 2.5 to evaluate conceptual relevance, detect semantic similarity using cosine similarity search among peer submissions, and identify potential AI-generated or copied content. Based on these analyses, the system performs automated attendance validation.

E-DAV is implemented using Fast API, ReactJS, Supabase, and hybrid AI deployment, integrating locally hosted embedding models with cloud-based reasoning services. The system provides dedicated interfaces for students and instructors, enabling scalable monitoring and analytics of student engagement. By transforming attendance from a presence-based metric into an understanding-based evaluation, E-DAV is a scalable, objective, and intelligent framework for modern academic environments, improving attendance integrity, and promoting active learning.

Keywords: *Artificial Intelligence, Optical Character Recognition, Attendance Validation, Semantic Embedding, Cloud Services, Vector Database.*

MCSOP15

A VIRTUAL LABORATORY FRAMEWORK FOR TAMIL-MEDIUM SCIENCE PRACTICAL EDUCATION

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ABSTRACT

Practical laboratory sessions play a vital role in science education; however, many school students face difficulties in understanding experiments due to language barriers and limited access to physical laboratory resources. Most existing virtual laboratory platforms are available only in English, posing a significant challenge for Tamil-medium learners and affecting their comprehension, confidence, and practical performance. In addition, several available simulation tools provide limited interactivity and unclear result visualization, leading students to focus more on theory than hands-on understanding.

A Tamil-based virtual practical laboratory simulation system designed to enhance the understanding of school-level science experiments. The proposed system provides experiment procedures, apparatus descriptions, and observations in simple Tamil, supported by interactive animations that replicate real laboratory activities. It also includes accurate result visualization, a Tamil glossary of scientific terms, assessment modules, and experiment history tracking. The system promotes inclusive learning, improves student engagement, and serves as an effective alternative to physical laboratories for regional-language education.

Keywords: *Virtual laboratory, Tamil medium education, science simulation, e-learning, practical experiments*

MCSOP16

DEPRESSION RISK DETECTION USING SMARTPHONE BEHAVIOUR MINING AND MACHINE LEARNING TECHNIQUES

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ABSTRACT

Depression is one of the most common mental health disorders worldwide, yet early detection remains challenging due to social stigma, limited awareness, and dependence on self-reported questionnaires.

Traditional screening methods require individuals to actively recognize and report their symptoms, which may not always be timely or accurate.

To address this limitation, this study proposes a passive and data-driven approach for early depression risk detection using smartphone behaviour mining. The proposed work analyzes daily smartphone usage patterns to identify behavioural changes associated with depressive symptoms. The study uses a publicly available Smartphone Usage Behaviour Dataset, which includes non-invasive behavioural indicators such as app usage duration, screen activity patterns, typing speed, night-time phone usage, and interaction frequency. These features are processed to capture deviations from normal usage behaviour that may reflect mood disturbances and reduced cognitive engagement. Machine learning algorithms, including Logistic Regression and Random Forest, are applied to classify users into different depression risk levels low, moderate, or high. The approach focuses on analysing behavioural metadata rather than personal content, thereby ensuring user privacy and ethical data usage. The outcome of this research is an early-warning mental health monitoring system that supports timely identification of depression risk. This system can assist individuals, caregivers, and healthcare professionals in taking preventive action and promoting proactive mental well being without relying on direct questionnaires or self-reporting.

MCSOP17

ACADEMIC AND PSYCHOLOGICAL COMPARISON WITH AI-DRIVEN GROWTH COGNITIVE MODEL

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ABSTRACT

Attention to behavioral and psychological factors is crucial now a days in educational institutions which make the teaching and learning process smooth and ultimate success. There are few literatures where the various components of behavior, emotion and cognition are aligned into a single model that predicts students' performance in institutions. It is general psychology that if the student scores high, he can handle everything. There is much discussion in current literature about the hidden and stagnation problem like high academic score but loss obsession, low improvement intent and emotional instability of present era students.

The current work introduces a Dynamic Growth Loss Cognitive Index (GLCI), an AI-based integrated model that incorporates the academic trend indicators like emotional stability, improvement intent, discipline consistency, cognitive teaching frequency alignment, and obsession loss.

This work is a demand driven shift from measuring achievement by scores to modeling intelligence as growth based. This work flags the risk of the current era high scorers. The ethical considerations were strictly followed and none of the participants information was revealed. A group of 34 diploma level students are selected as a convenience sampling, and the model is tested. The results using the GLCI model (distributed z score for all the parameters taken) show that the normal students (18), stagnation Risk (4), Growth oriented high achievers (3), moderate stable group (3), Hidden stagnation (2). Out of 34 students, 14 students are showing the negative GLCI score and explains that their standard deviation is below the equilibrium. The model empirically shows that growth is predicted more by mindset, emotional stability and the relational maintenance than marks. The GLCI models accuracy is 0.99 with 95% of CI (0.6306,1) using the HIS cutoff (0.5229) as predicted by the model. The results show a system by which long-term academic and psychological development can be screened for. The AI based early waning model RF with importance parameter analysis shows that the top 3 parameter importance by Random Forest Model are Hidden Stagnation Index (1st rank), Facilitator support (2nd rank), approachability to the facilitator(3rd rank). Longitudinal psychological dimensions are used by Explainable AI (SHAP) to predict future growth, with test scores only having a lighter influence. This shows that the students with high academic scores do not have high HSI and the growth is in fragile stage. In this stage, preventive counseling and academic cum behavioral intervention is needed. The number of samples and sampling methods used here is the limitation of this work. Dropout and burnout risks can be considered for future development of this work.

Keywords: *Academic, AI, Students, Stagnant, psychology.*

MCSOP18

AGRI CONNECT – A COMPREHENSIVE DIGITAL ECOSYSTEM FOR PRECISION FARMING AND COMMUNITY EMPOWERMENT

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ABSTRACT

Agri Connect is an integrated, multifaceted digital platform designed to bridge the systemic gap between traditional farming practices and the modern, data-driven agriculture.

Information asymmetry, volatile market prices, and lack of localized technical support are some of the persistent challenges faced by the farmers and therefore we have on a solution by designing a centralized platform to streamline decision-making and empower farmers through technology.

The platform's core innovation lies in its Customized Assistance module, which utilizes Machine Learning algorithms to deliver precision crop recommendations by analyzing real-time soil fertility data and weather patterns. By processing complex environmental variables, the system provides actionable insights that help optimize agricultural yields. Additionally, the platform integrates advanced data analytics and predictive modeling techniques to support informed decision-making, enabling farmers to adopt efficient farming practices and improve overall productivity. Furthermore, this system promotes data-driven agriculture by bridging the gap between modern technological solutions and traditional farming practices, thereby fostering sustainable and intelligent farming ecosystems.

Beyond technical utility, the platform integrates a Social Networking layer where farmers can share lived experiences, post updates, and seek peer-to-peer solutions, effectively digitizing the community spirit essential to agriculture. Furthermore, the work incorporates real-time Market Trend Analysis via open APIs, allowing farmers to track current prices and navigate market fluctuations with confidence. This work demonstrates the potential of intelligent software solutions to drive socio-economic empowerment and sustainability in the primary sector.

MCSOP19

ASM-NET: AN ADAPTIVE SYMBOLIC MAPPING NETWORK FOR EFFICIENT LOSSLESS DATA COMPRESSION

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ABSTRACT

Modern data infrastructure is struggling with an explosion of high-resolution digital media. Traditional lossless compression standards, such as LZW and DEFLATE, rely on fixed-rule dictionary matching which often fails to capture complex, non-linear redundancies in raw bitstreams. This research introduces the Adaptive Symbolic Mapping Network (ASM-Net), a framework designed to evolve beyond static compression rules using Artificial Intelligence.

ASM-Net utilizes a 1D-Convolutional Neural Network (CNN) to act as an intelligent scanner, identifying recurring 16-bit and 32-bit patterns within serialized binary data. These patterns are transformed into optimized symbols through Adaptive Symbolic Mapping, effectively creating a custom "shorthand" for any given file. To prevent file expansion due to metadata, the system employs a Heuristic Mathematical Filter.

This filter performs a real-time cost-benefit analysis, ensuring a pattern is only mapped if the spatial saving exceeds the storage cost of the dictionary header.

The result is a strictly lossless, high-efficiency compression model with a Zero Bit-Error Rate. ASM-Net demonstrates that lightweight AI can significantly reduce the storage footprint on resource-constrained edge devices, providing a scalable alternative to traditional data reduction methods.

Keywords: *Lossless Compression; 1D-CNN; Adaptive Symbolic Mapping Network; Data Reduction.*

MCSOP20

EMAIL SPAM CLASSIFICATION: USING MULTINOMIAL NAIVE BAYES

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ABSTRACT

Unsolicited bulk messages (spam) severely affect user experience and pose security risks such as phishing and malware, highlighting the need for automated filtering systems. This study proposes a supervised machine learning framework for classifying email messages as spam or legitimate (ham), focusing on the effectiveness of the Multinomial Naive Bayes algorithm for text-based spam detection. The raw text data undergoes standard Natural Language Processing (NLP) steps, including case normalization, tokenization, stop-word removal, and filtering of special characters, to ensure a consistent and noise-free dataset. The processed text is converted into numerical features using Count Vectorizer and Term Frequency–Inverse Document Frequency (TF-IDF) methods, enabling the model to identify key terms that differentiate spam from legitimate emails. Various classifiers Multinomial Naive Bayes, Logistic Regression, and Support Vector Machines – are trained and evaluated on a labelled spam–ham dataset using accuracy, precision, recall, and F1 score as performance metrics.

Results show that the Multinomial Naive Bayes model achieves the best trade-off between precision and recall, minimizing false positives while maintaining strong overall detection accuracy. Finally, the model is deployed via a Streamlit-based web application, providing an interactive, real-time system for spam classification, demonstrating an efficient and scalable approach to combating email spam.

Keywords: *Email spam detection, Multinomial Naive Bayes, Machine learning Classification, Natural language processing (NLP), TF-IDF Feature Extraction*

DIGITAL HYGIENE: THE ADHERING OF CYBER SECURITY POLICIES IN EVERYDAY LIFE

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ABSTRACT

We live in an era where losing a smartphone feels more catastrophic than losing a wallet, highlighting how deeply digital technologies are embedded in everyday life. From UPI (Unified Payments Interface) transactions to private social media interactions, sensitive personal and financial data are constantly stored and exchanged online. However, the rapid growth of digital dependency has also led to a rise in cyber security attacks, including phishing, identity theft, ransom ware, and social engineering fraud. Despite advanced technological safeguards, most breaches occur due to the human element rather than system failure. Weak passwords, clicking malicious links, and trusting fraudulent “customer care” calls remain major causes of compromise. This paper focuses on the importance of adhering to cyber security policies in everyday life as a preventive defense mechanism. It emphasizes digital hygiene practices such as multi-factor authentication, regular software updates, strong password management, and cautious evaluation of unsolicited communications. The study also proposes a practical solution, the Link Verification System, which allows users to verify whether a URL is legitimate or malicious before accessing it. By encouraging strict adherence to cyber security guidelines and promoting awareness-driven habits, individuals can significantly reduce their exposure to digital threats.

Ultimately, in a world that never logs off, adherence to cyber security policies is not optional but essential for safeguarding privacy, finances, and overall digital well-being.

Keywords: *Digital Hygiene, Multi-Factor Authentication, Link Verification System, Digital Safety, Cyber Resilience*

MCSOP22

ADDRESSING CHALLENGES IN DIGITAL AGRICULTURE FOR INDIAN FARMERS

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ABSTRACT

Digital technologies at present have the potential to make the Agriculture a more efficient one, by providing access to information about the core and basic elements of Agriculture (crops, lands, soil, market, etc..) and enabling expert advice facility. However, in India, Agriculture platforms are difficult to adopt because of low digital literacy among the farmers. Digital Agriculture platforms that are already existing are mainly focus on providing individual services, requires continuous reliable internet connectivity, have complex interfaces, face multilingual limitations; these are the practical challenges faced by the Indian farmers. The main objective of this paper is to identify the challenges faced by the farmers while interacting with those platforms. It aims to propose to build an platform that improves usability, accessibility, and reliability under low connectivity conditions. The methodology is to analyse the agriculture platforms to identify the challenges faced by the Indian farmers. Based on these findings, an offline-first architecture is proposed with simplified platform interfaces, multilingual support, unified facilities and SMS-based communication. This design also reduces platform fragmentation and enhances overall usability. This paper suggest the key challenges faced by Indian farmers and propose to build an farmer friendly agriculture platform. By focusing on accessibility, connectivity, simplified interfaces, this approach has the potential to improve digital Agriculture adoption among the Indian farmers, especially those in rural areas which are still under development.

Keywords: *Digital agriculture, Indian farming, Offline-first platform, Rural connectivity, SMS-based communication.*

MCSOP23

ARTIFICIAL INTELLIGENCE BASED ENTROPY ROUTING NETWORK

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ABSTRACT

This paper introduces an AI based Entropy Routing Network (ERN) that intelligently adapts its computational depth by leveraging Shannon entropy to quantify the complexity and uncertainty of each input sample.

After comprehensive data collection and preprocessing including normalization, reshaping, and systematic train-test splitting an entropy computation module evaluates the informational content of the input. Based on the resulting entropy score, an AI driven dynamic routing mechanism selectively directs samples through different processing paths, enabling conditional computation. Low-entropy, less complex inputs are efficiently handled by a lightweight classifier, while high entropy, information-rich samples are routed to a deep CNN backbone for enhanced feature extraction and discrimination. This hybrid architecture effectively balances model accuracy, inference speed, and computational cost, avoiding unnecessary deep-layer activation for simple inputs. Experimental validation on standard benchmark datasets demonstrates that ERN achieves substantial computational savings, lower latency, and energy efficiency, while maintaining near state-of-the-art accuracy, making it highly suitable for real-time, scalable, and resource-constrained AI applications.

Keywords: *Entropy Routing Network (ERN), Shannon Entropy, Adaptive Inference, Dynamic Routing / Conditional Computation, Computational Efficiency (Inference Cost and Latency Reduction)*

MCSOP24

STUDENT DEPRESSION CLASSIFICATION USING A HYBRID ML MODEL

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ABSTRACT

This paper aims to predict the likelihood of depression among students using machine learning algorithms, with increasing academic pressure and social stress, students' mental health has become a critical concern over the past few years especially with the pandemic. All the students were confined within the walls of their houses and were made to look at screens from hours on end. The dataset used for this paper includes psychological and behavioural parameters such as anxiety levels, stress scores, sleep quality, and academic performance.

Through data integration, data preprocessing and feature engineering with pandas, standardizing the data with Standard Scaler, splitting of dataset with stratified k fold and model building with Scikit-learn, several algorithms were tested – Logistic Regression, Support Vector Machine, and Random Forest. To enhance accuracy, ensemble learning techniques like Voting and Stacking Classifiers were applied.

The final model achieved high predictive performance, indicating its potential for early depression detection in academic environments. Though it cannot be used as a replacement for a psychiatrist, this can still effectively detect the presence of mental health concerns.

Keywords: *Machine Learning, Scikit learn, standardization, Stratified K fold, Logistic regression, Random Forest, Support Vector Machine (SVM), Mental Health, Depression, Ensemble methods.*

MCSOP25

IMPACT - DRIVEN SOCIETAL AND INDUSTRIAL OUTCOMES

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ABSTRACT

Impact-driven societal and industrial outcomes focus on creating meaningful and measurable change through innovation and strategic development.

In today's rapidly evolving world, organizations and governments aim to align technological progress with social responsibility and economic growth. Emerging technologies, sustainable practices, and data-driven decision-making play a vital role in achieving these outcomes. Industries are transforming operations to improve efficiency, reduce environmental impact, and enhance productivity. At the same time, societal initiatives promote inclusivity, accessibility, and improved quality of life. Collaboration between public and private sectors accelerates sustainable development. Ethical frameworks and responsible innovation ensure long-term benefits for communities. Investment in skill development and digital infrastructure strengthens industrial competitiveness.

Measuring real-world impact helps in refining policies and strategies. Ultimately, impact-driven approaches bridge the gap between technological advancement and societal well-being.

URBAN TRAFFIC CONGESTION PREDICTION USING A MULTIMODAL ENSEMBLE LEARNING FRAMEWORK WITH INTEGRATED SPATIOTEMPORAL AND SOCIAL MEDIA SENTIMENT FEATURES

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ABSTRACT

In high-density metropolitan regions, intelligent transportation systems (ITS) must be able to predict traffic congestion in real time. Despite their heavy reliance on past flow data, conventional predictive models frequently fail to account for the influence of abrupt socio-environmental events and public emotion. The generalized multimodal approach proposed in this study combines real-time social signals with high-fidelity traffic data to improve forecast accuracy. Using a thorough feature engineering pipeline, the suggested methodology produces 38 dimensions, including rolling statistics, sinusoidal temporal encoding, and interaction terms between peak-hour variables and road capacity. VADER sentiment analysis was used on social media streams to extract fear levels and geolocated complaint volumes in order to supplement the physical traffic data. A Time Series Split validation architecture was incorporated with the Synthetic Minority Over-sampling Technique (SMOTE) to address the technical issue of class imbalance.

With hyperparameters adjusted via Bayesian search using the Optuna framework, the predictive core consists of a weighted ensemble of three sophisticated gradient boosting machines: XGBoost, LightGBM, and CatBoost. The ensemble model is experimentally evaluated on a large-scale metropolitan dataset and shows a **ROC-AUC of 0.996** and a classification accuracy of 97.5%. Road capacity utilization and short-term volume patterns are the main predictors of congestion, according to feature importance analysis. The scalable architecture presented in this study enables urban centers to take advantage of diverse data sources for incident mitigation and proactive traffic management.

Keywords: *Traffic Congestion Forecasting, Multimodal Data Fusion, Ensemble Learning, Gradient Boosting, Social Media Analytics, Optuna Optimization.*

MCSOP27

A HYBRID ML RULE-BASED MODEL FOR PRECISION NUTRIENT AND IRRIGATION MANAGEMENT IN SMART AGRICULTURE

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ABSTRACT

Improper fertilizer usage and irrigation management affect crop yield and the environment in modern agricultural practices. The conventional fertilizer recommendation methods do not take into consideration the soil nutrients, weather changes, and crop requirements. To overcome this problem associated with modern agricultural practices, a fertilizer recommendation system using machine learning is proposed for fertilizer type prediction, fertilizer quantity prediction, and irrigation level prediction. The system uses a hybrid decision mechanism that combines machine learning and decision rules. In this proposed system, various machine learning models, including Random Forest, SVM, and a proposed ASG Boost algorithm, are implemented for performance evaluation purposes. Result shows that the proposed ASG Boost algorithm achieves higher accuracy compared to other machine learning models.

Keywords: *Fertilizer Recommendation, Machine Learning, ASG Boost, Random Forest, Support Vector Machine, Precision Agriculture, Irrigation Management.*

MCSOP28

AN INTELLIGENT PREDICTIVE MODEL FOR HASHIMOTO'S THYROIDITIS USING SUPERVISED MACHINE LEARNING TECHNIQUES

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ABSTRACT

Achieving appropriate clinical treatment with the necessary complications avoidance in the accurate and precise prediction of this disease is the task that doctors must complete.

The research work presented here develops a predictive model that employs machine learning techniques to predict Hashimoto's Thyroiditis based on clinical and biochemical parameters. The dataset is preprocessed using data cleaning and missing value handling and feature encoding to improve the performance of the model. The researchers employed various supervised machine learning algorithms that include XGBoost Random Forest Logistic Regression and CatBoost to assess the potential of these algorithms in disease prediction. The assessment task employs accuracy and precision and recall and F1-score metrics simultaneously with data visualization techniques that include confusion matrix and receiver operating characteristic curve and feature importance plots. The experimental result reveals that the CatBoost model performs better than all other models due to its high accuracy and efficiency. The research work presented here clearly indicates how machine learning algorithms can help healthcare systems to detect thyroid diseases at an early stage and assist medical professionals in their treatment selection process.

Keywords: *Hashimoto's Thyroiditis, CatBoost, Machine Learning, Disease Prediction, Healthcare Analytics.*

MCSOP29

BRIDGING ACCURACY AND INTERPRETABILITY: AN EXPLAINABLE ENSEMBLE MODEL FOR HEART FAILURE DETECTION

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ABSTRACT

The following paper presents a machine learning approach to predict time-based heart failure risk. A Heart Failure Clinical Records dataset with significant medical features was employed. Random Forest and Support Vector Machine models were employed for predictions of the mortality risk of patients at 3, 6, and 9 months. Feature scaling and class balancing were applied to the dataset in order to further improve the performance of these models. On this basis, an Explainable Scaled Random Forest model has been proposed with optimized hyperparameters to improve accuracy with interpretability. The performance is evaluated in terms of Accuracy, Precision, Recall, F1-score, and ROC-AUC. The results show that the proposed model has achieved better predictive performance compared to SVM and thus is able to provide effective support to clinical decision-making.

Keywords: *Heart Failure Prediction, Machine Learning, Random Forest, Support Vector Machine, Explainable AI, Time-Based Risk Prediction, Clinical Decision Support.*

MCSOP30

MACHINE LEARNING-BASED AUTHENTICATION FOR HUMAN VS AI

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ABSTRACT

Differentiating human speech and AI-generated audio has become more crucial in the fight against fraud, identity theft, and digital disinformation due to the quick development of artificial intelligence-based speech synthesis and voice cloning technologies.

This paper presents a machine learning-based framework for classification of audio samples as either human or AI-generated speech. The proposed system converts continuous-time speech signals into digital form through standard analog-to-digital conversion, followed by preprocessing steps including resampling, silence removal, noise reduction, and amplitude normalization. Discriminative acoustic features are extracted using Mel-Frequency Cepstral Coefficients (MFCC), which effectively capture the spectral characteristics of speech signals. The extracted feature vectors are used to train a supervised classification model for binary decision-making. The system is evaluated using standard performance metrics such as accuracy, precision, recall, F1-score, and error rate. The proposed approach is computationally efficient, operates offline, and supports common audio formats, making it suitable for lightweight authentication and forensic applications.

Keywords: *Voice Authenticity, AI-Generated Speech, MFCC, Machine Learning, Speech Classification, Audio Forensics*

MCSOP31

CITY SHAPER (NOISELESS CARS)

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ABSTRACT

Urban noise pollution has become a critical environmental and public health concern, primarily caused by transportation systems, industrial activities, and excessive vehicle horn usage. Continuous exposure to high noise levels can lead to severe health issues, including hearing loss, cardiovascular problems, sleep disturbances, and psychological stress.

Addressing this issue requires innovative technological solutions that reduce unnecessary sound generation while maintaining effective communication between vehicles.

This paper proposes a novel approach to minimizing noise pollution through the development of a noiseless vehicle communication system using Infrared (IR) transmitter and receiver technology. Instead of relying on conventional horns, the proposed system enables vehicles to communicate wirelessly through IR signals. When a vehicle intends to overtake or alert another driver, the IR transmitter sends a signal to the receiver installed in the vehicle ahead. This eliminates the need for loud horn sounds while ensuring safe and efficient communication between vehicles.

The proposed concept contributes to the development of quieter and smarter urban transportation systems.

By reducing dependence on traditional horns, this system can significantly lower urban noise levels, enhance driver comfort, and promote a healthier environment. Furthermore, the integration of such communication technologies supports the vision of smart cities by combining innovation, sustainability, and improved quality of life. The implementation of noiseless vehicle communication systems represents a promising step toward creating more peaceful, efficient, and environmentally friendly urban mobility solutions.

MCSOP32

FROM INTUITION TO ALGORITHM: A CRITICAL SURVEY OF AUTOMATED PROMPT OPTIMIZATION (APO) AND THE INTERPRETABILITY PARADOX

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ABSTRACT

As the size of Large Language Models (LLM) has continued to grow, human intuition as a component of prompt engineering has become a prominent bottleneck. According to recent benchmarks 2025, the human created prompts are often rigid. This paper presents a review of the paradigm shift for Automated Prompt Optimization (APO), while analyzing peer reviewed studies (2023–2025) on algorithmic frameworks such as OPRO and DSPy. We are highly skeptical of methodologies of "LLM-as-an-Optimizer" in which prompts are considered learnable parameters.

We find that APO frameworks at all times perform at a higher rate than expert human engineers at about 12 percentage point in reasoning. However, we found a novelty that is the "Interpretability-Performance Paradox." Even though APO algorithms are maximally accurate, they can produce semantically unclear or gibberish prompts. In disciplines, such as healthcare, law, etc., which are of high stakes, we contend that this "Black Box Prompting" is extremely unsafe. The paper provides a conclusion and suggests a new line of research in the form of a Human-Centric APO Framework which proposes optimization algorithms that can be used to strike a balance between performance and semantic clarity to have safe and transparent AI systems.

Keywords: *Automated Prompt Optimization, DSPy, Interpretability Paradox, LLMs, OPRO.*

MCSOP33

IMPORTANCE OF CYBERSECURITY IN DAILY LIFE

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ABSTRACT

We live in an era where a lost smartphone feels more catastrophic than a lost wallet. From UPI payments at a roadside stall to private conversations on social media, our entire lives are now stored in "the cloud". Yet, while we wouldn't dream of leaving our front doors wide open at night, millions of us leave our digital doors completely unlocked every day. This paper explores why cybersecurity has shifted from being a "tech-savvy" focused area to an essential life skill for the average person. The biggest threat today isn't a complex piece of malware; it's the "human element". Most security problems happen not because of a computer glitch, but because of a simple human mistake – a clicked link, a weak password, or misplaced trust in a "customer care" call. This study looks at how digital hygiene – like using two-factor authentication and maintaining a cautious attitude toward unsolicited messages – is the new form of personal safety. By shifting the focus from complicated algorithms to simple, everyday habits, this research aims to show that staying safe online is less about being an expert and more about being aware. In a world that never logs off, being "cyber-smart" is no longer optional; it is our best defence in protecting our finances, our privacy, and our peace of mind.

Keywords: *Digital Safety, Human Factor, Personal Privacy, Cybersecurity Awareness, Online Security, Cyber Threats, Everyday Tech.*

IoT-ENABLED SMART PET FEEDER WITH BARK DETECTION AND MOBILE CONTROL

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ABSTRACT

The growing reliance of pet owners on technology in daily living processes has accelerated the need for smart software in the care of pets. Traditional pet feeders often need to be manually operated and do not have ways to track how much food has been consumed or monitor characteristics of the pet's behavior. To deal with these difficulties, in this work, IoT enabled smart pet feeder with bark detection and mobile control is proposed and designed. The system has the ESP32 microcontroller as the main unit with a LCD display to update the situation in real time.

A servo motor mechanism is used for controlled food dispensing, which can be timetabled via an IoT-based cloud application that can be accessed via Enterprises through mobile. In addition to pre-dispensed feeding, a sound sensor is also built in that can detect the barking so that the feeder can release food based on the pet's vocalizations, making this an interactive and adaptive feeding process. An ultrasonic sensor to check the level of food in the container has been utilized, information on which is continuously updated in the mobile application to help the owner keep track of the feeding requirements remotely. The combination of automated scheduling, sound-based activation and real-time monitoring boosts convenience and reduces the need for manual intervention and lacking reliability in pet feeding. This system shows the way for IoT technologies in contributing smart, responsive, and easy-to-use products to the world of pet care. The prospective feeder represents part of the solution to the twin demands posed by petting our pets - providing them with their due share of nourishment in a timely fashion while conferring flexibility and peace of mind to the pet owner.

Keywords: *IoT, Smart Pet Feeder, ESP32, Bark Detection, Mobile control, Ultrasonic Sensor, Automated feeding.*

AUGMENTING TEXTILE DEFECT CLASSIFICATION PERFORMANCE THROUGH PROBABILISTIC HYPERPARAMETER TUNING WITH TREE-STRUCTURED PARZEN ESTIMATOR

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ABSTRACT

Detecting defects in textiles during the manufacturing process is crucial for ensuring product quality and reducing waste. This research introduces an innovative approach to enhancing the performance of machine learning models in textile defect classification.

By integrating the principles of Tree-structured Parzen Estimators (TPE) into the hyperparameter tuning process for Random Forest (RF), XGBoost, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), and Gradient Boosting (GB) models, the proposed method significantly improves the exploration and diversification capabilities of these models. Comprehensive experiments conducted on a substantial textile defect dataset reveal the algorithm's superior performance compared to three conventional tuning methods. The results consistently demonstrate the TPE algorithm's ability to achieve higher classification accuracy and better generalization across various scenarios. These findings highlight the potential of this approach to enhance textile defect classification models, which is crucial for quality control in the textile industry. By bridging the gap between advanced machine learning models and the cutting-edge TPE methodology, this research offers a promising solution for optimizing textile defect classification, thereby contributing to more effective quality management and resource optimization in the textile sector.

Keywords: *Textile Defect Classification, Hyperparameter Tuning, Tree-structured Parzen Estimators (TPE), Machine Learning Models.*

INTEGRATED MEDICAL IMAGE PROCESSING MODEL FOR LUNG CANCER DETECTION USING DEEP LEARNING TECHNIQUES

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ABSTRACT

Lung cancer is one of the severe health issues, causing considerable number of cancer-related mortality worldwide and early precise diagnosis of lung cancer is important to improve the patient survival rates. The Computer Aided Diagnosis (CAD) in medical image processing with deep learning techniques have been widely explored in recent years for capturing lung abnormality patterns effectively for serving an early exact treatment to improve the probability of living. The fully automated proposed approach engineered with the dataset that have CT scan images with their masks given by different radiologist. The quality of the CT scan image is enhanced by image preprocessing techniques resizing, normalization and noise reduction. The Soft-Label Mask of an CT scan image is induced by averaging its three different masks.

Further, the CT Scan Image and its corresponding Soft-Label Mask are given to the Attention U-Net with Pretrained ResNet34 for segmentation. Finally, enhanced DenseNet deep learning model is trained for precise classification and accurate determination of cancerous regions with high reliability. Early identification of lung cancerous regions of this model supporting efficient clinical decision-making to improve the survival of the patients. This proactive framework, the segmentation mask generation and deep learning-based classification is an effective automated lung cancer diagnosis system that achieves good accuracy, precision, and recall.

MCSOP37

DESIGN AND PERFORMANCE EVALUATION OF A SCALABLE HEADLESS E-COMMERCE ARCHITECTURE USING MODERN WEB TECHNOLOGIES

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ABSTRACT

The rapid evolution of digital commerce has exposed architectural limitations in traditional monolithic e-commerce platforms, particularly in scalability, deployment flexibility, and system maintainability. This study presents the design and performance evaluation of a scalable headless e-commerce architecture implemented using Next.js as the frontend framework and Payload CMS as the backend content management system. The proposed model adopts a headless paradigm that decouples presentation logic from backend services, enabling modular development, independent deployment, and structured API-driven interoperability.

The system architecture facilitates secure user authentication, centralized product and order management, cart processing, and administrative control through RESTful API communication. By separating frontend and backend responsibilities, the framework eliminates structural dependencies commonly observed in tightly coupled systems, thereby improving maintainability and scalability.

Performance evaluation through functional and deployment testing demonstrated an average page load time reduction of approximately 18% compared to a conventional integrated deployment model. The architecture also improved backend management efficiency and optimized content delivery workflows.

Cross-platform responsiveness ensures consistent user experience across desktop and mobile environments. Furthermore, the modular design supports seamless future extensibility without significant structural reconfiguration.

This research contributes a practical, implementation-oriented architectural framework that addresses real-world scalability challenges in digital retail systems. The proposed model provides a sustainable and adaptable blueprint for small and medium enterprises seeking efficient digital transformation through contemporary web technologies.

Keywords: *Headless Architecture, Scalable Web Systems, API-Driven Integration, E-Commerce Platforms Modular Backend Design*

MCSOP38

MACHINE LEARNING-BASED BIKE OVERSPEED AND RISK PREDICTION SYSTEM USING REAL-TIME SENSOR DATA

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ABSTRACT

Two-wheeler road accidents are commonly triggered by over speeding and risky riding behaviour, which significantly increases the chances of severe injuries and fatalities. This paper presents a Machine Learning-based Bike Overspeed and Risk Prediction System that uses real-time sensor data to identify and classify unsafe riding patterns. The system collects critical parameters such as vehicle speed, acceleration, sudden braking intensity, lean angle variation during turns, and GPS-based location tracking. These inputs are continuously monitored and processed using supervised machine learning algorithms such as Random Forest and Support Vector Machines (SVM).

The trained models analysis patterns in the sensor data and classify rider behaviour into three categories: low-risk, moderate-risk, and high-risk. When the system detects over speeding or abnormal riding behaviour, it immediately generates real-time notifications to alert the rider. In high-risk situations, the system activates visual alerts directly on the digital speedometer display and may also trigger additional warning mechanisms such as audio signals or vibration feedback. By combining machine learning algorithms, sensor integration, and real-time data processing, this intelligent safety solution aims to promote responsible riding behaviour and significantly reduce the likelihood of road accidents involving two-wheelers.

MCSOP39

EPICARE: COMPREHENSIVE SKIN CANCER DIAGNOSTIC MANAGEMENT SYSTEM

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ABSTRACT

Skin cancer is one of the most serious and life-threatening diseases worldwide, particularly when diagnosis is delayed.

Early detection significantly improves survival rates and reduces medical expenses. EPICARE is an AI-powered comprehensive skin cancer diagnostic and management system developed to support the early identification and classification of malignant skin lesions. The system primarily focuses on detecting common skin cancers such as Basal Cell Carcinoma (BCC) and melanoma through advanced image analysis.

The proposed system employs deep learning techniques, especially Convolutional Neural Networks (CNN), to analyze dermoscopic images and accurately classify skin lesions. Trained models developed using modern deep learning frameworks process the input images and extract critical features such as texture, shape, and color patterns for precise prediction. Experimental evaluation demonstrates reliable classification accuracy, efficient processing performance, and secure handling of medical data. EPICARE provides a scalable, accessible, and cost-effective solution for early skin cancer detection, contributing to improved diagnostic efficiency and better healthcare outcomes.

Keywords: *Artificial Intelligence (AI); Deep Learning; Convolutional Neural Network (CNN); Skin Cancer Detection; Melanoma; Basal Cell Carcinoma (BCC); Medical Image Analysis; Telemedicine; Cloud- Based Healthcare*

MCSOP40

PERFORMANCE EVALUATION OF CLOUD RESOURCE OPTIMIZATION USING AGENTIC AI AND MULTI-AGENT SYSTEMS

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ABSTRACT

Efficient cloud resource allocation is a critical challenge in modern cloud computing environments due to dynamic user demands, workload variability, and performance constraints. Traditional static allocation techniques often lead to resource underutilization, increased latency, and higher operational costs. To overcome these limitations, intelligent and adaptive allocation strategies are required. This paper presents a comparative performance evaluation of Agentic Artificial Intelligence (AI) and Multi-Agent Systems (MAS) for cloud resource optimization. Agentic AI employs a single autonomous intelligent agent capable of monitoring system workload, analyzing resource requirements, and making independent allocation decisions. In contrast, Multi-Agent Systems utilize multiple specialized agents that collaboratively manage computing resources through distributed coordination and communication.

A simulation-based working model is developed to analyze both approaches based on key performance metrics, including response time, resource utilization, scalability, fault tolerance, and system efficiency. Experimental results demonstrate that Agentic AI provides faster response times and simpler system management for moderate workloads, whereas Multi-Agent Systems achieve superior scalability, reliability, and optimized resource utilization under high-demand conditions. The comparative analysis highlights the strengths and limitations of both paradigms and provides insights into selecting suitable intelligent frameworks for cloud-based applications. The study further suggests the potential of hybrid intelligent architectures that integrate the autonomy of Agentic AI with the collaborative efficiency of Multi-Agent Systems for next-generation cloud infrastructures.

Keywords: *Cloud Computing, Agentic AI, Multi-Agent Systems, Resource Optimization, Intelligent Systems.*

MCSOP41

MULTI-CLASS LUNG DISEASE PREDICTION USING TRANSFER LEARNING ON CHEST X-RAY IMAGES

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ABSTRACT

Lung diseases such as pneumonia, COVID-19, and tuberculosis can be serious if they are not diagnosed at an early stage. Normally, doctors rely on chest X-rays to detect such conditions, but it takes time to manually check each image, and sometimes errors can occur. In this research, a system is proposed that uses deep learning to automatically detect lung diseases from X-ray images. Three different pre-trained models are employed, and their outputs are combined to enhance the accuracy of the results. Basic image processing methods are employed before training. The performance of the system is evaluated using accuracy and other metrics. The findings of the research indicate that the combination of multiple models can help in providing more accurate and reliable results, which can help doctors in quick diagnosis.

Keywords: *Lung Disease Detection, Chest X-Ray, Deep Learning, EfficientNetB0, DenseNet121, InceptionV3, Ensemble Model, Clinical Diagnosis Support.*

BALANCING SPATIAL RESOLUTION AND SPECTRAL INTEGRITY: THE NEED FOR AI-DRIVEN SATELLITE DATA FUSION FOR REMOTE SENSING APPLICATIONS

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ABSTRACT

Satellite data fusion is an important step forward in Earth Observation (EO). It allows us to combine information from various remote sensing sources, which helps to address the limitations of individual sensors.

This study takes a close look at the main approaches to data fusion: pixel, feature, and decision levels. It provides both quantitative and qualitative comparisons of their characteristics, benefits, and drawbacks. This paper also examines how fusion methods and results differ considerably across various satellite data types, including optical, radar, thermal infrared, and LiDAR. The analysis points out the ongoing trade-offs between spatial detail and spectral integrity, the vital role of techniques like Artificial Intelligence, deep learning, machine learning and the essential pre-processing steps needed for successful fusion. This study also highlights the need for optimal choice algorithm for different target specific applications such as agricultural crop monitoring, disaster management, urban planning, environmental assessment, and geological exploration. In conclusion, this paper highlights the ever-changing nature of satellite data fusion, which is driven by the ongoing need for richer, more precise, and multi-dimensional insights into Earth's complex systems.

Keywords: *AI, Deep Learning, LiDAR, Remote Sensing.*

DEEP SEQUENTIAL LEARNING-BASED EARLY WARNING SYSTEM FOR PROACTIVE IDENTIFICATION OF ACADEMICALLY AT-RISK STUDENTS USING HYBRID LMS DATASETS

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ABSTRACT

The expansion of digital learning has intensified the need for intelligent systems capable of proactively identifying academically at-risk students. Traditional early warning systems (EWS) often rely on static demographic or grade-based indicators, which fail to capture the dynamic behavioral patterns inherent in Learning Management Systems (LMS). This study proposes a Deep Sequential Learning-Based Early Warning System that leverages hybrid LMS datasets from multiple institutional platforms to enhance prediction robustness and generalizability. The framework integrates heterogeneous data sources, including login frequency, time-on-task, assignment patterns, and clickstream sequences.

To ensure cross-institutional compatibility, the hybrid dataset is constructed through standardized preprocessing, feature harmonization, and temporal alignment. Sequential behaviors are modeled using Long Short-Term Memory (LSTM) networks and Transformer-based architectures to capture both short-term engagement fluctuations and long-range temporal dependencies. Experimental evaluation demonstrates that the proposed deep sequential framework significantly outperforms traditional machine learning models such as Logistic Regression and Random Forest in accuracy, F1-score, and Area Under the Curve (AUC). Results confirm the model's ability to identify at-risk students earlier in the academic timeline while reducing institutional bias. This research contributes a scalable, data-driven architecture that supports proactive academic interventions and improved student retention in diverse digital learning ecosystems.

Keywords: *Early Warning Systems (EWS); Educational Data Mining; Deep Sequential Learning; Long Short-Term Memory (LSTM); Learning Management Systems (LMS); Student Retention; Transformer Architectures.*

MCSOP44

SAFE HANDS – FIRST AID GUIDANCE APP

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ABSTRACT

In emergency situations, immediate first aid can save lives before professional medical help arrives. However, many people lack proper knowledge, training, and confidence to provide correct first aid at the right time. **SAFE HANDS is a mobile-based** First Aid Guidance Application designed to provide instant, simple, and step-by-step first aid instructions for common emergencies. The application covers various emergency situations such as accidents, burns, bleeding, fractures, snake bites, heart attacks, choking, poisoning, fainting, and more. Users can quickly select the type of emergency through categorized options, and the app displays clear guidance using easy language, structured steps support either Tamil or English to ensure quick understanding even in stressful conditions.

The system also includes an **SOS alert** feature that allows users to send emergency notifications along with their location details to selected contacts. **SAFE HANDS** is designed with a simple and user-friendly interface so that people of all age groups can use it without difficulty.

The main objective of **SAFE HANDS** is to bridge the gap between emergency occurrence and medical assistance by empowering users with accurate first aid knowledge. It aims to increase awareness, reduce panic during emergencies, and encourage quick and correct action before professional help arrives.

This project promotes safety awareness, and responsible community support through digital technology. anytime, anywhere – right in your pocket.

MCSOP45

SECURE MULTI-AGENT SYSTEMS: AUTHENTICATION, TRUST, AND PRIVACY

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ABSTRACT

Multiple autonomous intelligent agents working together in a common environment to accomplish individual or group objectives make up multi-agent systems (MAS).

Without human assistance, these agents can function autonomously thanks to agentic AI, which allows them to make decisions and learn from data. Unauthorized agents, data leaks, and malicious activities that jeopardize system integrity are some of the serious security issues that MAS must deal with. Before allowing access, authentication is necessary to confirm agent identities using public-private key pairs and certificate authorities. Through peer reviews, behavior monitoring, and reputation scores, trust management assesses the dependability of agents over time. Encryption is used in privacy-preserving communication to shield confidential information exchanged between agents from unwanted exposure.

For strong security, this paper suggests a secure MAS architecture that incorporates cryptographic techniques. SHA-256 hashing, digital signatures for integrity, JWT tokens for access, and optional blockchain for unchangeable trust ledgers are important mechanisms. Applications include resource management in healthcare, fraud detection in finance, and traffic coordination in smart cities. The framework offers advantages like increased scalability for distributed environments, safety from attacks, and reliability.

Future Scope investigates AI-based trust models that use machine learning to detect anomalies in real time. To protect against new quantum threats, it also takes post-quantum cryptography into account.

Keyword: *Multi-Agent Systems, Agentic AI, Autonomous Agents, Digital Signatures, Privacy-Preserving Communication, Distributed Systems*

MCSOP46

SECURING DATA IN IoT: EMPIRICAL ANALYSIS OF SECURITY ISSUES AND CHALLENGES OVER RESOURCE CONSTRAINED DEVICES

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ABSTRACT

Internet of Things (IoT) is an emerging technology which is the next generation of wireless network that establishes the network over smart devices. Smart devices may be energy-constrained as well as low resource devices. IoT is an open wireless environment and let the devices to share the information among themselves. The smart devices are sensor devices and RFID tags which have limited memory and storage facilities.

Since, IoT environment is open wireless network, there are more security issues and challenges are there. Security objectives are framed in order to ensure the secure communication among the nodes. This paper presents the different security objectives in detail and presents Lightweight Cryptographic algorithms in general Availability in particular. Also, this paper highlights the concepts, applications, impacts of Lightweight Cryptographic algorithms and Internet of Things.

Keywords: Confidentiality, Availability, RFID.

MCSOP47

SMART VEHICLE SECURITY SYSTEM: AN IoT AND BIOMETRIC AUTHENTICATION APPROACH

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ABSTRACT

Vehicle theft has become a serious issue in today's world, especially for two-wheelers. To address this problem, this project proposes a Smart Bike Security System that integrates biometric authentication, Wi-Fi communication, and mobile application control to ensure enhanced vehicle protection. The system is built using Arduino and NodeMCU (ESP8266) along with a relay module, and LCD 16*2 communication module. The bike can be started only after successful fingerprint verification of one of the three authorized users. If an unauthorized person attempts to access the vehicle, the system immediately sends a notification message to the owner. In case of emergency situations, the owner can remotely grant temporary access through the mobile application. The mobile app, developed using React Native and Java Script, provides an multiple authentication options such as fingerprint, pattern, or password to ensure secure access control. The relay module controls the ignition system of the bike, while the ESP8266 enables real-time communication between the hardware and the mobile application through the WiFi. Additionally, the system sends notifications even when an authorized user accesses the bike, keeping the owner informed at all times. This project enhances vehicle security by combining IoT technology, biometric authentication, and remote monitoring. It provides a cost-effective, reliable, and user-friendly solution to prevent theft and ensure safe vehicle usage.

MCSOP48

SURPASSING THE LIMITATIONS OF ZERO-TRUST ARCHITECTURE IN LOCATION-BASED SYSTEMS

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ABSTRACT

Zero-Trust Architecture (ZTA) enhances the security of Location-Based Systems (LBS) by enforcing continuous authentication, least-privilege access, and strict identity verification. However, applying ZTA to real-time LBS environments introduces challenges such as increased latency, scalability constraints in dense cellular networks, complex policy management, and interoperability issues with legacy infrastructure. These limitations can impact positioning accuracy and service responsiveness.

This paper proposes an enhanced Zero-Trust framework designed to overcome these constraints through edge-native trust evaluation, hierarchical policy orchestration, and adaptive risk-based authentication. By integrating lightweight cryptographic protocols, AI-driven anomaly detection, and privacy-preserving mechanisms such as differential privacy and data minimization, the proposed model improves security while maintaining real-time performance. The approach strengthens resistance against location spoofing, rogue base station attacks, and trajectory inference threats. The proposed enhancements enable scalable, low-latency, and privacy-aware Zero-Trust deployment for next-generation LBS in 5G and emerging 6G ecosystems.

Keywords: *Location Based Security, Privacy Preservation, Differential Privacy Preservation.*

MCSOP49

TRANSFORMATIVE TRENDS IN COMPUTING AND CYBER TECHNOLOGIES

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ABSTRACT

The rapid evolution of computing, artificial intelligence (AI), and cyber technologies has fundamentally transformed modern digital ecosystems across industries and societies.

This chapter examines transformative trends shaping contemporary computing paradigms, including artificial intelligence and machine learning, cloud and edge computing, cybersecurity innovations, blockchain and distributed ledger technologies, and quantum computing. These advancements have enhanced data processing capabilities, automated decision-making, strengthened digital security frameworks, and enabled scalable, interconnected infrastructures. At the same time, emerging technologies have introduced complex challenges such as cyber threats, privacy risks, regulatory uncertainties, interoperability issues, and ethical concerns surrounding AI governance. The chapter highlights how the convergence of intelligent systems, high-performance computing, and secure cyber architectures is redefining economic models, digital governance, and technological innovation. Emphasis is placed on sustainable development, cybersecurity resilience, and global collaboration to ensure responsible and secure technological progress. Ultimately, transformative computing and cyber technologies are driving the emergence of intelligent, adaptive, and future-ready digital societies.

Keywords: *computing paradigms, artificial intelligence, machine learning, cloud computing, edge computing, cybersecurity, blockchain.*

MCSOP50

BEYOND INTEGRATION: ARCHITECTING DIGITAL TRANSFORMATION IN HIGHER EDUCATION FOR 2026 AND BEYOND

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ABSTRACT

As of 2026, Higher Education Institutions (HEIs) have shifted from emergency digital adoption to a permanent state of digital maturity. This paper examines the transition from fragmented "digital silos" toward a unified Integrated Digital Ecosystem (IDE). By synthesizing Artificial Intelligence (AI), predictive analytics, and hybrid pedagogical models, the IDE framework seeks to optimize the student experience and institutional efficiency. This study utilizes a mixed-methods approach to analyze the "Digital Capability Triad" across three international campuses. Results indicate a 15% increase in student persistence and a 30% reduction in faculty administrative burden. The paper concludes by recommending a "High-Tech, High-Touch" approach and exploring future enhancements in affective computing and blockchain-based credentialing.

Keywords: *Digital Transformation, Higher Education, EdTech, Artificial Intelligence, Integrated Digital Ecosystems.*

MCSOP51

HUMAN-AI COOPERATIVE FRAMEWORKS IN SOFTWARE PROCESS ENVIRONMENTS

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ABSTRACT

Generative Artificial Intelligence (GenAI) is transforming modern software development by automating and augmenting tasks traditionally performed by human developers. This technology, exemplified by large language models (LLMs) such as GPT-based systems and purpose-built assistants, supports key development processes including code generation, intelligent auto completion, automated documentation, and test creation. Integration of GenAI tools into integrated development environments (IDEs) and continuous integration pipelines further accelerates coding cycles and enhances developer experience. While empirical studies reveal significant time savings and enhanced test coverage, they also highlight challenges including output reliability, security vulnerabilities, maintainability, and the need for human oversight. Effective developer-AI collaboration requires structured evaluation, robust validation mechanisms, and governance strategies to ensure quality, explainability, and trust. As GenAI continues to evolve, its role in development workflows will shift from supplementary assistance toward intrinsic components of software engineering practices.

Keywords: GenAI, Software development, Developer

MCSOP52

A STUDY ON PREFERENCE TOWARDS AI TOOLS AMONG ARTS AND SCIENCE COLLEGE STUDENTS FOR ACADEMIC PURPOSES IN MADURAI CITY

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ABSTRACT

Artificial Intelligence (AI) tools are becoming increasingly important in modern education. This study examines the preference for AI tools among Arts and Science college students in Madurai City for academic purposes. The objective of the research is to analyze students' awareness, usage patterns, and preferences regarding AI tools in learning, assignments, and research activities.

A descriptive research design collected by articles. The study highlights the advantages of AI tools, such as improved understanding of subjects, quick access to information, and enhanced academic productivity. At the same time, it identifies certain concerns, including overdependence on technology and the need for proper guidance. The findings suggest that AI tools can support students' academic performance when used responsibly. The study recommends creating awareness and training programs to promote the effective and ethical use of AI tools in higher education.

Keywords: *Artificial Intelligence, AI Tools, Student Preference, Academic Learning, Higher Education, Madurai City, Educational Technology.*

MCSOP53

ETHICS IN AI-POWERED LEARNING ENVIRONMENTS: CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Artificial Intelligence (AI) is rapidly transforming education by enabling intelligent tutoring systems, adaptive learning platforms, and automated assessment tools. These technologies enhance learning efficiency, personalization, and accessibility. However, the widespread adoption of AI in education introduces significant ethical challenges that must be addressed to ensure responsible use. This paper investigates key ethical concerns in AI-powered learning environments, including algorithmic bias, data privacy, lack of transparency, and accountability issues. It further examines the impact of these challenges on students, educators, and institutions. The study proposes mitigation strategies such as explainable AI, robust data governance, bias reduction techniques, and human-in-the-loop approaches. Finally, future directions are discussed to promote the development of fair, transparent, and trustworthy AI systems in education.

Keywords: *Artificial Intelligence, AI in Education, Ethics, Algorithmic Bias, Data Privacy, Explainable AI, Responsible AI*

REAL-TIME AUDIO COGNITIVE PROSTHESIS WITH VIDEO TRAINING FOR MILD COGNITIVE IMPAIRMENT

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ABSTRACT

The people with mild cognitive impairment (MCI) frequently have trouble processing audio cues from the real world, which impairs their situational awareness and capacity to react to commonplace occurrences like approaching cars, doorbells, or multiple speakers in a conversation. Current assistive technology frequently relies on straightforward alerts or visually demanding interfaces that can overwhelm users rather than assist them, and it frequently lacks context awareness and adaptability. A functional prototype of a real-time, audio-driven cognitive prosthesis that addresses these issues through ongoing environmental monitoring and adaptive assistance is presented in this research work.

The implemented system operates in a continuous listening loop. The three main AI models process audio in parallel are Google's YAMNet for environmental sound classification across various categories, OpenAI's Whisper for speech transcription, and a SpeechBrain ECAPA-TDNN model for speaker verification. Each cycle, an energy-based voice activity detector determines whether speech processing is triggered; the accuracy of this detection varies depending on the level of background noise.

Using a hierarchical priority system, a custom rule-based cognitive decision engine combines the parallel outputs: transcribed text, speaker identity, and environmental sound predictions. Environmental sounds produce contextual awareness messages, emergency sounds take precedence over all other processing, external speech initiates awareness alerts, and primary user speech elicits basic emotional support responses based on keyword sentiment. The logic of repetition suppression stops repeated announcements from being made. Once a decision is made, the message is converted to speech by Google's Text-to-Speech engine and played through the system speakers.

A guided video training module pauses at checkpoints to ask questions and receive spoken responses. All core components: audio capture, speech recognition, speaker verification, environmental classification, cognitive decision logic, memory management, text-to-speech, and interactive video integration, are combined into a functional, demo-ready system.

Keywords: *Cognitive Prosthesis, Mild Cognitive Impairment, Whisper, ECAPA-TDNN, YAMNet, Rule-Based Decision Engine.*

BLOCKCHAIN-INTEGRATED BiLSTM AND TabNet FRAMEWORK FOR SMART CROP PREDICTION AND PRECISION FERTILIZER RECOMMENDATION

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ABSTRACT

Sustainable agricultural productivity is essential to ensure food security and advancing Sustainable Development Goals (Zero Hunger). Existing smart agriculture models often lack in secure data governance, temporal robustness, interpretability in structured soil datasets. Large-scale adoption of conventional machine learning techniques is limited by their yield prediction RMSE values of 8.5-12.3 quintals/hectare, crop classification accuracies of 82-90% and fertilizer recommendation R2 score below 0.85.

This study proposes a multi-layer deep learning architecture comprises data acquisition, predictive modeling, decision fusion and block chain security layers. for precise fertilizer recommendation and accurate crop prediction that is integrated with blockchain technology. The proposed architecture consists of an input layer receiving soil input which is obtained from the soil lab, Tamilnadu, India. A Bidirectional Long Short – Term Memory (BiLSTM) network layer captures bidirectional temporal dependencies in multi-season climatic and historical yield data for robust crop yield forecasting. TabNet uses its sequential attention mechanism to process structured soil laboratory datasets, such as N, P, K, pH, electrical conductivity, organic carbon, micro and macro nutrients for interpretable crop suitability classification and multi output fertilizer dosage regression.

Model training includes feature normalization, k-fold cross validation and Bayesian hyperparameter optimization. Experimental results demonstrated that crop classification accuracy of 94-96 %, RMSE for yield prediction is 18-22% lower than the Random Forest baselines and fertilizer recommendation R2 values of 0.91-0.93. Less than 6% computational overhead is ensured by a private blockchain layer with smart contracts guarantees that the tamper-proof storage of soil reports and prediction outputs.

The proposed framework delivers a secure, innovative, interpretable and impact-driven smart agriculture solution to promote sustainable nutrient management, productivity and transparent data governance.

Keywords: *Smart Agriculture, BiLSTM, TabNet, Blockchain Technology, Crop Yield Prediction, Precision Fertilizer Recommendation, Sustainable Farming.*

ZERO TRUST SECURITY MODEL – A MODERN APPROACH TO CYBERSECURITY IN THE DIGITAL ERA

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ABSTRACT

In this digital era, people work from anywhere, data is stored in the cloud, increase in cyber- attacks, insider threats are rising, and there is no frequent verification in traditional model. Therefore, traditional perimeter-based network protection model cannot handle the challenges created by the new technology. Once an attacker gains access to the internal network, traditional model automatically trusts them and allowing access to the sensitive data and system without further verification. To overcome these issues, security model called zero trust was introduced. Zero trust is a modern framework of cybersecurity, that works based on the principle “NEVER TRUST, ALWAYS VERIFY”. Instead of assuming users and devices inside the network are safe, it verifies all users and devices before granting access to the resources. Usually, it focusses on the key principles such as never trust and always verify, least privilege access, device security, strong authentication, and continuous monitoring of all activities regardless of location or devices. This paper explores the zero trust security model and compares it with traditional security model. It describes the key components such as identity verification, access control, and continuous monitoring.

This paper also explains the principles, applications, advantages, and disadvantages of zero trust. Shifting from traditional perimeter-based security model to zero trust security model increases security. The main aim of this paper is to show how zero trust improves security in modern digital era.

MCSOP57

EMERGING APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THE INDIAN BANKING SECTOR

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative force in the Indian banking sector, significantly enhancing operational efficiency, risk management, fraud detection, customer relationship management, and decision-making processes. This study investigates the emerging applications of AI in Indian banks from the perspective of bank employees. Primary data were collected from 250 bank employees across public and private sector banks using a structured questionnaire. Statistical tools such as descriptive analysis, Structural Equation Modeling (SEM), and multiple regression analysis were employed to examine the relationship between AI adoption, operational efficiency, customer service enhancement, risk management capability, and employee productivity. The findings reveal that AI adoption significantly influences operational efficiency and risk management, which in turn positively affect overall banking performance. The study provides strategic recommendations for strengthening AI integration in Indian banks.

Keywords: *Artificial Intelligence, Indian Banking Sector, AI Adoption, Structural Equation Modeling, Operational Efficiency*

MCSOP58

A COMPARATIVE STUDY OF BFS AND DFS ALGORITHMS - PERFORMANCE ANALYSIS AND APPLICATIONS

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ABSTRACT

Graph traversal algorithms sit at the heart of countless computational systems we rely on every day – from finding the fastest route on a GPS to crawling the web, analysing social networks, and solving shortest path problems. Among the many algorithms that exist for this purpose, some of the most well-known include Breadth First Search, Depth First Search, Dijkstra's algorithm, Minimum Spanning Tree, Kruskal's algorithm, and Bellman-Ford. Two of these stand out as particularly foundational: Breadth First Search (BFS) and Depth First Search (DFS).

Both are widely used across computer science and artificial intelligence, and while they share the same goal of exploring graph structures, they go about it in very different ways – each with its own behaviour, strengths, and trade-offs.

This paper takes a closer look at how BFS and DFS actually work, and how they perform across a range of real-world applications. We examine key performance metrics like time complexity and space complexity, and explore how each algorithm holds up against different types of problems. We also walk through the output sequences produced by each approach to make their differences more concrete and easier to understand. Ultimately, the goal of this study is to give practitioners a clearer picture of what each algorithm does well and where it falls short – so they can make more confident, informed choices when deciding which search strategy best fits the problem they're trying to solve.

MCSOP59

GENERATIVE AI FOR MALWARE DETECTION AND CLASSIFICATION

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ABSTRACT

The rapid growth of sophisticated malware, including polymorphic and zero-day variants, has exposed the limitations of traditional signature-based and rule-based cybersecurity systems. To address these challenges, this paper presents a Generative Artificial Intelligence (GenAI) framework for robust malware detection and multi-class classification. The proposed approach employs deep generative models, specifically Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), to learn complex malware behavior patterns from large-scale cyber threat datasets.

These models generate high-quality synthetic malware samples that augment limited and imbalanced training data, thereby improving the performance of downstream classification algorithms.

The system integrates both static and dynamic analysis features such as opcode sequences, API call logs, and binary entropy measures, which are transformed into meaningful feature representations. By learning latent feature distributions, the generative models capture hidden relationships among malware families and enhance the detection of obfuscated and metamorphic threats. A hybrid deep neural network classifier trained on real and generated samples achieves higher detection accuracy and better generalization to unseen malware compared to conventional machine learning methods.

Experimental results on benchmark datasets demonstrate a significant reduction in false positives and improved classification performance across multiple malware families.

Additionally, the study explores the resilience of the proposed model against adversarial evasion attacks and incorporates explainable AI techniques to interpret model decisions for cyber forensic analysis. The findings indicate that Generative AI not only strengthens malware detection capabilities but also enables proactive threat intelligence by simulating emerging attack patterns. This research contributes to the development of scalable, adaptive, and intelligent cybersecurity solutions capable of addressing evolving malware threats in modern cyber infrastructures.

Keywords: *Generative AI, Malware Detection, GAN, VAE, Deep Learning, Cybersecurity, Adversarial Malware.*

MCSOP60

NETWORK QUALITY PREDICTION USING MACHINE LEARNING

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ABSTRACT

Network quality significantly impacts digital communication performance [1]. This paper proposes a machine learning framework to predict network quality using parameters like signal strength, latency, and download speed [2]. Three supervised algorithms—Decision Tree, SVM, and Random Forest—are evaluated to classify network quality as Good, Normal, or Poor [3]. Experimental results show Random Forest achieves 98% accuracy, outperforming Decision Tree (85%) and SVM (90%) [4]. Feature importance analysis reveals signal strength and latency as the most influential predictors [5].

The proposed approach enables proactive network monitoring, faster fault detection, and improved Quality of Service (QoS) [6], providing network administrators with actionable insights for optimizing network performance and enhancing user experience [7].

Keywords: *Network Quality Prediction, Machine Learning, Random Forest, Quality of Service (QoS), Predictive Analytics, Feature Importance, Supervised Learning*

BLOCKCHAIN-INTEGRATED PASSWORD RESET MECHANISMS: ELIMINATING IDOR VULNERABILITIES THROUGH DECENTRALIZED

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ABSTRACT

Identity-based attacks have been identified as the main entry point for cyber-attacks, making up about 90% of all incident response investigation requests, and facilitating more than 70% of all cloud-based attacks via compromised credentials and authentication mechanisms. The traditional authentication model for web applications, based on centralized and predictable identification, is critically exposed to attacks on Insecure Direct Object Reference (IDOR), where an attacker exploits a specific vulnerability to gain unauthorized access to a system.

A typical scenario is presented to show how Base64-encoded user identification, as part of a password reset URL, may be manipulated to allow unauthorized users to gain control of a user account.

This research study examines this production-level vulnerability, highlighting the ineffectiveness of "security by obscurity (SBO)" against current-day attackers. The research study promotes a paradigm shift to a new model of Blockchain-Integrated Password Reset Mechanisms, which utilize Decentralized Identifiers and Self-Sovereign Identity (SSI) frameworks to replace traditional centralized tokens with immutable authentication mechanisms, thus providing a solution that is free of single points of failure, utilizes zero-knowledge proofs to ensure privacy.

Through a comparative study, this research study, based on simulated results and threat intelligence data for the year 2026, indicates that a decentralized model provides a solution that reduces the attack surface by more than 90% when compared to traditional authentication mechanisms, thus meeting emerging regulatory requirements for data minimization and user sovereignty.

Keywords: *Insecure Direct Object Reference (IDOR), Blockchain-Integrated Authentication, Decentralized Identity (DID), Self-Sovereign Identity (SSI), Password Reset Vulnerability, Identity-Centric Threats, Cyber Resilience 2026*

INNOVATIVE SOLUTIONS THROUGH EMERGING TECHNOLOGY COMMUNICATION, ELECTRONICS AND NETWORKING

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ABSTRACT

This paper focuses on the fundamental concepts of communication, electronics, and networking and their role in modern society. The main objective of the study is to understand how electronic devices and communication systems work together to enable efficient data transmission. The study is based on secondary data collected from textbooks, journals, and online sources. It explains the basic components of communication systems such as transmitter, receiver, and channel, along with the importance of electronic circuits in signal processing.

The paper also highlights different types of networks including LAN, MAN, and WAN and their applications in business, education, and daily life. The findings reveal that advancements in electronics and networking technologies have significantly improved global connectivity and information sharing. It is concluded that communication, electronics, and networking are essential pillars of today's digital world. Communication, electronics, and networking form the foundational pillars of modern information systems, enabling the efficient exchange, processing, and transmission of data across diverse platforms. Communication refers to the systematic transfer of information between entities through various channels, encompassing principles such as signal encoding, modulation, transmission, and reception.

Electronics provides the technological backbone for communication by employing devices and circuits that generate, amplify, and manipulate electrical signals. The integration of electronic components has significantly enhanced the reliability, speed, and capacity of communication systems.

A DATA-DRIVEN ANALYSIS OF SINGLE-PARENT FAMILY INFLUENCE ON THE ACADEMIC AND SOCIAL LIFE OF INDIAN ADOLESCENTS

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ABSTRACT

Family structure plays a significant role in shaping adolescents' academic performance and social development, and the increasing prevalence of single-parent households presents distinctive challenges within the Indian socio-cultural context. This study presents a data-driven analysis of the influence of single-parent family structure on the academic and social outcomes of Indian adolescents using machine learning. Primary data were collected from higher secondary and college students through structured questionnaires and institutional records. Feature engineering was performed on three core dimensions: academic indicators (grades, attendance, study hours), behavioural attributes (screen time, routine regularity), and household factors (parental involvement, socio-economic status, family stability). Data preprocessing included normalisation, outlier handling, and missing-value imputation.

A supervised artificial neural network model was developed for outcome prediction, with the input layer representing engineered features and hidden layers employing nonlinear activation functions. Model training was conducted using stratified k-fold cross-validation, and hyperparameters were optimised using systematic tuning. The learned representations capture both positive and negative impact correlations between family-related and behavioural factors and academic and social outcomes. The findings demonstrate the suitability of machine learning-driven analytical pipelines for examining family structure-related influences on adolescent development and support early identification of students at risk of academic decline and social maladjustment, enabling targeted academic support, counselling strategies, and data-informed institutional interventions.

Keywords: *Behavioural Computation, Machine Learning, ANN, Socio-Cultural*

MCSOP64

WILDLIFE INTRUSION DETECTION AND PREVENTION SYSTEM FOR RAILWAY TRACKS USING IoT and AI

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ABSTRACT

Wildlife accidents on railway tracks represent a significant threat to animal populations, passenger safety, and the uninterrupted operation of railway services. This study introduces an intelligent wildlife collision-avoidance system that identifies high-risk animal-crossing zones by analyzing historical accident data through machine learning methods. Utilizing these predictions, a GPS-enabled activation mechanism selectively powers surveillance Cameras exclusively at identified danger locations, thereby reducing energy consumption and minimizing false alerts. Real-time animal presence is confirmed using YOLO-based object detection integrated with night vision cameras, which ensures reliable detection in low-light environments. Upon detection of an animal, an automated alert system is triggered, with the potential for integration with an automatic train braking mechanism to prevent collisions. The proposed system aims to enhance railway safety, safeguard wildlife, and improve operational efficiency through a scalable, data-driven solution.

Keywords: High risk zones, YOLO, Automatic train braking system.

MCSOP65

DUAL-MODE AI FRAMEWORK FOR ALZHEIMER DISEASE DETECTION AND RISK ASSESSMENT IN RURAL HEALTHCARE

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ABSTRACT

Alzheimer Disease is a progressive neurodegenerative disease that impacts memory and cognitive functions, and hence requires early detection for efficient management. However, in rural healthcare settings, the lack of accessibility to MRI facilities makes it difficult to provide a correct diagnosis. Currently available systems are based on either MRI or clinical inputs, making them less flexible and accessible for diagnosis. To address this issue, this paper presents a Dual-Mode Artificial Intelligence Framework for Alzheimer Disease Detection and Risk Assessment.

The MRI module employs a Convolutional Neural Network (CNN) to identify the stages of Alzheimer Disease into Non-Demented, Very Mild, Mild, and Moderate Demented categories, with an accuracy of 84%. The clinical module employs a Machine Learning approach to identify Low and High-risk levels based on cognitive and clinical inputs, with an accuracy of 94%. A decision-based approach is employed to choose the correct mode depending on the availability of inputs. The proposed system enhances early detection, ensures diagnosis even when MRI is not available, and hence offers an efficient solution for rural healthcare support.

Keywords: *Alzheimer Disease detection; Deep Learning; CNN; Dual-Mode AI Framework; Machine Learning; Decision logic, Medical Image Analysis; Risk assessment; MRI; Rural healthcare.*

MCSOP66

CHALLENGES OF ARTIFICIAL INTELLIGENCE AND A SUSTAINABLE FUTURE

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ABSTRACT

For a novice or ordinary man Artificial Intelligence (AI) is a fascinating innovation that does wonders beyond his imagination. But for a techie, AI has a long way to go and tremendous, hideous unaddressed challenges are to be plugged in. Though AI has come thus far from a speculation to near reality, it is redefining the lives of people across the world. AI has gone through almost all the domains assisting the corporate, governments and common man. More industries are now depending on AI for decision making through various types of data sets they consume in order to dispense specified outcomes. It is imperative to delve into the delimitations of AI and how they need to be addressed. The boundaries with which it is operating now, and the things it cannot achieve, the areas where it fails to apply and area specific conflicts are to be analyzed and understood for a sustainable and meaningful future of AI and for effective governance across its fields. The challenges on ethical considerations in implementation also need to be addressed seriously as it plays the pivot role in transferring its value to the mankind.

This paper analyzes technical, ethical, legal, and societal delimitations of AI in the light of current challenges being investigated. It also tries to elicit the current scenario of AI's development and the way forward for a sustainable incorporation of AI into human lives.

Keywords: *Artificial Intelligence, Challenges, Boundaries, Ethical and Societal delimitations, Sustainable AI, Effective governance*

DEMAND RESPONSE BASED LOAD MANAGEMENT IN A MICROGRID

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ABSTRACT

Demand Response Based Load Management in a Microgrid is an advanced energy management approach that balances power generation and consumption within a localized grid system. A microgrid typically integrates renewable energy sources such as solar and wind along with conventional power sources and energy storage systems. Due to the intermittent nature of renewable energy, maintaining supply-demand balance becomes challenging.

The proposed system uses demand response techniques to control and prioritize electrical loads based on availability of power, peak demand conditions, and grid stability requirements. During peak load periods or power shortages, non-critical loads are reduced or shifted to maintain reliable operation and prevent system overload.

This approach improves energy efficiency, reduces operational costs, enhances renewable energy integration, and ensures stable and sustainable power management. Demand response-based load management plays a vital role in developing smart grids and future energy systems.

Keywords: *Demand Response (DR), Microgrid System, Load Prioritization, Renewable Energy System, Energy Management System, Smart Grid Technology*

MCSOP68

CONVERGED AI ARCHITECTURE FOR FINANCIAL FRAUD DETECTION: A BLOCKCHAIN- BACKED FEDERATED LEARNING AND EXPLAINABLE BEHAVIORAL ANALYTICS APPROACH

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ABSTRACT

We are living in the digital era as everything is going digital or it's better to say "online". This everything also includes the shifting of financial transactions from off-line to online mode. There is a huge and rapid growth in digital financial transactions and simultaneously an equivalent growth in financial frauds. Nowadays, fraudsters are having a lot of ways to conquer their motive of getting benefited from the loss of others. Modern online financial systems are supposed to be very strong and robust so that it will be able to process huge data in real time with minimum cost and be analysed in lowest time. In order to enhance the quality and ability of the modern financial system, this research proposes a converged AI architecture which combines the Blockchain backed Federated Learning and Explainable Behavioural analytics approach. This architecture will ensure security transparency and tamper resistant model and along with this the proposed model will also try to reduce the false positives. By combining Federated learning, Blockchain, behavioural analytics and explainable AI (XAI), a model can be generated that eliminate the sharing of raw data, increases trust, immutability and security, helps in anomaly detection, and most importantly works transparently by making regulatory complaint decisions.

Keywords: Blockchain, Federated Learning, Explainable AI, Behavioral Analytics.

MCSOP69

HYBRID QUANTUM-ENHANCED DETECTION OF THREATS IN ENCRYPTED NETWORK TRAFFIC

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ABSTRACT

Encryption runs pretty much everything we do online now. Your bank info, your chats encryption keeps all that locked up from prying eyes. That's great for privacy.

But security teams? They hit a wall. They can't peek inside those encrypted packets to spot viruses or whatever else might be hiding. So they look at the leftovers: packet sizes, traffic patterns, basically the metadata. They throw machine learning at the problem to catch anything weird, but there's a ton of noise. Plus, when online traffic spikes, these systems either miss stuff or just slow to a crawl. This paper digs into a way to bring quantum ideas into regular computers no need to wait for those massive quantum machines everyone's promising. They take the metadata and translate it into something like quantum states, angles or amplitudes, and then process it using current hardware. The whole setup is a mix: you get a little quantum edge for spotting patterns that old-school methods just don't catch. Even better, it actually works now, during this so-called NISQ era, where quantum tech is still noisy and a bit rough around the edges. They ran tests on real encrypted traffic, and this method kept pace with the usual machine learning approaches. Sometimes it even did better, mostly when they used amplitude encoding. That part really jumped out to me. It actually helps with those fast-changing threats in secure networks, and it's already kind of future-proof it can handle post-quantum problems, and you don't need fancy new hardware. Honestly, seeing quantum ideas blend into cybersecurity like this is pretty exciting. It won't magically fix everything overnight, but it's a solid starting point. Some folks might call it hype, others are convinced it's the next big thing.

Keywords: *Hybrid Quantum Machine Learning, Encrypted Network Traffic, Quantum Feature Encoding, NISQ Era, Metadata Analysis, Cybersecurity Enhancement, Quantum Support Vector Machine, Intrusion Detection*

AI-POWERED REAL-TIME YOGA POSTURE DETECTION AND CORRECTION SYSTEM

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ABSTRACT

In recent years, many individuals have started practicing yoga independently using online platforms. However, the absence of proper guidance often leads to incorrect posture, reduced effectiveness, and potential physical injuries. To address this issue, this paper proposes an AI-powered real-time yoga posture detection and correction system. The proposed system utilizes computer vision and deep learning techniques to analyze user posture through a live camera feed. Key body landmarks such as shoulders, hips, knees, and elbows are detected and compared with predefined ideal yoga pose models. Based on the deviation identified, the system provides immediate corrective feedback to help users adjust their posture. The implementation is carried out using Python as the primary programming language, with TensorFlow for pose estimation and model processing, and OpenCV for real-time video capture and image analysis. A web-based interface enables user interaction and accessibility. Experimental evaluation demonstrates that the system effectively detects common beginner-level posture errors, including improper back alignment and incorrect arm positioning. However, further refinement is required to improve accuracy for complex advanced poses and diverse body types.

This study highlights the potential of artificial intelligence in delivering accessible, cost-effective, and personalized yoga training solutions within the fitness and healthcare domain.

Keywords: *Artificial Intelligence, Computer Vision, Human Pose Estimation, Deep Learning, Yoga Posture Correction, Real-Time Feedback*

MCSOP71

SMART VEHICLE INSURANCE PRICING BASED UPON ON PUNISH AND REWARD USING MACHINE LEARNING MODEL

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ABSTRACT

Vehicle insurance pricing traditionally depends on static factors which do not accurately determine actual driving risk. The study develops a machine learning-based dynamic pricing framework which uses punish-and-reward systems to create customized premium rates. The system uses telematics together with behavioral data which includes speed and braking and mileage and violations to assess driver risk. Drivers who demonstrate safe driving behavior receive rewards which include lower premium rates whereas drivers who demonstrate dangerous driving behavior face financial penalties. The system uses supervised learning models for prediction purposes while utilizing historical claim data and feature engineering techniques. The system enables deployment through both IoT devices and mobile platforms in a manner that can expand to meet growing needs. The proposed system establishes insurance pricing methods which are both fair and based on user behavior while allowing for dynamic adjustments.

Keywords: *Machine Learning, Dynamic Pricing, Vehicle Insurance, Risk Prediction, Punish and Reward Mechanism, supervised learning, IoT.*

MCSOP72

CYBER SECURITY AWARENESS AMONG COLLEGE STUDENTS: A SURVEY BASED STUDY

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ABSTRACT

In today's digital world, cyber security has become very important because cyber attacks such as phishing, hacking, and malware are increasing rapidly. College students use the internet daily for studies, social media, online payments, and communication, which makes them more exposed to cyber threats. This study aims to understand how aware college students are about cyber security and to examine

their online safety practices. A survey will be conducted using a structured questionnaire that includes questions about password usage, phishing awareness, social media privacy, and safe browsing habits. The responses collected from students will be analyzed to identify their level of awareness and common mistakes they make while using the internet. The results of this study are expected to highlight the importance of improving cyber security awareness programs in higher educational institutions to encourage safer online behavior among students.

Keywords: *Cyber Security Awareness, College Students, Online Safety Practices, Phishing Awareness, Password Security, Social Media Privacy, Safe Browsing Habits, Cyber Threats, Information Security Education, Higher Education Institutions, Digital Safety Behavior.*

MCSOP73

AI-DRIVEN MATHEMATICAL MODELING AND PRECISION OPTIMIZATION OF SUSTAINABLE FERMENTATION PROCESSES FOR ENHANCED NUTRITIONAL AND ENVIRONMENTAL OUTCOMES

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ABSTRACT

Sustainable fermentation technologies are gaining strategic importance in addressing global challenges related to food security, nutritional enhancement, environmental sustainability, and industrial efficiency.

This research proposes an integrated Artificial Intelligence (AI)-driven mathematical modeling framework for precision optimization of fermentation processes in agri-food biotechnology. The study combines machine learning algorithms, computational modeling, and real-time sensor analytics to enhance microbial productivity, substrate utilization efficiency, and bioactive compound yield under controlled environmental conditions.

Advanced computational techniques—including artificial neural networks (ANN), support vector regression (SVR), and response surface methodology (RSM)—are employed to predict kinetic parameters, optimize process variables (pH, temperature, substrate concentration, aeration), and minimize resource consumption. The framework incorporates IoT-enabled monitoring systems for dynamic feedback control, reducing energy usage and carbon footprint while maximizing nutritional output and product consistency.

The proposed model contributes to precision fermentation by integrating mathematical optimization with AI-based predictive analytics, enabling scalable and environmentally sustainable production systems.

This interdisciplinary research bridges Agriculture and Food Sciences, Computing and AI Technologies, Environmental Sciences, and Mathematical Modeling, providing a robust decision-support system for next-generation bioprocessing industries.

Keywords: Artificial Intelligence; Precision Fermentation; Mathematical Modeling; Sustainable Bioprocessing; Machine Learning; Neural Networks; Process Optimization; Nutritional Enhancement; Environmental Sustainability;

MCSOP74

ENERGY-AWARE PREDICTIVE DUTY CYCLE MANAGEMENT IN HYBRID SOLAR–WIND–THERMAL POWERED IOT SYSTEMS FOR SMART AGRICULTURE

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ABSTRACT

Energy harvesting from ambient sources enables autonomous operation of IoT devices in remote agricultural fields. However, reliance on a single source (e.g., solar) is susceptible to weather volatility, leading to energy deficits and data loss.

This paper proposes a hybrid energy harvesting architecture combining solar, wind, and thermal energy with a predictive energy-aware duty cycle management framework that uses embedded energy models and short-term environmental forecasts. The hybrid system dynamically adjusts sensing and communication duty cycles based on estimated energy availability and storage state. Analytical models, a closed-form optimization solution, and simulation results demonstrate that the proposed system achieves reliable energy neutrality and enhanced data availability in agriculture compared to single-source systems. Results show up to **48% higher uptime** and **36% greater sensing quality** during seasonal and weather variations. The hybrid approach significantly improves reliability for precision irrigation, microclimate monitoring, and crop health sensing.

Keywords: IoT, hybrid energy harvesting, solar, wind, thermal, duty cycle, predictive control, agriculture, energy neutrality.

MCSOP75

ZERO TRUST SECURITY MODEL – A MODERN APPROACH TO CYBERSECURITY IN THE DIGITAL ERA

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ABSTRACT

In this digital era, people work from anywhere, data is stored in the cloud, increase in cyber attacks, insider threats are rising, and there is no frequent verification in traditional model. Therefore, traditional perimeter-based network protection model cannot handle the challenges created by the new technology. Once an attacker gains access to the internal network, traditional model automatically trusts them and allowing access to the sensitive data and system without further verification. To overcome these issues, security model called zero trust was introduced. Zero trust is a modern framework of cybersecurity, that works based on the principle “NEVER TRUST, ALWAYS VERIFY”. Instead of assuming users and devices inside the network are safe, it verifies all users and devices before granting access to the resources. Usually, it focusses on the key principles such as never trust and always verify, least privilege access, device security, strong authentication, and continuous monitoring of all activities regardless of location or devices. This paper explores the zero trust security model and compares it with traditional security model.

It describes the key components such as identity verification, access control, and continuous monitoring. This paper also explains the principles, applications, advantages, and disadvantages of zero trust. Shifting from traditional perimeter-based security model to zero trust security model increases security. The main aim of this paper is to show how zero trust improves security in modern digital era

MCSOP76

A STUDY ON AI-BASED PERSONALIZATION AND ITS IMPACT ON CONSUMER BUYING BEHAVIOUR IN E-COMMERCE PLATFORMS

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ABSTRACT

The expansion of digital commerce has transformed the way consumers interact with brands and make purchasing decisions.

In this technology-driven environment, Artificial Intelligence (AI) plays a crucial role in delivering personalized shopping experiences tailored to individual preferences and behaviours. The present study, titled “A Study on AI-Based Personalization and Its Impact on Consumer Buying Behaviour in E-Commerce Platforms,” examines how AI-enabled personalization strategies influence consumer attitudes, engagement levels, and buying decisions in online marketplaces. The research focuses on AI applications such as recommendation algorithms, chatbots, predictive analytics, customized promotions, and dynamic pricing systems that analyse consumer data to provide relevant product suggestions and content. The study investigates the impact of these personalization techniques on customer satisfaction, perceived value, trust, purchase intention, and brand loyalty. It also explores whether personalized digital experiences encourage impulse buying and improve long-term customer retention. A quantitative research design is adopted, with primary data collected through structured questionnaires distributed to online shoppers.

Statistical tools are used to assess the relationship between AI-driven personalization and consumer buying behaviour. The findings aim to provide meaningful insights into the effectiveness of AI-based strategies in enhancing customer experience and influencing purchasing patterns in the competitive e-commerce sector.

Keywords: *Artificial Intelligence, AI-Based Personalization, Consumer Buying Behaviour, E-Commerce, Customer Satisfaction, Purchase Intention, Brand Loyalty.*

MCSOP77

STUDY ON IMPACT OF USAGE OF AI TOOLS TOWARDS SELF-ESTEEM AMONG COLLEGE STUDENTS IN MADURAI

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ABSTRACT

The title “A Study On Impact of Usage of AI Tools Towards Self-Esteem Among College Students In Madurai” This study examines the impact of the usage of Artificial Intelligence tools on the self-esteem of college students in MADURAI. With the rapid integration of AI tools such as chatbots, content generators, and learning support systems into academic activities, students’ learning experiences and psychological perceptions are undergoing significant changes. Our study have a research gap that although several studies have examined the impact of artificial intelligence tools on academic performance and skill development among college

students, limited research has focused on their psychological impact, particularly on self-esteem. The research focuses specifically on 3rd year B.Sc. Information Technology students, as they frequent users of AI tools for academic assignments, problem-solving, and skill development. Primary data for the study will be collected by using self-structured questionnaire, this study used sample size of 213 students. The researcher used quantitative method and the researcher adopts a descriptive analysis and using census sampling design. Statistical tools such as percentage analysis, correlation analysis and independent sample T-test and kurtosis will be applied to interpret the data. The findings of the study conclude that AI awareness among students is growing rapidly and AI tools positively influence academic engagement and confidence to a certain extent. However, AI should be used as a supportive tool rather than a replacement for independent learning. Proper guidance, digital literacy training, and ethical awareness are essential to ensure balanced and responsible use of AI in education.

Keywords: *AI, self-esteem, students usage on AI tools.*

MCSOP78

DIGITAL HYGIENE: THE ADHERING OF CYBER SECURITY POLICIES IN EVERYDAY LIFE

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ABSTRACT

We live in an era where losing a smartphone feels more catastrophic than losing a wallet, highlighting how deeply digital technologies are embedded in everyday life. From UPI (Unified Payments Interface) transactions to private social media interactions, sensitive personal and financial data are constantly stored and exchanged online. However, the rapid growth of digital dependency has also led to a rise in cyber security attacks, including phishing, identity theft, ransom ware, and social engineering fraud. Despite advanced technological safeguards, most breaches occur due to the human element rather than system failure. Weak passwords, clicking malicious links, and trusting fraudulent “customer care” calls remain major causes of compromise. This paper focuses on the importance of adhering to cyber security policies in everyday life as a preventive defense mechanism. It emphasizes digital hygiene practices such as multi factor authentication, regular software updates, strong password management, and cautious evaluation of unsolicited communications.

The study also proposes a practical solution, the Link Verification System, which allows users to verify whether a URL is legitimate or malicious before accessing it. By encouraging strict adherence to cyber security guidelines and promoting awareness-driven habits, individuals can significantly reduce their exposure to digital threats. Ultimately, in a world that never logs off, adherence to cyber security policies is not optional but essential for safeguarding privacy, finances, and overall digital well-being.

Keywords: *Digital Hygiene, Multi-Factor Authentication, Link Verification System, Digital Safety, Cyber Resilience*

MCSOP79

ASM-NET: AN ADAPTIVE SYMBOLIC MAPPING NETWORK FOR EFFICIENT LOSSLESS DATA COMPRESSION

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ABSTRACT

Modern data infrastructure is struggling with an explosion of high-resolution digital media. Traditional lossless compression standards, such as LZW and DEFLATE, rely on fixed-rule dictionary matching which often fails to capture complex, non-linear redundancies in raw bitstreams. This research introduces the Adaptive Symbolic Mapping Network (ASM-Net), a framework designed to evolve beyond static compression rules using Artificial Intelligence. ASM-Net utilizes a 1D-Convolutional Neural Network (CNN) to act as an intelligent scanner, identifying recurring 16-bit and 32-bit patterns within serialized binary data. These patterns are transformed into optimized symbols through Adaptive Symbolic Mapping, effectively creating a custom "shorthand" for any given file. To prevent file expansion due to metadata, the system employs a Heuristic Mathematical Filter. This filter performs a real-time cost-benefit analysis, ensuring a pattern is only mapped if the spatial saving exceeds the storage cost of the dictionary header. The result is a strictly lossless, high-efficiency compression model with a Zero Bit-Error Rate. ASM Net demonstrates that lightweight AI can significantly reduce the storage footprint on resource constrained edge devices, providing a scalable alternative to traditional data reduction methods.

Keywords: *Lossless Compression; 1D-CNN; Adaptive Symbolic Mapping Network; Data Reduction.*

SARVAM AI: ADVANCING MULTILINGUAL FOUNDATION MODELS FOR INCLUSIVE ARTIFICIAL INTELLIGENCE

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ABSTRACT

The rapid evolution of artificial intelligence (AI) has accelerated the development of large-scale foundation models; however, linguistic diversity remains a significant challenge in achieving inclusive digital transformation. Sarvam AI addresses this gap by developing scalable, multilingual AI systems tailored for Indian and low-resource languages. This paper presents an overview of Sarvam AI's architectural approach, focusing on transformer-based large language models (LLMs) optimized for multilingual understanding, speech processing, and domain adaptation. The framework integrates large-scale pretraining on diverse Indic corpora, parameter-efficient fine-tuning, and alignment techniques to improve contextual accuracy across multiple languages. Additionally, the system emphasizes computational efficiency through model compression and inference optimization to support deployment in resource-constrained environments. Experimental evaluations demonstrate significant improvements in cross-lingual transfer performance, speech-to-text accuracy, and contextual reasoning when compared with baseline multilingual models. The proposed methodology contributes to reducing the digital language divide by enabling scalable AI applications in governance, education, and enterprise solutions. The findings highlight the potential of regionally grounded foundation models to foster equitable AI adoption while maintaining global interoperability.

Keywords: *Multilingual AI, Large Language Models, Foundation Models, Speech Recognition, Model Optimization.*

INFORMATION SYSTEM FOR MANAGEMENT OF WIND FARMS TO IMPROVE THE EASE OF OPERATION and MAINTENANCE AND IMPROVING POWER GENERATION

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ABSTRACT

Wind energy is one of the fastest growing renewable energy technologies around the world and in India too. The wind energy is captured by the device called Wind Turbine Generators (WTG), which converts the kinetic energy of wind into clean, renewable electricity. A group of Wind Turbines are called Wind Farm. The prime task of the Wind farm management is Operation and Maintenance (OandM) of their Wind Turbines in such a manner that the optimum power generation is done according the wind speed, while taking care of the safety and security aspects. Generally the Wind Turbines are located in remote areas. The functions of Wind Turbine Management Team (WTMT) comprises of multivarious activities (like Operation, breakdown maintenance, preventive maintenance, materials management, finance, safety and security). Appropriate information both pertaining to the internal parameters (rotating speed of the main shaft, direction of the turbine blade, power generation of the generators..etc) and external environment parameters (wind speed, wind direction, humidity of the environment ..etc) has to be made available to the Wind Farm Management for effective management of the various functions . For getting these information, the relevant data has to be absorbed (by using devises like IoT sensors) , processed using techniques like Machine Learning and Artificial Intelligence and effectively communicated to the concerned agency using appropriate computer networking techniques of the Internet.

This research work is done for design and development of an appropriate information system. The work is donby a practical study at the RS WindTech Engineers, located at the good wind belt area at Aralvaimozhi, Kanniyakumari District.

Keywords: *Wind Turbine Generators, Operation and Maintenance, Data Caputure, Information Processing, Optimum power generation*

AN ATTENTION-ENHANCED CNN ARCHITECTURE FOR RELIABLE STROKE DETECTION FROM BRAIN MRI

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ABSTRACT

Ischemic stroke is a leading cause of mortality and long-term neurological impairment worldwide, necessitating rapid and accurate lesion detection for effective therapeutic intervention. Magnetic Resonance Imaging (MRI), particularly diffusion-weighted imaging (DWI), plays a critical role in identifying acute ischemic abnormalities. However, automated stroke detection remains challenging due to lesion heterogeneity, intensity variations, and class imbalance in clinical datasets. This study proposes an Attention-Enhanced-Convolutional Neural Network (AE-CNN) architecture for reliable stroke detection using brain MRI from the ISLES 2022 dataset. The proposed framework integrates deep convolutional feature extraction with a channel attention mechanism that adaptively recalibrates feature maps to emphasize lesion-relevant representations while suppressing redundant background information. This adaptive feature weighting improves discriminative capability and reduces false negative predictions, which is crucial in medical diagnosis. The model was trained and evaluated using an 80-20 train-test split with data augmentation to enhance generalization. Performance was assessed using accuracy, precision, recall, F1-score, Dice similarity coefficient, and AUC-ROC metrics.

Experimental results demonstrate that the proposed AE-CNN achieves an accuracy of 97.1% and a Dice score of 0.95, outperforming conventional machine learning methods and baseline deep learning architectures such as VGG16 and ResNet50. The findings indicate that attention guided deep learning models can significantly enhance automated ischemic stroke detection from MRI and provide a reliable foundation for clinical decision support systems. Future work will focus on explainable AI integration and multi-class lesion characterization.

Keywords: *Stroke detection, MRI, deep learning, convolutional neural network, attention mechanism, ISLES 2022*

MCSOP83

SMART HELMET WITH REAL-TIME LOCATION TRACKING AND EMERGENCY NOTIFICATION ALCOHOL DETECTION

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ABSTRACT

The alarming increase in road accidents involving two-wheelers, particularly those caused by alcohol-impaired riding, has emerged as a significant public safety concern worldwide. Traditional helmets are designed primarily for head protection, but they do not provide any preventive or monitoring functions that could save lives in the event of accidents or impaired driving. This paper proposes an advanced smart helmet system that combines alcohol detection, real-time GPS location tracking, accident detection, and automated emergency notifications. The system uses an MQ-3 alcohol sensor to measure the rider's blood alcohol content, a combination of accelerometer and gyroscope sensors to identify collisions or falls, and a GPS module for precise location tracking. Upon detecting unsafe riding conditions or an accident, the system immediately communicates the rider's status and location to pre-registered contacts via GSM or IoT platforms. Experimental evaluation demonstrates that this integrated approach not only prevents impaired riding but also significantly reduces the time required for emergency response, thereby enhancing overall rider safety and contributing to road safety initiatives

Keywords: *Smart Helmet, Alcohol Detection, GPS Tracking, Emergency Notification, IoT, Rider Safety, Accident Prevention.*

MCSOP84

ADVANCED MEDICAL IMAGE SECURITY FRAMEWORK USING INTELLIGENT SATIN BOWERBIRD SEARCH-DRIVEN ADVANCED ENCRYPTION STANDARD

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ABSTRACT

The reliance on digital technologies in healthcare is transforming patient information management. As cloud-based systems for storing sensitive data, including medical images, become common, strong security protocols are necessary

to guard against data breaches and unauthorized access, ensuring patient trust and compliance with regulatory standards throughout the data lifecycle. This paper presents an innovative medical image security framework that integrates the Advanced Encryption Standard (AES) with a novel optimization algorithm called Intelligent Satin Bowerbird search-driven Advanced Encryption Standard (ISB-AES). This approach employs a dual mechanism, the AES for cryptographic encryption and the SBS algorithm for optimizing key management and encryption processes. The framework gathers MI and patient data, processes them through the model, and ensures secure storage and transfer. The proposed algorithm enhances encryption by mimicking the nesting behavior of satin bowerbirds, leading to improved key generation and management. The effectiveness of the framework using various performance metrics, including CPU time (s) (0.652), Entropy (8.621), Unified Averaged Changed Intensity (UACI) (30.08), and peak signal-to-noise ratio (PSNR) (dB) (7.83) is evaluated. Preliminary results indicate that the ISB- AES framework outperforms existing security systems in safeguarding medical images, thereby demonstrating its potential for real-world healthcare applications. This study contributes to the ongoing efforts to enhance medical image security in the digital landscape.

Keywords: *Medical Image Security, Key Management, Intelligent Satin Bowerbird search-driven Advanced Encryption Standard (ISB-AES), Cloud Computing.*

MCSOP85

HYGIENIC HAVEN-A SMART RESTROOM MANAGEMENT SYSTEM

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ABSTRACT

Effective management of public and institutional washrooms is essential for hygiene, user safety, and overall user experience. Traditional washroom maintenance usually relies on fixed schedules and manual checks. These methods are often inefficient and may not catch problems in real time, leading to unsanitary conditions or safety risks. To tackle these issues, this research presents an innovative IoT-based system that uses the ESP8266 microcontroller for smart, real-time monitoring and control of washroom environments. The proposed system includes several sensors, such as Gas sensors (MQ135), water leakage detectors, vibration sensors, Temperature and Humidity sensor (DHT22). These sensors are embedded with ESP8266 NodeMCU (data processor) and using this microcontroller the data are sent to a website dashboard, where maintenance staff can view the washroom status

in real time and receive alerts when specific thresholds are reached, such as abnormal gas detection (hazardous gas), fall down of elder people (due to water leaks), and changes in temperature. This enables staff to take immediate action to assist individuals or clean the restrooms when required. The system helps to optimize resource use, cut down on unnecessary manual inspections, and lower hygiene-related risks. It also allows for predictive maintenance, which improves the reliability of washroom facilities. Tests of the system show it can keep hygiene and safety at optimal levels, lower operational costs, and boost user satisfaction.

Keywords - *IoT, ESP8266 NodeMCU, MQ135 Gas Sensor, DHT22 Temperature and Humidity Sensor, Vibration Sensor, Water Leakage Detector, WebBased Monitoring, Predictive Maintenance, Smart Washroom Hygiene and Safety Management.*

MCSOP86

THE ROLE OF ARTIFICIAL INTELLIGENCE IN MODERN BUSINESS DECISION MAKING

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ABSTRACT

Artificial Intelligence has developed as an innovative influence in contemporary business environment, transforming traditional decision making operations with the help of developed data analytics, automation and predictive capabilities. In an era, marked by speedy digitalization and strong global competition, organisations increasingly depend on Artificial Intelligence driven network to boost strategic, tactical and operational decisions. This paper examines the role of Artificial Intelligence in modern business decision making from a descriptive viewpoint. It analyzes how AI technologies such as machine learning, natural language processing, big data analytics and intelligent automation contribute to improved accuracy, efficiency and competitiveness.

The research point outs AI's application in finance, marketing, human resource management, supply chain management and customer relationship management. It furthermore examines the gains of AI integration containing real time insights, risk reduction, cost optimization and enhanced customer personalization. Despite its advantages, AI adoption presents obstacles such as data privacy concerns, ethical issues, high implementation costs and skill gap.

Based on the secondary data gathered from journals, reports and published research, the paper concludes that AI is not simply a technological advancement but a strategic business tool that considerably affects managerial decision making.

Organizations that successfully incorporate AI into their decision system obtain a competitive advantage and upgraded organizational performance. The study focuses the requirement of responsible AI adoption and consistent skill development to expand its potential in business decision making.

Keywords: *Artificial Intelligence, Decision making, Organisational performance, Digital transformation, Predictive analysis.*

MCSOP87

SPATIOTEMPORAL DEEP LEARNING ARCHITECTURES FOR AUTOMATED EEG-BASED EPILEPSY SEIZURE PREDICTION

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ABSTRACT

Epilepsy affects millions globally, with approximately 30% of patients suffering from drug-resistant seizures. This research synthesizes four advanced deep learning frameworks for automated EEG-based seizure prediction: CNN-Bi-LSTM with attention, BNLSTM-CASA, GCN-LSTM for topological modeling, and Pseudo-3D CNN for nonlinear feature fusion. These models prioritize the integration of spatial and temporal dependencies to identify pre-seizure (preictal) states with minimal preprocessing. Performance evaluations using the CHB-MIT database demonstrate superior results, achieving average accuracies between 94.83% and 99.39%. The findings indicate that automated lead optimization and multi-feature fusion significantly enhance prediction reliability. By effectively capturing complex neural patterns, these spatiotemporal methodologies provide a robust foundation for developing real-time, wearable epilepsy warning systems that outperform traditional machine learning classifiers.

ECO-DISTILL: A MULTI-STAGE KNOWLEDGE DISTILLATION FRAMEWORK FOR GREEN EDGE COMPUTING IN 6G ECOSYSTEMS

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ABSTRACT

The fast increase of Large Language Models (LLMs) promises innovative know-hows for 6G networks; however, their deployment at the network edge is rigorously delayed by the massive computational overhead and energy demands of conventional Transformer architectures. This work presents Eco-Distill, a unique multi-stage knowledge distillation framework explicitly designed to bridge the gap between high-performance AI and the realities of resource-constrained edge environments.

By integrating hardware-aware teacher-student alignment with dynamic pruning and aggressive 4-bit quantization, Eco-Distill optimizes model architecture for localized, low-power execution without sacrificing functional utility. Our methodology shifts the paradigm from centralized, energy-intensive cloud processing to localized, sustainable intelligence. This approach allows edge devices to function as intelligent, autonomous nodes while significantly minimizing their environmental footprint – a core requirement for the infrastructure of the future.

Empirical validation conducted on the NVIDIA Jetson Orin Nano platform demonstrates that Eco-Distill achieves a remarkable 67% reduction in power consumption while retaining 98.5% of baseline accuracy.

These findings offer a scalable, sustainable pathway for the integration of "Green AI" into 6G ecosystems. As we move toward ubiquitous, hyper-connected intelligent infrastructure, Eco-Distill offers a critical blueprint for balancing the demand for cutting-edge computational power with the dire need, global mandatory of environmental responsibility. By reducing the energy cost of intelligence, we can enable a truly pervasive and eco-conscious 6G future.

Keywords: Knowledge Distillation, Edge AI, Green Computing, Model Compression, 6G.

A BEHAVIORAL ANALYSIS OF SKINCARE TREND ADOPTION AND DECISION MAKING AMONG YOUNG ADULTS

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ABSTRACT

Social media shared skincare trends have a growing impact on young adults' decisions and routines, frequently influencing how they perceive themselves and take care of their skin. This paper aims to focus on the behavioral, social, and informational factors contributing to young adults adopting skincare trends. Data is collected through a structured survey comprising social media usage habits, trust in social media figures, expenditure habits on skincare routines, pressures from society and peers, perception of self image, and the primary source of obtaining skincare related information from dermatologists, social media pages, and family guidance. Young adults' likelihood of adopting skincare trends is estimated by the prediction models using Random Forest and Logistic Regression based on the factors of exposure and skincare routines from the structured survey. This study looks at the behavioral and social factors that affect young adults' adoption of skincare trends. It highlights the influence of social media exposure, trust in influencers, and willingness to experiment. At the same time, it stresses the importance of responsible and informed skincare practices. The focus remains on behavioral patterns without offering any medical or psychological evaluations. The project aims to increase awareness of informed skincare choices through responsible, data-driven analysis of young adults' behavior and to improve understanding of how social environments shape personal care practices.

Keywords: *Skincare Trend Adoption, Influencer Trust, Predictive Modeling, Random Forest, Logistic Regression*

MCSOP90

SMART WASTE SEGREGATION USING MOBILENETV2 FOR A SUSTAINABLE ENVIRONMENT

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ABSTRACT

Smart waste segregation is essential for maintaining a clean and sustainable environment, especially in the context of growing urban populations and smart cities. This study presents a smart waste segregation system developed using the lightweight MobileNetV2 deep learning architecture to support efficient and reliable waste classification. The proposed system evaluates both multiclass and binary classification within a unified framework. In binary classification, waste materials are categorized as recyclable and non-recyclable. In multiclass classification, recyclable waste such as paper, cardboard and glass is identified as individual categories, while non-recyclable waste includes materials such as plastic, trash and metal. The model utilizes a softmax activation function to estimate prediction confidence scores and support effective decision making during the classification process. Overall, this project emphasizes the importance of intelligent waste segregation systems in promoting responsible recycling practices, improving environmental accountability, and supporting the development of cleaner and greener smart cities.

Keywords: *MobileNetV2, Deep Learning, Multiclass Classification, Binary Classification, Waste Segregation*

MCSOP91

URBAN AIR QUALITY RISK CLASSIFICATION USING MACHINE LEARNING

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ABSTRACT

Urban air quality is influenced by traffic emissions, industrial activities, and weather conditions. Poor air quality can lead to respiratory problems and other health issues, particularly in urban areas. Therefore, identifying air quality levels in a reliable manner is important to support safe outdoor decisions. This study presents a machine learning approach for classifying urban air quality into six health categories

defined by the Central Pollution Control Board (CPCB) of India such as Good, Satisfactory, Moderate, Poor, Very Poor, and Severe. The model is developed using pollutant concentration features including PM_{2.5}, PM₁₀, NO₂, SO₂, CO, and O₃. Missing values are handled through median imputation, and class imbalance is addressed using the Synthetic Minority Over-sampling Technique (SMOTE). Random Forest, XGBoost, and Gradient Boosting models are evaluated to determine a suitable classifier. A web application is developed to enable users to check air quality levels and receive SMS alerts when the predicted category reaches Moderate or higher. The proposed system demonstrates the practical application of machine learning techniques for air quality risk awareness.

Keywords: *Air Quality Index, Urban Air Pollution, Multi-class Classification, Ensemble Learning, SMOTE, Real-Time Monitoring*

MCSOP92

CASS-X: A MACHINE LEARNING APPROACH FOR 4-TIER CYBER BULLYING SEVERITY CLASSIFICATION IN SOCIAL MEDIA TEXT

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ABSTRACT

Cyberbullying detection on social media has traditionally been treated as a simple binary classification problem—content is either bullying or not. However, online harassment exists on a spectrum, ranging from mild negative comments to severe threats and hate speech. This paper introduces CASS-X (Cyberbullying Assessment Severity System - XGBoost), a machine learning framework designed to classify cyberbullying into four severity levels. The proposed model combines advanced text preprocessing techniques with an optimized XGBoost classifier to accurately categorize content across multiple social media platforms. The system was trained and evaluated on a large multi-platform dataset containing 164,531 samples collected from Twitter, YouTube, and aggression-related datasets. CASS-X achieved: 94.91% overall accuracy, with strong per-class performance: 100% F1-score for non-bullying content: 87.7% for mild cases: 73.7% for moderate cases: 82.7% for severe cases. By moving beyond binary classification, this research enables more effective and prioritized content moderation.

Keywords: *Cyberbullying Detection, Severity Classification, Natural Language Processing, XGBoost, Social Media Analysis, Machine Learning*

A MACHINE LEARNING FRAMEWORK FOR REAL-TIME CRYPTOJACKING DETECTION BASED ON SYSTEM RESOURCE PATTERNS

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ABSTRACT

Cryptojacking is a hidden cyberattack in which malicious scripts secretly use system resources to mine cryptocurrency, causing performance degradation and security risks. This paper presents a real-time cryptojacking detection system based on system resource behavior analysis. The proposed approach monitors CPU and memory usage patterns to distinguish normal activity from cryptojacking behavior. Advanced feature engineering is applied to capture meaningful resource variations, and data imbalance is addressed using synthetic sampling techniques.

Multiple machine learning models, including Gradient Boosting, Random Forest, and a hybrid model, are evaluated to identify the most suitable classifier for real-time detection. Gradient Boosting is selected as the final model due to its high accuracy on tabular resource data, low inference time, effective handling of feature interactions, and reduced computational cost compared to deep learning methods. The trained model is integrated into a web-based application that enables real-time analysis of websites. For each analyzed URL, the system provides a clear classification result along with a confidence score and live system metrics.

The proposed solution is lightweight, efficient, and suitable for deployment on resource-constrained devices. By combining accurate detection with practical real-time deployment, the system offers an effective defense against stealthy cryptojacking attacks in real-world environments.

Keywords: *Cryptojacking Detection, Machine Learning, Resource Monitoring, CPU and Memory Analysis, Web-Based Security, Gradient Boosting*

MCSOP94

STUDENT DROPOUT PREDICTION USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Student dropout has become one of the most critical challenges faced by higher education institutions worldwide. When students discontinue their studies, it negatively affects not only institutional performance but also students' academic growth, confidence, and future career prospects. Identifying students who are at risk of dropping out at an early stage can help colleges take timely preventive actions such as counseling, academic mentoring, and financial assistance.

This research proposes a machine learning-based framework to predict student dropout by analyzing academic, demographic, and socio-economic factors including attendance, internal assessment marks, prior academic performance, gender, family income, and parental education. The dataset is carefully preprocessed using data cleaning, encoding, and normalization techniques to improve data quality and model reliability. Three classification algorithms—Support Vector Machine (SVM), K-Nearest Neighbors (KNN) Classifier, and Gradient Boosting Classifiers—are implemented and evaluated using accuracy, precision, recall, and F1-score metrics. The findings confirm that machine learning techniques can effectively support data-driven decision-making and help institutions improve student retention through early intervention strategies.

Keywords: *Student Dropout Prediction, Machine Learning, Higher Education Analytics, Educational Data Mining, Classification Models, Student Retention.*

MCSOP95

A MECHANISTIC FIVE-COMPARTMENT MODEL REVEALS THRESHOLD TRIGGERS OF MANGO SUDDEN DECLINE

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ABSTRACT

Mango Sudden Decline (MSD) remains a poorly understood syndrome despite decades of research, with the specific triggers that initiate rapid tree mortality still unidentified.

In this study, we develop a deterministic compartmental model incorporating susceptible, latently infected, symptomatic, and removed mango trees, coupled with pathogen load in the vascular tissue and cryptic vector population dynamics. The model captures the characteristic rapid die-off observed in MSD outbreaks. Equilibrium points are derived and their stability is analyzed using the next-generation matrix and Routh–Hurwitz criteria, revealing a stable disease-free equilibrium below the critical threshold and an endemic equilibrium that undergoes a Hopf bifurcation – producing cyclical outbreaks – when specific trigger parameters cross critical values. Numerical simulations, parameterized with field data from affected orchards, reproduce the sudden collapse of mature trees within 7–14 days under certain environmental and biotic conditions. Global sensitivity analysis (via Latin hypercube sampling and partial rank correlation coefficients) identifies the rate of vascular pathogen migration, vector fecundity, and temperature-driven fungal sporulation as the most influential parameters governing the transition from chronic decline to acute sudden death. Our results suggest that MSD outbreaks are not solely pathogen-driven but arise from nonlinear interactions among multiple stressors; the model pinpoints specific measurable thresholds that, when exceeded, push the system into a catastrophic regime. This framework provides a novel, mechanistic approach to identifying hidden triggers and offers a predictive tool for early warning and targeted intervention.

Keywords: *Mango Sudden Decline; mathematical epidemiology; equilibrium points; stability analysis; Hopf bifurcation; numerical simulation; sensitivity analysis; compartmental model; pathogen-vector dynamics; trigger factors.*

MCSOP96

FRACTIONAL VISCOELASTIC MUCUS-INSPIRED OLDROYD-B NANOFLUID FLOW WITH VARIABLE VISCOSITY DRIVEN BY METACHRONAL CILIA WAVES IN AN ASYMMETRIC CHANNEL

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ABSTRACT

The present study examines the peristaltic transport of a fractional viscoelastic mucus-inspired nanofluid with variable viscosity driven by metachronal cilia waves in an asymmetric channel under the combined effects of a transverse magnetic field and thermal radiation. The rheological behaviour of the mucus-like fluid is described using a fractional Oldroyd-B model, enabling the incorporation of long-term memory and viscoelastic characteristics inherent to biological fluids. To enhance physical realism, temperature-dependent viscosity is considered, establishing a strong thermal–rheological coupling. Nanoparticle transport is modelled through the Buongiorno framework, accounting for Brownian motion and thermophoretic diffusion mechanisms.

Employing the assumptions of long wavelength and low Reynolds number, the governing nonlinear coupled partial differential equations are simplified and solved analytically using the Homotopy Perturbation Method (HPM). Compared to the second-grade fluid, the Oldroyd-B fluid has a much smaller velocity magnitude. In particular, the velocity magnitude of the second-grade fluid is around 11% more than that of the Oldroyd-B fluid. The cilia length parameter significantly enhances the velocity profile at the centre of the channel, which contrasts with the behaviour observed in conventional pressure-driven flows where central velocity is suppressed. The temperature distribution is found to increase with both the Brownian motion parameter and the thermophoresis parameter, indicating enhanced thermal diffusion within the bio fluid. Furthermore, an increase in the viscosity parameter initially enlarges the trapped bolus size, followed by a reduction at higher viscosity levels, demonstrating its dual influence on cilia-induced transport dynamics. The proposed model provides new insights into cilia-driven transport of complex bio-nanofluids and has potential applications in respiratory mucus clearance, targeted drug delivery, and biomedical microfluidic systems.

Keywords: *Oldroyd-B fluid, Variable viscosity; Metachronal cilia waves; Peristaltic transport; Magnetic field; Thermal radiation; Homotopy perturbation method.*

AHOP1

THE CULTURE OF THE GYPSIES: NATURE'S LAW VERSUS CIVILIZATION'S LAW IN PUSHKIN'S "THE GYPSIES"

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ABSTRACT

This paper explores Alexander Pushkin's poem "The Gypsies" examining the interplay between the Byronic hero archetype embodied in the character of Aleko and the concept of 'noble savage' as theorized by Jean-Jacques Rousseau. Set against the backdrop of 19th-century Russian literature, Pushkin's portrayal of Aleko juxtaposes the proud aspirations of the individual with the tranquil existence of the Gypsies, representing a conflict between nature's law and societal constraints. The Byronic hero, characterized by an internal struggle and a quest for meaning beyond societal expectations, is mirrored in Aleko's turbulent emotions and existential despair, leading to compelling comparisons with Rousseau's vision of humanity's original innocence disrupted by civilization. This exploration reveals how Pushkin intricately weaves themes of pride, exile, and the search for true freedom within the fabric of his narrative. Notably, Aleko's displacement and yearning for connection resonate with the Romantic ideal of the noble savage, prompting an examination of the romanticization of the Gypsy life against the moral and philosophical implications of civilization's burdens.

Ultimately, the poem serves to critique the societal norms that confine the individual spirit while advocating for a return to a more instinctual, harmonious existence in nature.

Keywords: *Noble savage; Byronic hero; Rousseau; Nature's law; Societal constraints.*

AHOP2

EXPLORING LANGUAGE, CULTURE, AND TECHNOLOGY IN CHIMAMANDA NGOZI ADICHIE'S *AMERICANAH*

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ABSTRACT

This paper examines Chimamanda Ngozi Adichie's *Americanah* through the lens of language, culture and technology, exploring how the novel navigates the complexities of identity, belonging and representation in a globalized world.

Ifemelu, the protagonist, navigates multiple languages, cultural contexts and digital spaces, highlighting the intersection of language, power and identity. Through her experiences, Adichie critiques societal expectations, racial dynamics and cultural norms, showcasing the tension between Nigerian and American cultures. The novel's exploration of technology, particularly social media and blogging reveals the complexities of digital identity and cultural exchange. By analyzing narrative strategies, linguistic choices, and thematic concern, this paper argues that *Americanah* offers a nuanced portrayal of the interplay between language, culture and technology on shaping individual and collective identities. This study contributes to ongoing discussions on the role of literature in representing and shaping cultural narratives in the digital age. By utilizing internet mediated communication theories, this study argues that technology does not merely reflect Ifemelu's reality but actively reshapes the immigrant experience, providing a virtual "third space" where marginalized voices gain agency. Ultimately, the paper concludes that Adichie's work underscores how digital advancement and linguistic fluidity are essential tools for navigating the complexities of contemporary Afropolitan identity.

Keywords: *Afropolitanism; Blogging; Cultural Hybridity; Diaspora; Identity Politics.*

AHOP3

DIGITAL LANGUAGE: TRANSFORMATION OF COMMUNICATION IN THE SOCIAL MEDIA ERA

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ABSTRACT

The rapid growth in digital platforms (social media) has changed the contemporary mode of communication not only how people communicate but also how language is spoken and comprehended in everyday life. This paper examines the evolution of digital language through the lens of sociolinguistic approach, which is interested in the ways online communication changes the vocabulary, expression, and meaning of users. Compared to face-to-face communication, online communication encourages the use of shortened forms, informal arrangements, and context-based articulations, which are new tendencies in communication as dictated by technological spaces. The role of English as lingua franca in the interaction between speakers of various linguistic backgrounds is particularly highlighted, and such practices as code-switching demonstrate the co-existence of the global and local linguistic identities in the online community. The paper further discusses the semantic shift of some socially sensitive words in digital discourse and the negotiation and reconstruction of meaning by using collective online language. These language transformations highlight the dynamic character of language, society and technology. The paper implies that digital communication is a creative and adaptive transformation of the language to capture the changing social reality. It also emphasised the dynamic nature of communication in the social media era and the current flexibility of language in digitally mediated societies through the analysis of daily trends of online communication.

Keywords: *Digital language; sociolinguistics; code-switching; social media; communication.*

AHOP4

ALGOSPEAK: HOW AUTOMATED MODERATION DILUTES SOCIAL INTENSITY AND VERNACULAR

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ABSTRACT

This paper focuses on the emergence of 'Algospeak', a way of using coded language, euphemisms, and substitutes created by online internet users to bypass automated content moderation.

Although recent research often categorizes these tactics as techniques to bypass online platform censorship, this study addresses a significant research gap, the affective attenuation or moral blunting that happens when these terms enter offline discourse. The study uses qualitative discourse analysis to examine the semantic mapping of these lexemes, especially focusing on 'unalive' (suicide), 'PDF file' (pedophile), 'mascara' (sexual assault), 'corn' (pornography), 'menty b' (mental breakdown). This analysis shows the process of 'Semantic Bleaching' where the fun or technical nature of these forced euphemisms reduces the language of its original affective intensity. This study argues that Algospeak dilutes the intensity of social issues by creating a semantic gap that exists in both online and offline discourse. The paper showcases how algorithmic constraints act as an important factor in linguistic evolution by analyzing real world context collapse like the Julia Fox 'mascara' incident. These results show that focusing on platform reach instead of linguistic depth can actually lead to a decrease in collective empathy. Using the recent framework 'Algorithmic Sociolinguistics', this paper argues that this model is needed to track the evolution of lexemes and also to evaluate the impact of machine learning constraints on social interaction and human ethical reasoning in this digital era.

Keywords: *Algospeak; Affective Attenuation; Semantic Bleaching; Algorithmic; Sociolinguistics.*

AHOP5

THE IMPACT OF QUEER REPRESENTATION ON GENDER NORMS IN CONTEMPORARY INDIAN FICTION

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ABSTRACT

Contemporary Indian fiction has emerged as a significant space for questioning and reconfiguring dominant gender norms through the representation of queer identities. Traditionally, Indian society has been structured around rigid patriarchal and heteronormative frameworks that marginalize non-conforming sexualities and gender expressions. The study examines how queer representation in contemporary Indian fiction challenges these normative structures and contributes to rethink of gender roles and identities. Constructing on queer theory and feminist perspectives, the study analyses select Indian fictional narratives that foreground same-sex desire, gender fluidity, and non-binary identities. Through close textual analysis, the paper explores how queer characters negotiate family expectations, social stigma, and cultural constraints, thereby exposing the constructed nature of gender norms.

These literary representations disrupt binary understandings of masculinity and femininity and emphasize gender as performative, fluid, and socially regulated. The study further argues that queer narratives function as sites of resistance and visibility, enabling marginalized voices to contest silence and exclusion within mainstream discourse. By portraying lived queer experiences with emotional depth and realism, contemporary Indian fiction fosters empathy and encourages readers to critically engage with prevailing social attitudes toward gender and sexuality. Ultimately, the study highlights the social and cultural impact of queer representation in literature, demonstrating its role in reshaping perceptions of gender norms and promoting inclusivity in modern Indian society.

Keywords: *Queer Representation; Gender Norms; LGBTQ+; Queer; Heteronormativity; Gender Fluidity; Sexuality and Literature.*

AHOP6

ARRANGED MARRIAGE AND DIASPORA IN CHITRA BANERJEE DIVAKARUNI'S ARRANGED MARRIAGE

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ABSTRACT

This research article studies Chitra Banerjee Divakaruni's short story collection, *The Arranged Marriage*, from a diasporic perspective, focusing on the emotional, cultural, and psychological experiences of an immigrant woman changing to marriage and life in an alien country. The study explores how *Arranged Marriage* functions not only as a cultural institution but also as a space in which identity, expectations, and personal freedom are constantly discussed. Through simple and powerful narration, Divakaruni presents the innermost conflicts of a woman who moves from acquaintance to isolation, and from silence to self-awareness. The article analyses how relocation deepens problems such as loneliness, cultural displacement, gender roles, and the pressure to preserve tradition while adapting to a new social environment. It also highlights how the protagonist's journey reflects the broader struggles of diasporic women who attempt to balance personal desire with inherited cultural values. By examining themes of belonging, emotional survival, and self-realisation, this study argues that the story presents *Arranged Marriage* as a complex and evolving experience rather than a fixed cultural practice.

Keywords: *Diaspora; Identity; Arranged Marriage; Migration; Cultural Conflict.*

LAUGHING TO HOLD THE FAMILY TOGETHER: MATERNAL HUMOUR AS EMOTIONAL LABOUR

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ABSTRACT

This study looks at humour in the home as a neglected emotional labour done by older, frequently less educated moms and housewives who must find their position in 21st century households that are becoming more technologically advanced, educated, and changing quickly.

Even if satire, public comedy, and digital cultures are the core subjects of current humour studies, women's private, silent comedic activities are still severely underappreciated. The study fills this gap by examining how older mothers, who are often left out of formal education and modern technology, use humour, jokes, recollections, and light-hearted stories to maintain relationships, reduce generational distance, and mask emotional suffering. These ladies use laughing to ease stress, prevent conflict, and preserve marital harmony in homes where family members are frequently busy and emotionally unavailable due to work demands and an increasing reliance on digital technology and artificial intelligence. In order to interpret humour as a structured and gendered practice rather than an impulsive act of cheerfulness, the paper uses a qualitative, theoretical methodology based on textual analysis of literary and cultural representations of motherhood. It draws on feminist theories of emotional labour, affect, and care ethics. The analysis shows that maternal humour functions as affective management, allowing families to run smoothly while making women's labour invisible. It does this by disguising loneliness, absorbing neglect, and converting individual misery into group comfort. Simultaneously, such humour quietly reflects perseverance, memory, and modest resistance to marginalisation. The study concludes by highlighting the hidden costs paid by older women who are trying to fit in with modern, educated, and technologically advanced families and by acknowledging domestic humour as emotional and ethical labour, which broadens the scope of humour studies beyond enjoyment.

Keywords: *Motherhood; Humour; Pain; Social difference; technology (AI).*

NARRATIVE, TRAUMA, AND ADOLESCENT IDENTITY:
A MULTI-DISCIPLINARY READING OF CHIMAMANDA NGOZI
ADICHIE'S PURPLE HIBISCUS

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ABSTRACT

Purple Hibiscus, a novel by Chimamanda Ngozi Adichie, has been widely analyzed from feminist and postcolonial perspectives; however, such one-way approaches often limit understanding of its complex narrative engagement with trauma, domestic violence, and the formation of adolescent identity. This paper argues that Purple Hibiscus requires an integrated, multidisciplinary mode of analysis that synthesizes literary studies with psychological theories and sociological insights to fully capture the novel's complex narrative. The paper explores how Adichie's use of first-person narrative, silences, and symbolic themes communicates the psychological aftermath of domestic violence experienced by the protagonist, Kambili. It also seeks to analyze domestic space as a site of power where patriarchy, religious authoritarianism, and postcolonial histories intersect to shape identity and silence voice. At the same time, it also seeks to explore how alternative family structures promote emotional resilience and the development of agency. Through the lens of narrative as a location of psychological and social meaning, the study reveals that literary texts are more than aesthetics; they are engaged with lived experiences of trauma and resistance. In this regard, Purple Hibiscus is situated as a critical site for analyzing how literature is engaged with identity formation in oppressive domestic structures, thus highlighting the importance of multidisciplinary approaches in understanding complex human experiences.

Keywords: *Domestic violence; Patriarchy; Narrative identity; Resilience; Bildungsroman.*

POSTCOLONIAL BORDERS IN AMITAV GHOSH'S THE SHADOW LINES

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ABSTRACT

This article observes *The Shadow Lines* by Amitav Ghosh from a postcolonial perspective, concentrating on how the novel questions the idea of national borders, identity, and historical memory. The study argues that Ghosh presents borders not as fixed political realities but as imagined divisions created through violence, fear, and collective misunderstanding. Through fragmented narration and personal memories, the novel connects private lives with larger historical events such as Partition and communal conflict. The analysis shows how movement across cities such as Calcutta, Dhaka, and London challenges rigid ideas of nation and belonging. The characters' experiences reveal that memory and human relationships often cross boundaries that politics attempts to enforce. The article also discusses how the novel critiques nationalist thinking by showing the emotional and psychological consequences of division.

By blending history with personal narrative, Ghosh exposes the instability of borders and emphasises shared human experience over national separation. The study concludes that *The Shadow Lines* remains a significant postcolonial text because it redefines space, history, and identity beyond territorial limits.

Keywords: *Postcolonialism; Border; Memory; Identity; Nationhood.*

AHOP10

A DIGIMODERNIST TAKE ON SKINCARE PRODUCT REVIEWS

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ABSTRACT

With the growth of the digital era, the limitations of postmodernism were in plain sight and hence needed a much inclusive framework. Proposed by Alan Kirby, digimodernism is not a counter movement to postmodernism but rather is an expansion of it in a digital context. It falls in the same flow of postmodernism as it shakes the fixed grand narrative by imposing heaving on netizen engagement. Digimodernism considers the disposition of digital users not as spectators but of active participants. This framework includes the agency of different texts emerging from the result of digitalization and computerisation. One such micro-literature is that of written skincare reviews. These product reviews uphold within themselves the system of literariness and thereby emerges as micro, localised and subjective narratives. Skincare marketing which feeds off binarism, in recent times is treated with digital - user scepticism rather than a grave acceptance of persuasion. This era which heavily marks the user engagement, blurs the line between the creator/ writer and the participant/ reader. Hence these reviews under the light of digimodernism are subversive, challenging and interactive while defying the fixed system of influencer and persuasive marketing.

Keywords: humanities; digimodernism; product reviews; micro-literature;

AHOP11

DIGITAL REFRACTIONS: THE EVOLUTION OF ENGLISH LITERATURE THROUGH ALGORITHMIC NARRATIVES AND GLOBAL SOCIO-TECHNOLOGICAL SHIFTS

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ABSTRACT

This paper explores the transformative intersection of English literature, digital technology, and global societal shifts in the 21st century. As the English language continues to function as a lingua franca of the digital age, the traditional boundaries of the literary canon are being reshaped by algorithmic influence, multimodal platforms, and cross-cultural digital exchanges. The study investigates how “Global English” manifested in contemporary electronic literature (E-Lit) and social-media-driven narratives, moving beyond the printed page to embrace non-linear, interactive storytelling.

By analyzing a selection of digital-born English texts, this research examines how technology acts as both a medium and a disruptor—facilitating the democratization of literature while simultaneously challenging traditional notions of authorship and cultural hegemony. Furthermore, the paper addresses the societal implications of this evolution, arguing that the integration of AI and digital platforms into literary production reflects a broader cultural move toward hybrid identities. This ‘digital refraction’ of the English language allows for marginalized voices to permeate global literary spaces, yet it also risks a new form of linguistic standardization dictated by software constraints. Ultimately, this presentation seeks to provide a framework for understanding how English literature serves as a dynamic site of resistance and adaptation within our increasingly digitized global society. By bridging the gap between classical literary theory and modern digital humanities, the study offers insights into the future of human expression in a technology-mediated world.

Keywords: *Global English; Digital Refraction; Linguistic Standardization; Digital Humanities; Democratization of Literature.*

AHOP12

FOUCAULT’S PANOPTICON LENS ON ALICE IN BORDERLAND

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ABSTRACT

This research examines Netflix’s *Alice in Borderland* as dystopian fiction through Michel Foucault’s concept of ‘Panopticism’. The series is adapted from Haro Aso’s Japanese manga. The *Borderland* is set in ruined Tokyo, where totalitarian rules are enforced by a disciplinary ‘visa system’. Players must survive deadly games where thousands die routinely. The Panopticon is a prison designed for constant surveillance. Although the work lacks an explicit panopticon architecture, it takes place in enclosed arenas with a monitor room embodying its core elements. Participants are constantly watched by a lethal laser. Beach propaganda projects a false panoptical utopia, concealing the grim reality. This paper reveals the authorities to be unverifiable, causing the players to self-police. Betrayal becomes a moral duty. Leaders ignore survivors’ psychological trauma. These mechanisms construct a dystopian *Borderland*. This study exposes how surveillance and visa controls transform players into self-policing subjects, while games weaponise trust to enforce ideological conformity.

Keywords: *Alice in Borderland; totalitarian; dystopia; Panopticism; surveillance; ideological conformity.*

AHOP13

PORTRAYAL OF CASTE IN PARIYERUM PERUMAL AND VAADIVAASAL: A COMPARATIVE STUDY

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ABSTRACT

This paper presents a comparative study on Tamil film *Pariyerum Perumal* and the Tamil novel *Vaadivaasal*, both of which address caste discrimination in Tamilnadu through different narrative mediums. *Vaadivaasal* explores caste hierarchies within the traditional sport of *Jallikattu*, where issues of class pride and social distinction are embedded in cultural practices.

The conflict between the *Picchi* and the *Zamindar* reflects how caste operates subtly within traditional social structures. In contrast, *Pariyerum Perumal* presents an explicit portrayal of caste oppression in contemporary Tamil society. Through the experiences of *Pariyan*, a law student from a marginalized caste, the film highlights systemic discrimination and modern subaltern struggles. While *Vaadivaasal* offers a traditional exploration of caste embedded in rural practices, *Pariyerum Perumal* represents a more political and confrontational critique. Both works demonstrate how caste continues to shape social relations across generations in both subtle and overt ways.

Keywords: *Class Conflict; Caste; subaltern struggles;*

AHOP14

REBUILDING ENGLISH LANGUAGE EDUCATION FOR FUTURE-READY LEARNERS

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ABSTRACT

This paper examines the transformation of English language teaching in college and university classrooms through innovative pedagogical techniques that move beyond traditional lecture-based instruction. It reflects on the use of learner-centered approaches such as flipped learning, project-based tasks, collaborative activities, experiential learning, and technology-supported instruction to create more engaging and meaningful learning environments. The study highlights how these methods respond to the evolving needs of contemporary learners by promoting active participation, critical inquiry, and practical language use. By integrating traditional literary study with modern interactive strategies, the paper demonstrates how deeper learning can be achieved in higher education contexts.

Drawing from teacher and learner narratives, it illustrates how reimagined classroom practices enhance communication skills, creativity, confidence, and learner autonomy. The paper argues that adaptable and inclusive teaching techniques are essential in preparing students for academic success, professional readiness, and lifelong learning in a rapidly changing global environment.

Keywords: *Learner-centered pedagogy; English language teaching; Higher education; Experiential learning; Technology integration.*

AHOP15

PERFORMING THE COOL GIRL: INTERNALIZATION OF THE MALE GAZE IN GILLIAN FLYNN'S GONE GIRL

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ABSTRACT

In Gillian Flynn's *Gone Girl*, the 'Cool Girl' monologue delivered by Amy Dunne transcends a mere satirical character trope, exposing the insidious process through which women are unconsciously taught to ceaselessly perform for the male gaze. This paper argues that Amy's initial transformation into, and the subsequent rejection of, the 'Cool Girl' persona embodies an unintentional internalization of patriarchal expectations, where women suppress their true selves to cater to male fantasies. This study employs Laura Melvey's feminist theory of male gaze which criticises the erotic and objectified portrayal of female characters in cinema solely for the pleasure of male viewers, and John Berger's discourse, "men act and women appear" (47), which discusses how the male gaze causes women to become both the 'surveyor' and the 'surveyed', often times fetishizing themselves under an internalized male scrutiny. These two theoretical frameworks applied to Flynn's narrative, exposes the voyeuristic male presence invading a woman's self-perception that instigates the 'Cool Girl' performance. Ultimately, Amy Dunne's monologue serves as a powerful critique of the unrealistic patriarchal expectations imposed on women, which eventually encroach upon their identity.

Keywords: *male gaze; surveillance; self-objectification; gender performance.*

AHOP16

WHEN THE BODY BECOMES AN INVESTMENT: BIOCAPITALIST LOGIC OF MAHESH DATTANI'S TARA

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ABSTRACT

This study examines *Tara* by Mahesh Dattani as an exemplary narrative of the biocapitalist thinking within the dominant patriarchal structures, especially within the familial institutions.

In this play, though Dr. Thakkar advises that the third leg was biologically meant for Tara, it is transplanted to Chandan, because he is a male. This prejudiced decision is mainly due to gender preference and future expectations. Chandan's body rejects the transplanted leg leading to its amputation. Both Tara and Chandan are left disabled. Tara is disabled not by birth rather by the unfair decision of her own family members which is a conscious choice that prioritises male potential over the female life. The female body is considered as an investment and the survival of the female is based on the gendered assessment. Through the lens of biocapitalism, the study scrutinises how the transfer of the third leg mirrors the larger system within which life is administered through the economic and social priorities. Chandan is viewed as the future bearer of the family, an heir to the family lineage while Tara is neglected and considered as less valuable, just because she is a female. Ultimately, the study illustrates how biocapitalism aids the biased patriarchal structures by determining whose life demands protection and whose life can be abandoned.

Keywords: *biocapitalism; gender bias; patriarchy; investment; neglect.*

AHOP17

HETEROGLOSSIA AND THE POLITICS OF VOICE IN THE ENGLISH PATIENT BY MICHEAL ONDAATJE

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ABSTRACT

The novel *The English Patient* by Michael Ondaatje exemplifies the multiple voices and the ideologies of the characters. This paper explores the distinct views of the characters on the world and how it has been influenced by their cultural background and past experiences through the theoretical framework of Heteroglossia, conceptualised by Mikhail Bakhtin.

It moves beyond the concept of multilingualism and constructs a heteroglossic narrative that constantly interacts and challenges one another. The layered and polyphonic structures of the military language, colonial authority, intimate confession and historical narrative coincide with the single text. As the novel doesn't give a single authoritative perspective, the meaning emerges through the tension between different ideological positions.

By studying these simultaneous voices, this paper provides an explanation of how *The English Patient* becomes a powerful tool for heteroglossia, where the voices become a site of political and emotional struggle.

Keywords: Heteroglossia; Politics; Narrative; Ideology.

AHOP18

GOLDEN POVERTY: MORAL HUNGER AND GENDERED SURVIVAL IN PUDHUMAIPITHAN'S "THE GOLDEN CITY"

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ABSTRACT

This paper studies Pudhumaipithan's short story Ponnagaram "The Golden City" as a sharp portrayal of urban poverty hidden behind the illusion of prosperity. The title of the city suggests wealth and brightness, yet the story presents a slum filled with mud, stagnant water, hunger and exhaustion. Through irony and realistic description, the writer exposes the gap between appearance and reality. The so-called "Golden City" survives on the silent suffering of its poorest inhabitants. The story revolves around the character Ammalu, a young working-class woman whose life is shaped by constant economic struggle. When her husband is injured and asks for milk porridge, she has no money to provide it as her salary will be provided only after 2 days. Faced with hunger and helplessness, she earns a small amount by giving herself to a man waiting in the dark. The story presents this moment without melodrama or judgment. Instead of blaming Ammalu, it shows how poverty forces such decisions. Hunger in the story is not just physical but it becomes moral hunger, where social values like chastity lose meaning in the face of survival. Through Ammalu's experience, Pudhumaipithan reveals how poverty affects women differently. The female body becomes the last available resource in a system that offers no security or dignity to the poor. The story questions urban modernity and exposes how the glitter of the city depends on hidden sacrifice. In this way, *The Golden City* presents 'golden poverty' as a painful paradox, where survival replaces morality and illusion hides injustice.

Keywords: Poverty; Prosperity; Moral hunger; Urban modernity.

AHOP19

LANGUAGE, TECHNOLOGY, AND RESPONSIBILITY IN MARY SHELLEY'S FRANKENSTEIN

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ABSTRACT

This paper examines Mary Shelley's *Frankenstein* (1818) through a post humanistic lens and considers its ongoing relevance to contemporary debates about innovation, interdisciplinary, and socially responsible technological development. The novel's depiction of the artificial creation of life anticipates current concerns about artificial intelligence and biotechnology, while also challenging rigid human, non-human distinctions. Shelley's text, which emphasizes the ethical and social consequences of scientific ambition, emerges as an important literary site for discussion of the cultural meaning of technological progress. The study reinterprets the creature as an early example of human -nonhuman hybridity by drawing on Donna Haraway's cyborg theory from *A Cyborg Manifesto* (1985). By undermining the distinction between organisms and machines, Haraway's framework makes it possible to interpret the creature not just as an unsuccessful scientific endeavor but also as a traditional entity whose marginalisation reveals the boundaries of humanist conceptions of personhood. The creature's acquisition of language and literary knowledge receives special attention, which highlights the part that culture plays in constructing subjectivity and blurs the lines between the artificial and the human. Using a multidisciplinary framework the study places *Frankenstein* in the context of contemporary technology discourse by utilizing a multidisciplinary approach that combines literary criticism, science and technology studies, and ethical investigations. It contends that the book should be interpreted as an early post humanist meditation on responsibility, distributed agency and human-nonhuman relations rather than just as a cautionary tale about scientific excess. In the end, the study shows that *Frankenstein* is still an essential text for comprehending how language and literature mediate the connection between societal impact and technological innovation.

Keywords: *Cyborg theory; Posthumanism; Emerging technologies; AI ethics; Technological Imagination.*

AHOP20

A FEEDBACK ANALYSIS ON COMMUNITY LANGUAGE TEACHING

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ABSTRACT

Teaching English as a Second Language is quite challenging for tertiary level learners. A curriculum which trains the language students in teaching ESL will enhance the exploitation of the Methods of Teaching English. The students explored various methods of teaching English beginning from early methods such as Direct Method and Grammar Translation Method, to the modern methods such as Task-based Instruction and Mobile Assisted Language Learning. A Peer Teaching venture, as part of the syllabus for the final year Undergraduate English literature students of the American College, gives them an experiential learning with the Community Language Teaching. This teaching method, developed by Charles A. Curren serves as a holistic language learning approach. The evaluation of their learning trajectory during Community Language Teaching was discussed in the classroom. This research paper gives a qualitative analysis of the Feedback given by the student teachers, after their Peer teaching experience.

Keywords: Feedback analysis; ESL, teaching methods; experiential learning; community language teaching.

AHOP21

தமிழ்ச் சிறுகதைகளில் 'ஊர்வன உயிர்கள்' (Reptile) குறித்த

பதிவுத் திறங்கள்

ஆ.பூமிச்செல்வம்,

தமிழ் உயராய்வு மையம்,

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ஆய்வுச் சுருக்கம் - Abstract

மாணுடர்களான நாம் வாழும் உலகம் நமக்கானது மட்டுமல்ல; நம்மைச் சுற்றிலும் காணக் கிடைக்கின்ற உயிர் உள்ளவை - அல்லாதவை என்கிற அனைத்திற்கும் சொந்தம். ஆனால், உலகமயம் - தாராள மயம் - தனியார் மயம் என்கிற நவகாலச் சூழலில். மனித இனம் சுற்றுச் சூழலைக் கணக்கின்றி கட்டுப்படுத்தவும், தன்னகப்படுத்தித் துய்க்கவும், எவ்வித வரையறையுமின்றி, கட்டற்றுச் செயல்பட்டு வருகிறது. இவ்விதச் சவாலை எதிர்கொண்டு மாற்ற வேண்டிய

கடப்பாடு ஆற்றிவு பெற்றுள்ளதாகக் கூறிக் கொள்கிற ஒவ்வொரு மனிதருக்கும் உள்ளதுதான். சூழல் மாசுபாடு மற்றும் சூழல் அழிவுப் பிரச்சினைகளைப் பற்றிச் சிந்திக்கும் போதெல்லாம் அவை அறிவியலாளர்களுக்கு மட்டுமே உரியன என எண்ணாமல், கலை – இலக்கியவியலாளர்களுக்கும் உண்டு என ஏற்றுச் செயலாற்ற வேண்டிய நிர்ப்பந்தம் நடப்புச் சூழலில் உருவாகியுள்ளது. இதன் ஒரு பகுதியாகவே, தமிழ்ச் சிறுகதையாளர்கள் நம் புவிக் கோளத்தில் நம்மைப் போலவே வாழ்ந்து வருகிற, வாழ உரிமை பெற்ற, நம் வாழ்விற்கும் கூடத் துணை செய்கிற ‘ஊர்வன உயிர்கள்’ (Reptile) பற்றியான அவதானிப்பைச் செய்து வருகின்றனர். அவர்கள்தம் செய்முறைகளின் திறங்கள் பற்றி ஆய்ந்து காண வேண்டியது நடப்புத் தேவையாகிறது.

“தாவரங்களைத் தவிர்த்து, இவ்வுலகில் உள்ள மற்ற உயிரினங்கள் அனைத்தும் விலங்குகள் என அழைக்கப்படும்; இதில் மனிதர்களும் அடங்குவர்” (உயிர்கள், ப.12) என்பார் பத்ரி சேஷாத்ரி. ஆனால், இம்மனிதர்களுள் பெரும்பாலோர் தம் சந்ததியினரைக் காரணங் காட்டியும், தமது எதிர்காலத்தைக் கருத்தில் கொண்டும் தமக்குத் தேவை உள்ளதோ இல்லையோ, உலகில் உள்ள பொருட்கள் அனைத்தையும் சுரண்டிப் பதுக்குகின்றனர். இவ்விதப் பதுக்கலை இம்மானுட இனம் தவிர்த்த மற்ற எவ்வோர் உயிரினமும் செய்வதில்லை. என்கிற விதத்தில், ஆற்றிவு என்பது மானுடர்க்கானதா? மற்ற உயிர்களிடம் உள்ளதா! எனப் பார்க்க வேண்டியுள்ளது. இவற்றுடன், சூழல் கூட்டமைவில் தாம் இன்றியும் இவ்வுலகம் வாழும்; இவ்வுலகில் உள்ள அஃறிணை உயிர்கள் இல்லாவிடின் தம் இனமும் சேர்ந்து அழிந்து விடும் எனத் தெரிந்தும் கூட, அவ்வுயிர்களைத் துச்சமாக மதித்து அழிக்கும் பலர் நம்முள் உள்ளனர். இவர்களுக்கு அஃறிணை உயிர்களின் மாண்புகளை, குறிப்பாக ஊர்வன உயிர்களின் (Reptile) உண்மை வாழ்நிலைகளைக் கண்டு சொல்வது தேவையாகிறது. இதனைக் கருத்தில் கொண்டு செயலாற்றி உள்ள தமிழ்ச் சிறுகதையாளர்களின் பதிவுத் திறங்களை இவ்வாய்வு கண்டு உணர்த்திட முயல்கிறது.

பறவைகள் எனில் பாசத்திற்குரியன; விலங்குகள் எனின் சற்றே விலக்கி வைக்கத் தக்கன; பூச்சிகள் எனில் முற்றிலும் புறந்தள்ள வேண்டியன; ஊர்வனவெனின் அழிக்கவே உகந்தன என்னும் கருத்து நிலை மனிதர்களின் எண்ணங்களில் ஆழ்ந்து பதிந்திருக்கிறது. இதன் காரணமாகவே பாம்பெனின் விஷம், பல்லியெனின் துர்சகுணம், ஆமையெனின் ஆகாமை, முதலை எனின் வெறுப்பு, ஓணாண் எனின் அசூயை என்கிற மனோநிலைகளைச் சாமானிய மானுடர் பலரும் பெரும்பாலும் பெற்றுள்ளனர். ஆனால், இவ்விதக் குணாம்சங்களை ஈராயிரமாண்டு இலக்கியப் பாரம்பரியங்களை உடைய படைப்பாளியர்களும் கூடக் கொண்டிருக்கின்ற நிலையினை இவ்வாய்வு காட்ட முயல்கிறது. மேற்காட்டிய செயல்முறைகளை புலப்படுத்துவனவாக இவ்வாய்வின் சாரங்கள் அமையும்.

AHOP22

TRANSFORMATIVE TRENDS IN COMPUTING AND CYBER TECHNOLOGIES

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ABSTRACT

The rapid evolution of computing, artificial intelligence (AI), and cyber technologies has fundamentally transformed modern digital ecosystems across industries and societies.

This chapter examines transformative trends shaping contemporary computing paradigms, including artificial intelligence and machine learning, cloud and edge computing, cybersecurity innovations, blockchain and distributed ledger technologies, and quantum computing. These advancements have enhanced data processing capabilities, automated decision-making, strengthened digital security frameworks, and enabled scalable, interconnected infrastructures. At the same time, emerging technologies have introduced complex challenges such as cyber threats, privacy risks, regulatory uncertainties, interoperability issues, and ethical concerns surrounding AI governance. The chapter highlights how the convergence of intelligent systems, high-performance computing, and secure cyber architectures is redefining economic models, digital governance, and technological innovation. Emphasis is placed on sustainable development, cybersecurity resilience, and global collaboration to ensure responsible and secure technological progress. Ultimately, transformative computing and cyber technologies are driving the emergence of intelligent, adaptive, and future-ready digital societies.

Keywords: *computing paradigms; artificial intelligence; machine learning; cloud computing; edge computing; cybersecurity; blockchain.*

AHOP23

CASTE DESPOTISM MASQUERADING AS CULTURAL IDENTITY IN TAMIL RURAL DRAMAS

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ABSTRACT

This research examines how Tamil rural dramas set in southern Tamil Nadu deploy casteist dialogues, lyrics, and caste coded names or titles under the guise of 'cultural identity'. Films such as *Thevar Magan*, *Virumandi*, *Sundara Pandian*, *Komban*, and *Marudu* prioritize caste-based references to cater to the regional audiences of dominant communities. Drawing on Director PA Ranjith's critique 'What is cinema, who handles it, and what stories does it tell?' It argues that such portrayals embody caste despotism, hindering Dalit cinema's emergence like *Pariyerum perumaal*, *Karnan*

etc. Through textual analysis of pride motifs like kinship and macho symbols, this study reveals cinema's role in perpetuating hierarchies. Given cinema's profound influence, it is imperative to eradicate casteist mentions entirely, as rural audiences often expect and reinforce glorification. What we sow, we reap.

Keywords: *Tamil Rural Dramas; Caste Despotism; Cultural Identity; PA Ranjith; Dalit Cinema,*

AHOP24

SEMIOTIC DISINTEGRATION AND THE FRAGILITY OF MEANING IN *THE MEMORY POLICE*

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ABSTRACT

This paper offers a structuralist reading of *The Memory Police*, analysing disappearance as a semiotic crisis that collapses the very structure of meaning. Based on the linguistic theory of Ferdinand de Saussure, the study argues that meaning is created through difference within a structured system of signs. The theory insists that nothing has meaning by itself; meaning exists only within a structure of relationships. In this novel, the systematic disappearance of objects and the enforced erasure of people's memories reveal how the regime suppresses not only individual speech but also obliterates language itself, and show the ways in which meaning thins due to the prevalence of a narrowed structure. Each disappearance generates a rupture between signifier and signified, which leads to unstable or chaotic signs. When objects vanish, words lose their referents, and the relational network that helps to strengthen meaning collapses. The collapse of difference serves as a catalyst to change the perspective from a political act into a structural crisis. Through this lens, the novel is not just dystopian but semiotic. It proves that the collapse of structure leads to language disintegration, and when language disintegrates, the whole of reality becomes unstable. Eventually, *The Memory Police* depicts meaning as fragile, sustained only by structural relations, but continuously broken by occurrences of disappearance.

Keywords: *Semiotic disintegration; Disappearance; Structural relations; Fragility of meaning.*

AHOP25

GENDERED VISIBILITY: THE DISCURSIVE CONSTRUCTION OF MADNESS IN MAD WOMAN ON THE BRIDGE BY SU TONG

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ABSTRACT

Madness in *Mad Woman on the Bridge* by Su Tong unfolds less as private pathology

and more as a public spectacle. Through Michel Foucault's theorization of madness as a historically contingent construct, this paper reads the protagonist's supposed madness as a discursive construct shaped by power and social regulation.

It argues that her condition emerges through sustained exposure to communal scrutiny and gendered visibility. The bridge, as a setting, functions as a liminal space in which the woman becomes hypervisible and continuously narrativised. Her silences are interpreted, her movements are observed, and her community consolidates a shared "truth" about her condition, professing her madness. Drawing on Foucault's insight that societies stabilize themselves by distinguishing the "normal" from the "abnormal," this paper views the village as a diffuse disciplinary system through which deviance is identified and regulated. This visibility of the "mad woman" is heightened by gendered expectations of modesty, intensifying her judgement and socially authoring her containment. This paper thus studies madness as a category sustained through communal narration, and explores how visibility itself becomes a mechanism of control over the gendered body.

Keywords: Gendered visibility; discursive construct; madness; social regulation.

AHOP26

சங்கப் பனுவல்களில் பண்ணைத் தமிழரின் அறிவியற் புலமை

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உயராய்வு மையம்
அமெரிக்கன் கல்லூரி, மதுரை

ஆய்வுச் சுருக்கம்

இன்றைய நவீன வாழ்வியலில் விஞ்ஞானம் வளர்ச்சி பெற்று, தொழில் நுட்பங்கள் பெருகி, பல்வேறு கண்டுபிடிப்புகளின் 'உலகமாக' மாறி வருகிறது. அறிவியல் என்பது ஒரு நிலையிலிருந்து அடுத்த நிலைக்கு நம்மை நகர்த்திச் செல்வது. ஒரு நாட்டில் அறிவியல் வளர்ச்சி இல்லையென்றால் மனிதன் சமூக இயக்கம் ஓர் இருத்தில் தேங்கி நின்று விடுகிறது. ஒரு வகையில் அறிவியல் வளர்ச்சி சமூக முன்னகர்த்தலை நோக்கியதான ஒன்றானதாகவே கருதப்படுகிறது. குறிப்பாக, மனிதர்கள் எல்லா நிலைகளிலும் அறிவியலைச் சார்ந்தே இருக்கிறார்கள். இன்றைய உலகில் அறிவியல் சீர்தனைகளையும் அறிவியல் கண்டுபிடிப்புகளையும் அவை சார்ந்த கருவிகளையும் வெகு எளிதாகப் புறக்கணித்து விடுமுடியாது என்றே கூறலாம். உலக மொழிகளுள் தமிழில்லாத தகுதி கொண்டு தனித்துவச் செவ்வியல் மொழியாகிய தமிழ் மொழியில் இலக்கண - இலக்கியச் சுவைகள், கற்பனை, வருணனை, அணியல் மட்டுமின்றி, சங்கப் புலவர்கள் தாம் புனைகின்ற பனுவல்களுக்கும் வியத்தகு அறிவியல் செய்திகளையும், அறிவியல் கண்டுபிடிப்புகளையும், தொழில்நுட்பக் கூறுகளையும் கவிதை புனையும் சொல் முறையில் உத்தி முறைகளாகப் பலவற்றைப் பதிவு செய்துள்ளனர். ஒருவகையில் சங்கப் பனுவல்கள் வெறும் கற்பனை புனைவுகளோ, அழகியல் வெளிப்பாடுகளோ மட்டுமல்ல; அவை கணக்கில் அங்காத எண்ணற்ற அறிவியல் சீர்தனைகளின் கருவூலமாகத் திகழ்கிறது. ஆனால், அவற்றை எல்லோரும் அறிவியல் கண்ணோட்டுதல் பார்ப்பதில்லை இலக்கியப் பார்வையோடு மட்டும் இப்பனுவல்களை வாசித்து அணுகுகின்றனர். தமிழ்ச் சங்கப் பனுவல்களில் இடம்பெற்றுள்ள அறிவியல் சீர்தனைகள் தான், உலகெங்கிலும் நடுத்தும் வரும் அறிவியல் பூர்வமான ஆய்வுகளுக்கு முன்னோடியாகவும் உறுதுணையாகவும் இருக்கின்றன என்று கூறலாம். நிலவியல், பெளதிகவியல், வேதியியல், வானியல், மண்ணியல், உயிரியல், கணிதவியல் முதலான பல்துறைகளை உள்ளடக்கியதுதான் அறிவியல். இங்ஙனம் பல்துறைகளிலும் பண்ணைத் தமிழர் கொண்டிருந்த அறிவியல் துறைசார் சீர்தனைகளை - அவர்தம் அறிவியல் கருத்தாக்கங்களைச் சங்கப் பனுவல்களின்வழி எடுத்துரைப்பதோடு, பண்ணைத் தமிழர் அறிவியல் சீர்தனைமிக்க வலுநர்களாகத் திகழ்ந்தனர் என்பதை வெளிப்படுத்தும் நோக்கில் இவ் ஆய்வுக் கட்டுரை அமைகிறது.

இக்கட்டுரையில் பண்ணைத் தமிழரின் அறிவியல் புலமையையும் சங்கப் பனுவல்களில் இடம்பெற்றுள்ள அறிவியற் புதுமைகளையும் முழுமையாக அறிந்து கொள்ள இயலும்.

குறிச்சொற்கள்: சங்கப் பனுவல்கள், அறிவியல், கருவிகள், கண்டுபிடிப்புகள், தொழில்நுட்பம், அறிவியலறிவு.

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சங்க இலக்கியத்தில் ஆணின் கற்பித வெளியில் பெண் : பெண்ணிய நோக்கு

முனைவர் ச.மேகலா

உதவிப் பேராசிரியர்

தமிழ் உயராய்வு மையம்

அமெரிக்கன் கல்லூரி

மதுரை.

ஆய்வுச் சுருக்கம்

சமூக அமைப்பில் பெண்கள் பல்வேறு விதங்களில் ஆணாதிக்க கருத்தியல்களால் வழிநடத்தப்படுகின்றனர். அக்கருத்தியல்கள் பெண்கள் மீதான ஒடுக்குமுறையை மையமாகக் கொண்டு அமைந்துள்ளன என்பதை பிற்காலத்தில் தோன்றிய பெண்ணியச் சிந்தனைகள் வெளிப்படுத்தின. குடும்பம், திருமணம், கற்பு போன்ற நிறுவனங்கள் பெண்கள் மீது பண்பாடு என்னும் பெயரில் ஒடுக்குமுறையை நிகழ்த்தி வருகின்றன. குடும்ப அமைப்பில் பெண்கள் மீது நிகழ்த்தப்படும் ஒடுக்குமுறைகளை அவள் அறியாத வண்ணம் சமீபகாலச் சொல்லாடல்கள் மூலம் அவை இயல்பானவையாக மாற்றப்பட்டு உள்ளன. அது போல் பெண்களைத் தம் கைப்பாகையாக மாற்றிட பல்வேறு சொல்லாடல்களை ஆணாதிக்கச் சமூகம் உற்பத்தி செய்துள்ளது. அதில் ஒன்றுதான் கற்பிதங்களின் மூலம் பெண்களைத் தம் வயப்படுத்தி அடங்கிய தன்னிலையாக மாற்றும் ஆணின் செயல்பாடுகள் ஆகும். இந்தக் கற்பித வெளியில் பெண் புகழப்படுகிறாள். அவளது அழகும், வனப்பும் அடையவே முடியாதவை என ஆணினால் விதந்தோதப்பட்டு ஆணின் விருப்பத்தினை நிறைவேற்றுவதே தன் தலையாயக் கடமை என்னும் அளவிற்கு பெண் மாற்றப்படுகிறாள். ஒடுக்குதலை இந்த வழியிலும் செய்திட இயலும் என்பதே ஆணாதிக்கச் சமூகத்தின் பண்பாக இருக்கிறது. பண்பாடு, நடத்தைகள் போன்றவற்றால் பெண்ணை ஒழுங்குபடுத்துதல் என்பது போலத் தன்மேல் மோகங்கொள்ளச் செய்து தன்னை அலங்கரிப்பதிலும் தன் உடலை வனப்பாக வைத்துக் கொள்வதிலும் அதற்காகவே தான் படைக்கப்பட்டிருப்பதாகக் கருத வைப்பதிலும் ஆணாதிக்கச் சமூகம் பெண் பற்றிய புகழுரைகளை உற்பத்தி செய்கிறது. பெண்ணின் கூந்தல், நுதல், வாய், மார்பங்கள் ஆகியவற்றைப் புகழ்ந்துரைத்து அதை பேணுவதில் தன் கவனத்தைச் செலுத்தும் வகையில் மடைமாற்றுவதாக அமைகிறது. இக்கட்டுரை பெண்ணின் மீதான கற்பிதங்களை உற்பத்தி செய்து அதன்மூலம் பெண்ணை முடங்கிய தன்னிலையாக மாற்றும் விதமான ஆணாதிக்கச் சொல்லாடல் உற்பத்தி குறித்து சங்க இலக்கியத்தை முன் வைத்து விவாதிக்கப்படுகிறது.

குறிப்புச் சொற்கள்

ஆணாதிக்கம், தன்னிலை, குடும்பம், சொல்லாடல், கற்பிதம், புனைவு, அலங்காரம், வனப்பு, பண்பாடு.

SANGAM LITERATURE AS A HISTORICAL AND ARCHAEOLOGICAL SOURCES

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The Pandya kingdom is regarded as one of the longest remembered dynasties in South Indian history, with evidence spanning nearly two millennia. Sangam literature (300 BCE – 300 CE) acts as a premier source for reconstructing ancient South India's (Tamilakam) social, political, and economic life. It describes the Chera, Chola, and Pandya kingdoms, detailing war (puram), love (akam), and trade, supported by archaeological evidence like Tamil-Brahmi inscriptions, hero stones, and Roman coins/pottery. Political Structure: Details the three major kingdoms (Cheras, Cholas, Pandyas) and smaller chieftains, along with tales of war, victory, and administration. Social and Economic Life: Describes social classes, the "tinai" concept (five geographical landscapes), trade, and agriculture. While tradition suggests three legendary, long-lasting assemblies, scholars date the actual compositions to roughly 100 BCE to 250 CE. Hero Stones (Veerakal): Inscriptions erected to honor fallen heroes in battle, matching descriptions of war in Puram poems. Tamil-Brahmi Inscriptions: Found in caves (e.g., Arachalur, Jambai), confirming the existence of Tamil kings and poets, such as the 1st-century CE inscription of Atiyaman Netuman Anci. Artifacts: Discoveries of Roman pottery, beads, shells, and punch-marked coins at sites like Arikamedu confirm extensive maritime trade mentioned in literature. Megalithic Burials: Excavations of iron tools, weapons, and pottery in graves (urn burials) confirm the material culture described, including belief in life after death. Among the three crowned Tamil dynasties the Cheras, Cholas, and Pandyas the Pandyas are in the classical position. But, we authenticate these claims myth or historical reality. This is where our sources play the role. To unveil history not merely as legend but as critically examined and reconstruct with reliable sources are essential.

Sangam literature plays a crucial role in revealing excellence of the Pandya rulers. Literary works, even Silappatikaram authored by Ilango Adigal, isn't exception in mentioning pandyas in his works, when these literary evidences are correlated with the other evidences like inscriptions, coins they contribute meaningfully as a Historical and Archaeological source. This paper attempts to analyze how Sangam literature functions as a historical source and as a Archaeological source while correlating with other evidences to understand the Pandyas. As a student of history, this study emphasizes that both the Pandya rulers and the Sangam authors who form the foundational roots of Tamil history are needed to be examined and remembered.

Keywords: *Sangam Literature, Archaeological Evidence, Pandya Kingdom.*

AHOP29

FEMINIST AND PSYCHOANALYTICAL PERSPECTIVES ON NIDHI UPADHYAY'S *I HEAR YOU*

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ABSTRACT

This paper investigates Nidhi Upadhyay's *I Hear You* through a psychoanalytic and feminist perspective which is centered on Mahika, Shivam and Rudra. Mahika is a house wife who is entangled in a love marriage with Shivam who is a Geneticist obsessed with creating a perfect baby through his known technology along with Dr. Steven who is an award-winning Gene therapist. Shivam uses her body as a site of scientific ambition. His mistrust and jealousy distort their relationship and rendering. Which made Mahika voiceless and confined. Psychoanalysis uncovers Shivam's deep-seated insecurities and need for control. Also, the feministic criticism exposes the gendered power imbalances and the gendered power imbalance that shapes Mahika's sorrow. And the turning point of this story arises through Rudra who is the genetically modified child within Mahika's womb. Who despite being unborn possesses extraordinary empathy and also a cognitive maturity. Rudra's silent yet profound understanding of his mother's pain symbolizes an inner resistance and hope that transcends imposed limitations. Through Rudra's unseen support, Mahika navigates emotional torment, eventually escaping her toxic marriage and reclaiming agency. This study argues that sorrow, embodied in Mahika's journey, transforms into resilience through the bond with Rudra, representing the triumph of emotional strength over patriarchal oppression.

Keywords: *Psychoanalysis; Feminism; Genetic Modification; Maternal Resilience; Patriarchal*

AHOP30

NORMAL IS A CONSTRUCT: UNMASKING COMPULSORY ABLE-BODIEDNESS IN R.J. PALACIO'S *WONDER*

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ABSTRACT

This paper explores R.J. Palacio's *Wonder* through the lens of Crip Theory to investigate how the novel constructs and subtly reinforces the idea of compulsory able-bodiedness. This study argues that, although *Wonder* is celebrated for fostering empathy and kindness towards the people with disabilities, it concurrently normalizes ableist norms by portraying the disabled body as remarkable, inspirational for others. Drawing on Robert McRuer's concept of compulsory able-bodiedness, the paper examines how August Pullman's identity is influenced by a society that associates normalcy with physical conformity. This approach examines narrative voice, character reactions, school culture, and the vocabulary of 'ordinary' as mechanisms that challenge and reinforce dominant stereotypes. While the novel tries to humanize disability, it frames Auggie's difference as something to be overcome rather than systemically questioned. This paper elucidates how children's literature serves as a significant medium for internalisation and reproduction of societal ideals of normalcy by revealing the underlying tensions. This critical analysis advocates for more radical representation of disability that transcend pity and foster authentic epistemic and social transformation.

Keywords: *Crip Theory; Compulsory able-bodiedness; Disability studies; Children's literature; Normalcy.*

AHOP31

INNER CONFLICT AND FEMALE SUBJECTIVITY IN SHASHI DESHPANDE'S *SMALL REMEDIES*

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ABSTRACT

The study "Inner conflict and female subjectivity in Shashi Deshpande's *Small Remedies*" delves into the complex psychological landscapes of the female characters. Through the lens of psychoanalytic theory, the study investigates how the women's identities and life choices are influenced by unresolved emotions, repressed memories, and unconscious desires. Deshpande's protagonists struggle between their own aspirations and social expectations, revealing deep emotional struggles rooted in trauma, regret, parenting, and the search for selfhood.

The study looks at how characters like Madhu and Savitribai attempt to strike a balance between their inner lives and the demands of family, tradition, and cultural norms. Concepts like identity crisis, repression, sublimation, and the conflicts between the id, ego, and superego are used to understand their psychological journey. The study concludes by arguing that *Small Remedies* presents womanhood as a site of constant negotiation, where healing and self-discovery can only occur by confronting the hidden aspects of the mind. This psychoanalytic reading illustrates how Deshpande portrays women not only as victims of their circumstances but also as individuals actively navigating the complexities of their inner lives.

Keywords: *female subjectivity, repression, identity crisis, psychoanalysis, and internal conflict.*

AHOP32

SUSTAINABLE PRODUCTS ADOPTION: PERCEPTIONS AND CHALLENGES AMONG MADURAI CONSUMERS

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ABSTRACT

The increasing focus on environmental sustainability has significantly influenced consumer markets and purchasing behaviour. Sustainable products are designed to reduce environmental impact while supporting social and economic well-being. The adoption of such products largely depends on consumer perception, awareness, and the challenges they encounter during the purchasing process. This study aims to examine the perceptions and challenges associated with sustainable product adoption among consumers in Madurai district. The research follows a descriptive and analytical design, using primary data collected through a structured questionnaire. Key variables such as environmental awareness, perceived quality, price sensitivity, trust, and product availability are considered to understand consumer attitudes and adoption behaviour towards sustainable products.

Keywords: *Sustainable products, consumer perception, adoption, sustainability.*

THE ROLE OF ARTIFICIAL INTELLIGENCE IN MODERN BUSINESS DECISION MAKING

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ABSTRACT

Artificial Intelligence has developed as an innovative influence in contemporary business environment, transforming traditional decision making operations with the help of developed data analytics, automation and predictive capabilities. In an era, marked by speedy digitalization and strong global competition, organisations increasingly depend on Artificial Intelligence driven network to boost strategic, tactical and operational decisions. This paper examines the role of Artificial Intelligence in modern business decision making from a descriptive viewpoint. It analyzes how AI technologies such as machine learning, natural language processing, big data analytics and intelligent automation contribute to improved accuracy, efficiency and competitiveness.

The research point outs AI's application in finance, marketing, human resource management, supply chain management and customer relationship management. It furthermore examines the gains of AI integration containing real time insights, risk reduction, cost optimization and enhanced customer personalization. Despite its advantages, AI adoption presents obstacles such as data privacy concerns, ethical issues, high implementation costs and skill gap. Based on the secondary data gathered from journals, reports and published research, the paper concludes that AI is not simply a technological advancement but a strategic business tool that considerably affects managerial decision making. Organizations that successfully incorporate AI into their decision system obtain a competitive advantage and upgraded organizational performance. The study focuses the requirement of responsible AI adoption and consistent skill development to expand its potential in business decision making.

Keywords: *Artificial Intelligence, Decision making, Organisational performance, Digital transformation, Predictive analysis.*

AHOP34

INNOVATIVE IN E-COMMERCE GROWTH AND FUTURE TRENDS

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ABSTRACT

E-commerce has become one of the most rapidly growing sectors in the global economy. It refers to the buying and selling of goods and services through online platforms such as websites and mobile applications. Over the past decade, the growth of e-commerce has been driven by technological advancements, increased internet penetration, smartphone usage, and the rise of digital payment systems. The COVID-19 pandemic further accelerated online shopping, making e-commerce an essential part of daily life. This paper highlights the evolution and expansion of e-commerce, key factors contributing to its growth, and the major trends shaping its future. Emerging developments such as artificial intelligence, mobile commerce, social commerce, augmented reality, and advanced logistics are expected to redefine the online retail experience. However, challenges like cyber security threats, delivery issues, and intense competition remain significant concerns. The study concludes that e-commerce will continue to expand and play a crucial role in transforming business models and consumer behavior in the coming years.

Keywords: *E-Commerce, Digital Commerce, Online Shopping, Mobile Commerce*

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GREEN INNOVATION AND SUSTAINABLE BUSINESS PRACTICES (CIRCULAR ECONOMY MODELS AND SUSTAINABLE RESOURCE MANAGEMENT)

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ABSTRACT

Rising environmental challenges and limited natural resources, green innovation has become an essential element of modern business strategy. It enables organizations to achieve sustainable growth while reducing environmental impact. This paper examines the adoption of sustainable business practices through circular economy models and sustainable resource management.

By shifting from linear production systems to regenerative and closed-loop approaches, firms can minimize waste, improve resource efficiency, and support ecological sustainability. The study highlights key drivers of green innovation, strategic approaches for integrating circularity into business operations, and challenges affecting adoption.

The findings indicate that circular economy practices enhance competitiveness, promote innovation, and create shared value for stakeholders. Sustainable resource management is emphasized as a vital pathway for aligning business objectives with environmental limits.

Keywords: *Green Innovation, Circular Economy, Sustainable Business Practices, Resource Efficiency.*

AHOP36

FINTECH AND DIGITAL PAYMENT INNOVATION-BIOMETRIC CONVERGENCE

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ABSTRACT

This study examines how biometric convergence is becoming a significant turning point in the development of digital payments, moving beyond single-factor authentication to unified financial identity hubs. Through an analysis of recent industry deployments, including multimodal palm-face-voice point-of-sale systems and sovereign digital ID integrated with payment rails, the study investigates how biometrics are now used to concurrently authorize transactions, verify age, enroll loyalty, and enable alternative credit scoring for unbanked populations. Importantly, it examines the privacy-by-design architectures (on-device matching, tokenization, liveness detection) that lessen surveillance concerns as well as the regulatory catalysts (EUDI Wallet, FIDO) that encourage interoperability. Findings show that biometric convergence is rethinking trust, inclusion, and invisibility in commerce, even though scaling depends on cross-platform standardization and customer opt-in.

Keywords: *Biometric convergence; Digital payments; Multimodal biometrics; Financial identity.*

AHOP37

DRIVING ECONOMIC GROWTH THROUGH INNOVATION IN FINANCIAL TECHNOLOGIES (FIN TECH)

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ABSTRACT

Traditional financial systems face persistent problems such as slow transaction speed, high service costs, and limited access to banking facilities, which restrict economic participation and growth. Financial Technology (Fin Tech) addresses these challenges by integrating digital innovations like mobile payments, online banking, and automated financial services into existing economic structures.

Platforms such as the Unified Payments Interface and applications like Google Pay demonstrate how Fin Tech streamlines transactions, improves financial inclusion, and supports business development. By enabling faster, secure, and cost-effective financial operations, Fin Tech promotes entrepreneurship, enhances productivity, and expands access to financial resources. Although issues related to cyber Security and regulation remain, the effective integration of FinTech offers significant advantages, including improved efficiency, wider market participation, and sustainable economic growth.

Keywords: *Financial systems, Unified Payments Interface, FinTech*

AHOP38

INNOVATIVE SOLUTIONS THROUGH EMERGING TECHNOLOGIES IN COMMERCE, MANAGEMENT AND ECONOMICS

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ABSTRACT

Emerging technologies are transforming commerce, management, and economics by creating innovative solutions that enhance efficiency, competitiveness, and sustainable growth. Technologies such as Artificial Intelligence (AI), Big Data Analytics, Blockchain, Internet of Things (IoT), Cloud Computing, and Financial Technology (FinTech) are redefining traditional business operations and economic structures.

In commerce, digital platforms like Amazon and Alibaba Group demonstrate how data-driven personalization, automated logistics, and secure digital payments improve customer experience and global market access. In management, emerging technologies enable strategic decision-making through real-time data analysis, predictive modeling, and process automation. Managers use AI-powered tools to enhance productivity, optimize supply chains, and improve human resource management. Cloud-based systems support collaboration, reduce operational costs, and increase organizational agility. From an economic perspective, technological innovation contributes to productivity growth, financial inclusion, and digital entrepreneurship. FinTech solutions, such as those pioneered by PayPal, facilitate secure transactions and expand access to financial services. Additionally, blockchain technology enhances transparency and trust in economic exchanges, reducing transaction costs and fraud. Despite these advantages, challenges such as cyber security risks, ethical concerns, workforce displacement, and the digital divide require careful governance and policy intervention. Therefore, successful integration of emerging technologies depends on responsible innovation, regulatory support, and skill development.

Overall, emerging technologies serve as catalysts for innovative solutions in commerce, management, and economics, fostering sustainable development and reshaping the global economic landscape.

Keywords: Emerging technologies, cyber security, sustainable development.

AHOP39

DIGITAL PAYMENTS AND THEIR IMPACT ON CONSUMER BEHAVIOUR IN INDIA

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ABSTRACT

As digital technology has advanced, financial transactions in India have changed, and digital payment methods including internet banking, mobile wallets, debit and credit cards, and the Unified Payments Interface (UPI) have become widely used. This study looks at how customer behaviour is affected by digital payments, specifically with regard to financial management, purchasing habits, and convenience. Digital payments encourage customers to switch from cash-based to electronic platforms because they offer quicker, safer, and more transparent transaction methods.

Government programs encouraging a cashless economy, more smartphone usage, and easier access to the internet have all sped up this shift. As a result, digital payments have improved transaction monitoring, raised online shopping activity, and affected customer purchase decisions. Notwithstanding these advantages, there are still obstacles to the widespread use of digital payments, including privacy issues, cybersecurity threats, and low levels of digital literacy among some populations. To guarantee secure and accessible digital financial services, these issues must be resolved. According to the study's findings, digital payments have had a major impact on how consumers behave and have helped the economy become more technologically advanced. The efficient usage of digital payment systems should be further encouraged by boosting security measures and raising digital awareness.

Keywords: Digital Payments, Consumer Behaviour, Unified Payments Interface (UPI), Cashless Economy.

AHOP40

DIGITAL TRANSFORMATION IN COMMERCE: SHAPING MODERN BUSINESS AND ECONOMIC GROWTH

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ABSTRACT

Advancement of rapid technology is transforming the business functioning and modern business environments. There is an intelligence and innovation systems, its enhancing market connectivity and operational efficiency. There is an enhancement of online payments and digital trade. Business increase identifying of consumer behaviour and make an strategic planning. These ideas or developments creates higher productivity, create new employment opportunity and strengthen competitiveness and also its forecasting sustainability and increase economic growth.

Keywords: *Emerging Technologies in commerce, E-Commerce expansion, Financial system transformation, Data driven decision making.*

AHOP41

COMMUNICATION, ELECTRONICS AND NETWORK

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ABSTRACT

Communication electronics and networks play a vital role in modern technology-driven society. Rapid innovations in wireless communication, fiber optics, and satellite systems have transformed global connectivity. The development of 5G and emerging 6G technologies enables ultra-fast data transmission with minimal latency. Advanced semiconductor devices and integrated circuits enhance the efficiency and performance of communication systems. The Internet of Things (IoT) connects billions of smart devices, creating intelligent environments in homes, industries, and cities. Cloud computing and edge computing further improve network reliability and data processing speed. Artificial Intelligence is increasingly integrated into networks for smarter traffic management and cyber security. Innovations in optical communication provide high bandwidth and secure data transfer. Software-defined networking (SDN) and network virtualization make systems more flexible and scalable. These advancements support applications like telemedicine, online education, autonomous vehicles, and smart grids. Overall, innovation in communication electronics and networks continues to drive digital transformation and global economic growth.

Keywords: *Artificial Intelligence, digital transformation, Software-defined networking.*

ARTIFICIAL INTELLIGENCE IN FINANCIAL MARKETS: TRANSFORMING INVESTMENT DECISION-MAKING

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ABSTRACT

The Indian financial market is undergoing a significant transformation as Artificial Intelligence (AI) becomes increasingly integrated into investment activities. In earlier times, investment decisions were mainly guided by personal experience, intuition, and detailed analysis of historical data through fundamental and technical methods.

While these traditional approaches still remain relevant, the rapid growth of digital data and advances in computing technology have introduced more sophisticated tools into the financial system. Today, AI-driven systems can process vast amounts of financial information within seconds, enabling faster interpretation of market trends and more efficient decision-making. Major platforms linked with the National Stock Exchange of India and Bombay Stock Exchange increasingly rely on algorithm-based tools to improve trading efficiency and strengthen market surveillance. Technologies such as machine learning, predictive analytics, natural language processing, and robo-advisory services are reshaping how investors assess risk and return. These tools analyze historical price patterns, track news and social media sentiment, and automatically adjust portfolios according to changing market conditions. For retail investors, AI-powered fintech platforms have simplified access to financial markets and reduced transaction costs.

However, growing dependence on automated systems raises concerns regarding data security, algorithm transparency, regulatory adequacy, and potential market instability. This paper examines both the opportunities and challenges of AI adoption, aiming to provide a balanced understanding of its impact on the structure, efficiency, and inclusiveness of Indian financial markets.

Keywords: *Artificial Intelligence, Financial Markets, Investment Decision-Making, Algorithmic Trading, Machine Learning, Fintech, Risk Management.*

AHOP43

GREEN CONSUMER BEHAVIOUR AND ITS CONTRIBUTION TO BUSINESS SUSTAINABILITY THROUGH THE “THINK, EAT, SAVE” CONCEPT

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ABSTRACT

India, the world’s most populous nation, faces growing pressure to ensure food security while addressing environmental sustainability. Changing monsoon patterns and rapid technological shifts in agriculture have reshaped production and distribution systems, often leading to inefficient resource utilization and unequal access to essential commodities.

At the same time, food wastage remains a significant challenge that undermines both environmental and economic sustainability. The Think, Eat, Save concept promotes mindful consumption and responsible resource use, positioning green consumer behaviour as a critical factor in reducing waste and supporting sustainable business practices. This study investigates how green consumer behaviour contributes to business sustainability through the Think, Eat, Save framework and the underlying motivational factors driving consumers toward mindful consumption behavior focusing on the perspectives of 100 people in Madurai City. Primary data were collected using a structured questionnaire aligned with the study objectives, and appropriate analytical techniques were applied to derive meaningful insights. The findings aim to highlight the role of responsible consumption in promoting sustainability within both consumer behaviour and business practices. Thus, the study seeks to demonstrate how informed consumer behaviour can support both environmental protection and long-term business sustainability.

Keywords: *Food, Sustainability, Think, Eat, Save*

AHOP44

IMPACT-DRIVEN SOCIETAL AND INDUSTRIAL OUTCOMES OF ENVIRONMENTAL SCIENCE

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ABSTRACT

Environmental Science is no longer limited to studying forests, rivers, and wildlife in isolation; it now plays a vital role in protecting people, guiding policies, and transforming the way industries operate.

This paper explains how understanding ecosystems, pollution, and natural resources leads to real benefits for society and practical improvements in industrial practices. Support from organizations such as the World Health Organization, regulatory efforts by the Central Pollution Control Board, and global climate initiatives under the United Nations Framework Convention on Climate Change show how environmental knowledge becomes action through standards, laws, and shared responsibility.

For society, environmental science helps ensure clean air, safe water, proper sanitation, and effective waste management, all of which directly improve public health and quality of life.. Environmental education builds awareness and inspires individuals to adopt sustainable habits in everyday life.

For industries, environmental science encourages cleaner production, energy efficiency, waste reduction, and the use of eco-friendly technologies. Practices like environmental impact assessments and recycling show that following environmental standards can also improve efficiency, reputation, and long-term success.

By connecting ecological understanding with social and economic needs, environmental science acts as a bridge between people and industry. Its impact-driven approach supports sustainable development, helping communities and businesses grow responsibly while safeguarding the planet for future generations.

Keywords: *Environmental Science, energy efficiency, Central Pollution Control Board.*

AHOP45

THE ROLE OF ARTIFICIAL INTELLIGENCE IN MODERN BUSINESS DECISION MAKING

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ABSTRACT

Artificial Intelligence has developed as an innovative influence in contemporary business environment, transforming traditional decision making operations with the help of developed data analytics, automation and predictive capabilities. In an era, marked by speedy digitalization and strong global competition, organisations increasingly depend on Artificial Intelligence driven network to boost strategic, tactical and operational decisions. This paper examines the role of Artificial Intelligence in modern business decision making from a descriptive viewpoint. It analyzes how AI technologies such as machine learning, natural language processing, big data analytics and intelligent automation contribute to improved accuracy, efficiency and competitiveness. The research point outs AI's application in finance, marketing, human resource management, supply chain management and customer relationship management.

It furthermore examines the gains of AI integration containing real time insights, risk reduction, cost optimization and enhanced customer personalization. Despite its advantages, AI adoption presents obstacles such as data privacy concerns, ethical issues, high implementation costs and skill gap. Based on the secondary data gathered from journals, reports and published research, the paper concludes that AI is not simply a technological advancement but a strategic business tool that considerably affects managerial decision making. Organizations that successfully incorporate AI into their decision system obtain a competitive advantage and upgraded organizational performance. The study focuses the requirement of responsible AI adoption and consistent skill development to expand its potential in business decision making.

Keywords: *Artificial Intelligence, Decision making, Organisational performance, Digital transformation, Predictive analysis.*

AHOP46

IMPACT OF ARTIFICIAL INTELLIGENCE ON BANKING AND FINANCIAL SERVICES

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ABSTRACT

Artificial Intelligence (AI) is quickly converting the banking and financial services sector by enhancing operative effectiveness, decision-making, and customer experience. Banks and monetary institutions are increasingly adopting AI technologies such as mechanism learning, chatbots, robotic process computerization, and predictive analytics to automate routine tasks, detect fraud, manage risks, and improve service transport. AI-based systems enable faster credit calculation, accurate risk valuation, and real-time monitoring of transactions, thereby reducing costs and minimizing human mistakes. AI also plays a crucial role in enhancing buyer fulfilment through 24/7 virtual supporters, modified financial products, and quicker grievance redressal. Furthermore, AI-driven data analytics helps banks understand customer behaviours and offer modified solutions. Despite its advantages, the application of AI in banking and financial services faces several trials, including data security dangers, privacy concerns, ethical issues, and potential job shift. This paper examines the impact of Artificial Intelligence on banking and financial services by examining its applications, benefits, and tasks. The study highlights that AI has become a key driver of invention and attractiveness in the financial sector. It concludes that effective domination, ethical AI practices, and strong regulatory outlines are essential to ensure the accountable and sustainable acceptance of AI in banking and financial services.

Keywords: *artificial intelligence, banking sector, financial services, buyer fulfilment, technology.*

AHOP47

INNOVATIVE SOLUTIONS THROUGH EMERGING TECHNOLOGIES: COMPUTING, ARTIFICIAL INTELLIGENCE AND CYBER TECHNOLOGY

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ABSTRACT

Emerging technologies such as advanced computing, artificial intelligence (AI), and cyber technology are reshaping the way we live, work, and solve everyday problems. These technologies are no longer limited to technical fields; they are now widely used in healthcare, banking, education, agriculture, and business to improve efficiency, accuracy, and decision-making. Artificial intelligence helps automate tasks, analyse large amounts of data, and provide predictive insights, while modern computing technologies enable faster processing and smarter digital systems. At the same time, cyber technology plays a vital role in protecting sensitive data, ensuring privacy, and safeguarding digital platforms from growing cyber threats. This paper explores how the combination of computing, AI, and cyber technologies can provide innovative solutions to real-world challenges. Examples include AI-based fraud detection in digital banking, smart healthcare monitoring systems, intelligent customer service chatbots, and stronger cybersecurity frameworks for businesses and individuals. The paper also discusses recent developments such as cloud computing, machine learning, block chain security, and the increasing need for ethical AI practices. However, the rapid growth of these technologies also brings challenges, including data privacy concerns, ethical questions, cyber security risks, and the need for skilled professionals. Overall, emerging technologies have the potential to drive innovation, improve quality of life, and support sustainable development when used thoughtfully and responsibly.

Keywords: *Block Chain, Cyber Security, Artificial Intelligence*

AHOP48

A STUDY OF SMALLHOLDER FARMERS' PARTICIPATION IN FORMAL CREDIT MARKETS

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ABSTRACT

The factors and obstacles affecting smallholder farmers' involvement in official loan markets are examined in this study. There is still a sizable "financing gap" in spite of smallholders' vital role in ensuring global food security.

This study looks at institutional barriers, socioeconomic issues, and the developing role of digital financial services using a mixed-methods approach (qualitative interviews and quantitative survey data). According to the results, processing fees, collateral requirements, and "risk-rationing" – the practice of farmers avoiding formal loans out of concern for asset loss in a volatile climate – are now the top deterrents, even though distance to banks is still an issue. The study comes to the conclusion that switching from traditional collateral-based lending to data-driven, digital credit options is necessary to increase participation.

Keywords: *Smallholder Farmers; Formal Credit Market; Financial Inclusion; Credit Rationing; Agri-Fintech; Digital Credit Scoring; Climate Resilience.*

AHOP49

E-COMMERCE DEVELOPMENT AND ITS IMPACT ON TRADITIONAL MARKETS

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ABSTRACT

The rapid development of e-commerce accelerated by increased internet penetration, mobile technology, and shifting consumer behaviours, has profoundly transformed the global retail landscape. This paper explores the, multifaceted impact of online platforms on traditional brick-and-mortar markets, analyzing both the disruptive challenges and new opportunities for adaptation. Findings indicate that e-commerce has significantly reduced foot traffic in physical stores due to its superior convenience, wider product selection, and competitive pricing models.

While many traditional retailers face declining sales and the threat of obsolescence, the study highlights that the shift also compels innovation through digital integration. This research investigates the transition toward hybrid business models, where traditional retailers leverage in-store pickup, digital marketing, and enhanced customer service to compete in an omni-channel environment. While the rise of e-commerce presents risks regarding job displacement in conventional retail, it simultaneously offers small and medium-sized enterprises (SMEs) opportunities for wider market reach. The paper concludes that the future of retail is not a total replacement of physical stores, but a balanced, integrated ecosystem where traditional retailers must embrace technological adoption to thrive. Digital transformation will enable retailers to stay competitive, improve customer experiences, and tap into new markets. By merging online and offline channel, retailers can create seamless shopping experiences, driving growth and sustainability in a digital-first economy.

Keywords: *E-commerce Development, Traditional Retail, Digital Transformation, Omni-channel Strategy.*

AHOP50

PERCEPTION OF CUSTOMERS TOWARDS DEBIT CARDS IN ONLINE SHOPPING WITH SPECIAL REFERENCE TO MADURAI CITY

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ABSTRACT

After the pandemic COVID-19, there is a rapid increase in the volume of online sales. Customers have become accustomed to shopping online rather than waiting in long queues for billing and purchasing goods. With the involvement of internet in financial transactions, customers have got a wide range of payment methods to opt from. There are payment methods which allow making cashless transactions with minimum cost and user-friendly procedures. Debit cards are one of the most widely used payment instruments for online transactions. It allows users to make payments through both payment processing machines and mobile applications.

Though debit cards are not being used as widely as Unified Payment Interface (UPI) applications, they have been ruling the payment industry, being a constant method of making cashless transactions.

This study examines the perception of customers towards debit card usage in online shopping, with special reference to Madurai City in Tamil Nadu. The findings indicate that convenience, ease of transaction, and direct deduction from bank accounts are the major factors influencing the use of debit cards for online shopping. However, concerns regarding transaction security, fraud risk, and refund delays continue to affect customer confidence to a moderate extent.

Keywords: Debit cards, Online Shopping, Method of payment

AHOP51

A STUDY ON PREFERENCE TOWARDS AI TOOLS AMONG ARTS AND SCIENCE COLLEGE STUDENTS FOR ACADEMIC PURPOSES IN MADURAI CITY

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ABSTRACT

Artificial Intelligence (AI) tools are becoming increasingly important in modern education. This study examines the preference for AI tools among Arts and Science college students in Madurai City for academic purposes. The objective of the research is to analyse students' awareness, usage patterns, and preferences regarding AI tools in learning, assignments, and research activities.

A descriptive research design was adopted in the study. The study highlights the advantages of AI tools, such as improved understanding of subjects, quick access to information, and enhanced academic productivity. At the same time, it identifies certain concerns, including overdependence on technology and the need for proper guidance. The findings suggest that AI tools can support students' academic performance when used responsibly. The study recommends creating awareness and training programs to promote the effective and ethical use of AI tools in higher education.

Keywords: *Artificial Intelligence, AI Tools, Student Preference, Academic Learning, Educational Technology.*

AHOP52

A STUDY ON SOCIOECONOMIC BARRIERS IN ACCESSING HEALTHCARE AMONG ELDERLY IN ASARIPALLAM TOWN, KANNIYAKUMARI DISTRICT, TAMIL NADU

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ABSTRACT

The ageing population in India is growing rapidly, especially in Tamil Nadu, leading to major challenges in healthcare access for older adults. This research, titled "A Study on Socioeconomic Barriers in Accessing Healthcare among Elderly in Asaripallam Town, Kanniyakumari District," examines the economic, social, and healthcare system-related barriers that affect healthcare usage among individuals aged 60 and over. A quantitative research methodology was utilized, and data were gathered through a self-developed questionnaire containing Likert-scale items that addressed demographic details, socioeconomic status, financial dependence, social support, and barriers at the system level. Elderly respondents from Asaripallam town were selected using purposive sampling. The results will reveal that low income, financial dependence, social isolation, and lack of family assistance are prevalent issues. The research indicates that access to healthcare for the elderly is influenced not just by service availability but also by wider socioeconomic conditions. Addressing these barriers requires policy-level interventions, improved implementation of welfare schemes, enhanced awareness programmes, development of elderly-friendly infrastructure, and strengthened family and community-based support mechanisms. The findings will contribute to social work practice, gerontological research, and policy development aimed at promoting equitable, accessible, and sustainable healthcare services for the ageing population.

Keywords: *Elderly, Socioeconomic Barriers, Healthcare Access, Social Support.*

AHOP53

INNOVATE, INTEGRATE AND IMPACT: THE ROLE OF SOCIAL MEDIA IN TRANSFORMING SMALL-SCALE FOOD ENTERPRISES

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ABSTRACT

The small-scale food business sector is currently undergoing a noticeable transformation as social media platforms become central to marketing and customer engagement practices. In the past, local food enterprises primarily depended on word-of-mouth promotion, location visibility, and traditional advertising techniques to attract customers. Although these methods continue to play a role, the rapid expansion of digital communication technologies has significantly reshaped how businesses connect with their target audience. Today, platforms such as Instagram, Facebook, and WhatsApp provide accessible and cost-effective avenues for enterprises to expand their reach, interact directly with consumers, and build distinctive online brand identities. Through features like real-time updates, customer reviews, visual storytelling, and influencer collaborations, social media has begun to influence consumer perceptions and purchasing behaviour in meaningful ways. For small-scale food entrepreneurs, the strategic use of digital marketing tools enhances market competitiveness and creates new opportunities for sustained growth, particularly within highly competitive urban environments. At the same time, increased reliance on social media presents certain challenges. Maintaining consistent and engaging content, addressing digital skill limitations, managing online reputation, and coping with intense platform competition require continuous effort and adaptation. This study therefore examines both the potential benefits and practical constraints of social media adoption, seeking to provide a comprehensive understanding of its impact on business performance, customer relationships, and long-term sustainability within small-scale food enterprises.

Keywords: *Social Media Marketing, Small-Scale Enterprises, Digital Integration, Business Sustainability.*

AHOP54

ROLE OF START-UPS IN STRENGTHENING INDIA'S ECONOMIC RESILIENCE

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ABSTRACT

Start-ups are important for making the Indian economy more resilient by promoting innovation, productivity, and job creation.

Start-ups bring about innovative technologies and solutions in areas like fintech, edtech, health tech, and agriculture, which make the economy more efficient and competitive. Start-ups make the economy less dependent on conventional job sources and provide new avenues for income generation, especially for the youth and skilled workers.

In addition, Start-ups help in attracting investments, both domestic and foreign, which helps in the formation of capital and economic growth. They also help in the development of rural areas by promoting digital platforms and local businesses, resulting in balanced economic growth. In times of economic uncertainty, such as pandemics, inflation, or global economic downturns, Start-ups show resilience and adaptability, leading to quick economic recovery through innovative services and digital solutions. They also help in developing the digital economy, increasing exports, and achieving self-reliance. A robust Start-ups ecosystem helps in making the economy more diversified, stable, and sustainably developed, making it more resilient to future challenges.

Keywords: Start-ups, digital economy, economic downturns.

AHOP55

FINANCIAL LITERACY AND SAVINGS BEHAVIOUR OF GOVERNMENT SCHOOL TEACHERS IN TUTICORIN CITY

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ABSTRACT

Financial literacy has become increasingly important in helping individuals manage personal finances and develop disciplined saving practices.

This study investigates the financial literacy level and savings behaviour of government school teachers in Tuticorin City. Teachers require adequate financial knowledge to make informed decisions regarding income management, savings, investment planning, insurance, and retirement security. The research aims to evaluate teachers' understanding of basic financial concepts and examine how financial awareness influences their saving patterns and financial choices. Primary data were collected using a structured questionnaire administered to government school teachers in the study area. Analytical tools such as percentage analysis, chi-square test, and weighted ranking method were employed to interpret the data. The findings emphasize that improved financial literacy contributes to better savings habits and financial stability, highlighting the need for financial education initiatives to strengthen long-term financial well-being among teachers.

Keywords: Financial Literacy, Government Teachers, Financial Planning, Investment Awareness.

AHOP56

A STUDY ON PREFERENCES AND FACTORS INFLUENCING MEDICLAIM POLICYHOLDERS TOWARDS PRIVATE HEALTH INSURANCE COMPANIES IN MADURAI CITY

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ABSTRACT

Health insurance has become an essential financial safeguard against increasing medical expenses and unforeseen health emergencies.

This study focuses on the preferences and factors influencing Mediclaim policyholders towards private health insurance companies in Madurai City. The primary objective of the study is to examine the key determinants that influence policyholders' decisions while selecting private health insurance providers. The research is based on primary data collected from 30 Mediclaim policyholders through a structured questionnaire. The study aims to understand the role of service efficiency, financial benefits, and convenience-related aspects in shaping policyholder preferences. The findings of the research are expected to provide insights into consumer behaviour and assist private health insurance companies in formulating better strategies to enhance customer satisfaction and service quality.

Keywords: *Mediclaim Policyholders, Private Health Insurance, Consumer Preference, Financial Protection.*

AHOP57

ROLE OF SOCIAL MEDIA MARKETING IN INFLUENCING PURCHASE DECISIONS FOR CHILDREN'S APPAREL IN MADURAI DISTRICT

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ABSTRACT

This study investigates the influence of social media marketing on the purchase decisions of consumers for children's apparel in the Madurai district. Social media has emerged as a crucial marketing tool for clothing businesses due to the quick expansion of digital platforms. The study looks at how peer recommendations, content engagement, influencer endorsements, and social media advertising affect parents' and guardians' purchase intent and behavior. 250 respondents in Madurai were given a standardized questionnaire, and regression analysis and descriptive statistics were used to examine the data.

The findings show a strong positive correlation between social media marketing tactics and decisions to buy, with interactive content and influencer trustworthiness being found to be important factors. The study offers useful advice to clothing marketers on how to improve consumer interaction and social media campaigns, which will boost sales in local marketplaces.

Keywords: *Social Media Marketing, Purchase Decision, Children's Apparel, Digital Advertising.*

AHOP58

ROLE OF MSME IN INNOVATION AND STRENGTHEN INDIA'S ECONOMIC RESILIENCE

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) constitute a critical pillar of India's economic framework, significantly contributing to employment generation, industrial production, exports, and balanced regional development. The sector plays a pivotal role in enhancing economic resilience by promoting inclusive growth and reducing structural economic vulnerabilities. In an increasingly uncertain global economic environment, MSMEs demonstrate strong adaptive capacity through flexibility in operations, localized production systems, and entrepreneurial dynamism. Their ability to sustain livelihoods and support supply chains during economic disruptions highlights their importance in maintaining macroeconomic stability. Innovation serves as a key enabler in strengthening the resilience and competitiveness of MSMEs. Adoption of digital technologies, process modernization, product innovation, and sustainable business practices has empowered MSMEs to respond effectively to evolving market demands and global challenges. Supported by government initiatives, financial inclusion measures, and innovation-driven policy frameworks, MSMEs are increasingly transitioning toward technology-oriented and knowledge-based growth models. This paper emphasizes that fostering innovation capabilities, enhancing skill development, and improving access to finance and technology are essential to reinforcing MSMEs as drivers of sustainable economic growth and long-term economic resilience in India.

Keywords: *MSME, global challenges, knowledge-based growth model.*

AHOP59

THE FUTURE OF THE EDUCATION SYSTEM IN THE DIGITAL AGE- OPPORTUNITIES AND CHALLENGES

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ABSTRACT

The future of the education system in the digital age is rapidly changing at a very fast pace due to technology. The use of digital technology such as online classes, educational applications, smart boards, and video lectures makes learning easy and more engaging. Students can study at any time and any place using the internet. Websites such as Khan Academy and Coursera offer free and low-cost courses to millions of students. Technology also enables personalized learning, where students can study at their own pace. But the digital age also poses some challenges. Not all students have access to smartphones, computers, or the internet. Spending too much time in front of the screen can have negative effects on health and focus. There are also problems such as distractions on the internet, health and safety issues, and a lack of human interaction. Teachers also require training to effectively use digital technology. Thus, while digital education has many benefits, it also needs planning to overcome these challenges and provide equal learning opportunities to all.

Keywords: *Education System, digital technology, Digital Age*

AHOP60

A STUDY ON THE ROLE OF DIGITAL ACCOUNTING IN BLUE DART COMPANIES

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ABSTRACT

Digital accounting represents a significant evolution in the way organizations manage financial information in the era of rapid technological advancement. This descriptive study explores how the integration of cloud computing, artificial intelligence, robotic process automation, blockchain-based records, and advanced data analytics is transforming traditional accounting systems. Digital accounting enhances real-time financial visibility, strengthens internal control mechanisms, improves regulatory compliance, and supports data-driven strategic planning. It enables seamless integration across departments, facilitates remote financial operations, and reduces manual processing errors through automated workflows.

The study further describes how digital platforms contribute to cost efficiency, transparency, audit readiness, and informed managerial decision-making. Contemporary aspects such as cybersecurity frameworks, digital skill development, system interoperability, and sustainable financial practices are also highlighted. By outlining the structural and functional dimensions of digital accounting, the discussion emphasizes its expanding role in improving operational agility, financial reliability, and overall organizational performance in a competitive and technology-oriented business environment.

Keywords: *Digital accounting, organizational performance, financial technology, digital transformation.*

AHOP61

A STUDY ON DIGITAL TRANSFORMATION STRATEGIES IN EMERGING ECONOMIES

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ABSTRACT

Digital transformation is increasingly shaping the future of emerging economies by driving economic growth, modernizing institutions, and changing how businesses and consumers interact. Technologies such as artificial intelligence, cloud computing, big data analytics, mobile platforms, and fintech are enabling new business models and improving service delivery across sectors. This paper explores the strategies adopted by emerging economies to accelerate digital transformation while addressing challenges like infrastructure limitations, digital inequality, regulatory gaps, and shortages of skilled professionals. It highlights the important roles played by governments, private organizations, and international partnerships in building supportive digital ecosystems through policy reforms, infrastructure investments, innovation programs, and capacity development initiatives. The study also examines how small and medium enterprises use digital tools to enhance efficiency, reach wider markets, and strengthen their position in global value chains.

In addition, the paper emphasizes the need for digital inclusion, strong cybersecurity measures, and sustainable technology adoption to ensure long-term social and economic benefits. By reviewing successful practices and on-going barriers across different emerging markets, the research underscores that digital transformation requires context-specific strategies aligned with local socio-economic realities. The findings suggest that effective transformation depends on integrated planning, collaboration among stakeholders, and continuous adaptation to technological change.

Ultimately, digital transformation is presented not only as a technological shift but as a strategic pathway toward inclusive growth, higher productivity, and greater resilience, offering practical insights for policymakers, researchers, and business leaders seeking sustainable national development and global competitiveness.

Keywords: *Digital artificial intelligence, cloud computing.*

AHOP62

COLD PRESSED OIL-A HEALTHY OPTION FOR A HEALTHY LIFE

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ABSTRACT

Cultivating healthier eating habits has become more important worldwide due to the increasing prevalence of lifestyle-related disorders. In this context, cold-pressed oil is becoming more widely acknowledged as a healthy substitute for refined edible oils. Cold-pressed oils, which are made through a mechanical extraction process without the use of excessive heat or chemical additives, retain important nutrients, essential fatty acids, antioxidants, and naturally occurring bioactive compounds. Its nutritional profile, health-promoting qualities, and extraction method are all described in the paper "Cold Pressed Oil – A Healthy Option for a Healthy Life." It talks about how cold-pressed oils can help with metabolic balance, cardiovascular health, and general well-being. Overall, the study emphasizes how important it is to include cold-pressed oil in normal eating habits in order to promote long-term health and preventative health.

Keywords: *Cold Pressed Oil, Healthy Lifestyle, Nutritional Value, Traditional Extraction Method, Consumer Awareness, Sustainable Food Practices.*

AHOP63

IMPACT OF FINTECH MOBILE APPS ON SUSTAINABLE FINANCIAL BEHAVIOUR

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ABSTRACT

Financial services are now more accessible, effective, and user-friendly because to the explosive expansion of Financial Technology (FinTech) mobile applications, which has completely changed the global financial ecosystem. Understanding how digital platforms affect consumers' financial behavior has become more relevant in recent years as sustainability has grown in importance within financial institutions.

FinTech mobile apps are essential for advancing paperless banking, cashless transactions, financial inclusion, and eco-friendly financial practices. This study's primary goal is to investigate how FinTech mobile applications affect consumers' sustainable financial behavior. The study focuses on how these apps affect digital payment acceptance, responsible spending, savings behavior, and understanding of sustainable financial practices. Based on secondary data gathered from scholarly journals, research articles, industry reports, and official publications pertaining to FinTech and sustainable finance, this study uses a descriptive research methodology. The results show that FinTech mobile apps greatly promote sustainable financial practices. As more people choose digital payments over cash transactions, there will be less paper used and less of an influence on the environment. The study also emphasizes how FinTech apps provide access to green financial products, encourage disciplined saving, and improve financial literacy. Additionally, by offering simple and reasonably priced financial services, these platforms promote financial inclusion. The study concludes that FinTech mobile applications serve as effective tools for promoting sustainable financial behaviour. They contribute not only to economic efficiency but also to environmental sustainability by encouraging responsible financial practices. By connecting FinTech adoption with sustainability results, this study adds to the body of previous literature. In order to provide sustainable digital financial services and advance long-term sustainable development, it offers policymakers, financial institutions, and app developer useful insights.

Keywords: *FinTech, Mobile Applications, Sustainable Finance, Financial Behaviour.*

AHOP64

DIGITAL INNOVATION THROUGH SOCIAL MEDIA: IMPACT ON BRAND PERFORMANCE AND CONSUMER ENGAGEMENT

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ABSTRACT

Digital innovation through social media has significantly reshaped the way brands connect with their audiences in today's competitive marketplace. What was once primarily a communication channel has now evolved into a powerful strategic tool that influences brand growth and customer relationships. This descriptive study explores how organizations use social media platforms not just to promote products, but to create meaningful engagement and lasting brand value. By combining marketing strategies with digital technologies and insights into consumer behaviour, businesses are increasingly adopting creative approaches such as personalized content, influencer collaborations, interactive campaigns, and data-driven engagement techniques.

The paper further examines how social media contributes to building brand identity, increasing visibility, and strengthening consumer trust and loyalty. Through real-time interactions, instant feedback, and online communities, brands can better understand customer expectations and influence purchasing decisions. Drawing from existing research and industry practices, the study highlights the importance of thoughtfully integrating technological innovation with strategic management to achieve sustainable brand success in the digital era.

Keywords: *Digital Innovation, Data-Driven Engagement Techniques, Social Media.*

AHOP65

AN EMPIRICAL ANALYSIS OF FINTECH ADOPTION AND ITS IMPACT ON RURAL ECONOMIC DEVELOPMENT IN TAMIL NADU

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ABSTRACT

Digital transformation has significantly reshaped the financial landscape in India, particularly through the rapid expansion of Financial Technology (FinTech). FinTech platforms such as digital payments, mobile banking, micro-lending applications, and Unified Payments Interface (UPI) have enhanced financial accessibility in rural areas. This study empirically examines the level of FinTech adoption and its impact on rural economic development in Tamil Nadu. Primary data were collected from 60 respondents in selected rural areas using a structured questionnaire. Statistical tools such as Percentage Analysis, Mean and Standard Deviation, Chi-Square Test, and Correlation Analysis were employed. The findings reveal that FinTech adoption significantly improves financial inclusion, income stability, savings behaviour, and entrepreneurial activities in rural regions. The study concludes that digital financial services play a vital role in strengthening rural economic development in Tamil Nadu.

Keywords: *Digital Transformation, Financial Inclusion, FinTech, Rural Development, Economic Growth.*

AHOP66

IMPACT OF ARTIFICIAL INTELLIGENCE ON CHANGING ROLES OF PARENTS AND PARENTING PRACTICES IN THE DIGITAL AGE

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ABSTRACT

Life without artificial intelligence is very difficult in the digital era. The integration of artificial intelligence in our daily life is increasing rapidly. Parents are the key pillars of the family, and parenting is an art of growing and shaping children with values and responsibilities. In the process of socialization, parents help their children to learn discipline and sociocultural values that help in building a value-based society. Because of the rapid influence of AI and digital technology, there is a major transformation in the behaviour and attitude of children in the digital generation. It is now time for parents to upgrade their knowledge of AI and new technologies and adopt new parenting styles and methods for effective parenting and ensuring a healthy and balanced future for their children. This paper examines how AI is transforming the roles of parents and parenting practices in the digital age. This paper aims to identify the influence of artificial intelligence on the changing roles of parents and to analyze how this AI affects parent-child interaction and parenting practices in contemporary families and also to explore the challenges faced by parents due to the influence of artificial intelligence on their children's behaviour.

***Keywords:** Artificial Intelligence- Parenting practices – Digital generation - socialization – Family*

AHOP67

CHALLENGES OF ARTIFICIAL INTELLIGENCE AND A SUSTAINABLE FUTURE

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ABSTRACT

For a novice or ordinary man Artificial Intelligence (AI) is a fascinating innovation that does wonders beyond his imagination. But for a techie, AI has a long way to go and tremendous, hideous unaddressed challenges are to be plugged in. Though AI has come thus far from a speculation to near reality, it is redefining the lives of people across the world. AI has gone through almost all the domains assisting the corporate, governments and common man.

More industries are now depending on AI for decision making through various types of data sets they consume in order to dispense specified outcomes. It is imperative to delve into the delimitations of AI and how they need to be addressed. The boundaries with which it is operating now, and the things it cannot achieve, the areas where it fails to apply and area specific conflicts are to be analyzed and understood for a sustainable and meaningful future of AI and for effective governance across its fields. The challenges on ethical considerations in implementation also need to be addressed seriously as it plays the pivot role in transferring its value to the mankind. This paper analyzes technical, ethical, legal, and societal delimitations of AI in the light of current challenges being investigated. It also tries to elicit the current scenario of AI's development and the way forward for a sustainable incorporation of AI into human lives.

Keywords: *Artificial Intelligence, Challenges, Boundaries, Ethical and Societal delimitations, Sustainable AI, Effective governance*

AHOP68

WHEN THE WORLD SLEEPS, WHO CARES FOR THEM? SLEEP QUALITY AND EMOTIONAL WELL-BEING AMONG NIGHT-SHIFT NURSES IN TIRUNELVELI DISTRICT, TAMIL NADU

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ABSTRACT

Night-shift nursing is a global occupational reality that places nurses at heightened risk of sleep disruption and psychological distress. Despite growing awareness of occupational health challenges, the intersection of sleep quality and emotional well-being among night-shift nurses remains insufficiently addressed, particularly in the Indian context. This paper presents a mixed-methods study, primarily quantitative in orientation, examining sleep quality and emotional well-being among 50 night-shift nurses in Tirunelveli District, Tamil Nadu, India. Using validated structured questionnaires and thematic analysis of self-reported experiential accounts, the study explores sleep deprivation, emotional exhaustion, work-life conflict, and institutional inadequacy. Findings reveal that disrupted circadian rhythms, family responsibilities, and insufficient hospital support converge to create a persistent cycle of poor sleep and emotional deterioration. Participants reported significant fatigue, anxiety, and diminished personal well-being, reflecting the broader psychosocial toll of sustained night-shift work. The paper argues that addressing this issue requires not merely logistical adjustments but a fundamental reimagining of how healthcare institutions understand and respond to the psychosocial needs of their nursing workforce.

Recommendations for nursing administration, hospital policy, and occupational social work intervention are discussed.

Keywords: *sleep quality, emotional well-being, night-shift nurses, circadian disruption, occupational stress*

AHOP69

SOCIAL MEDIA USAGE PATTERNS AND ANXIETY LEVELS AMONG YOUNG ADULTS IN MADURAI DISTRICT, TAMIL NADU

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ABSTRACT

Social media has become a major part of daily life, especially among young adults who use it for communication, entertainment, academic activities, and self-expression. Although social media offers many advantages, there are growing concerns about its effect on mental health, particularly anxiety. The age group of 18 to 25 years is an important developmental stage where individuals face academic pressure, career uncertainty, identity formation, and social comparison. Excessive or uncontrolled use of social media during this period may lead to emotional distress, fear of missing out (FOMO), reduced self-confidence, and symptoms of anxiety. The present study focuses on understanding social media usage patterns and their relationship with anxiety among undergraduate and postgraduate students aged 18 - 25 years in Madurai district, Tamil Nadu. The study includes students from both rural and urban areas to ensure proper representation of different backgrounds. A quantitative research approach with a descriptive-correlational design will be used. Data will be collected from 80 -100 participants using a socio-demographic schedule, the Social Media Usage Scale (SMUS), and the Generalised Anxiety Disorder Scale (GAD-7). Statistical methods, including descriptive statistics, the chi-square test, and correlation analysis, will be applied to examine the relationship between social media use and anxiety levels. The study aims to identify anxiety levels among young adults and understand how factors like frequency, duration, purpose, and type of social media use influence anxiety. The findings will help mental health professionals, educators, and policymakers develop awareness and promote healthy social media habits among young adults.

Keywords: *Social Media Usage Patterns, Anxiety, Young Adults, Anxiety Levels, Mental Health.*

AHOP70

A STUDY ON THE LIVELIHOOD CHALLENGES AND COPING STRATEGIES OF STREET FLOWER VENDORS IN MADURAI DISTRICT, TAMIL NADU

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ABSTRACT

Street flower vendors are a common occurrence in Madurai as most people use flowers for temple purposes, festivals, and social occasions. Many of these street vendors use it as their main source of income, but it is an unsure and unstable source. This study focuses on understanding the livelihood problems faced by these flower vendors and the ways they manage to carry on with their work. The research uses a qualitative descriptive method. Data will be collected through semi-structured interviews with vendors selected through convenient sampling. The main goal is to describe the personal background and economic situation of the vendors, and to look at the challenges they face in their daily work. These challenges include changes in demand, unpredictable prices, not having social security, difficulty in accessing formal credit, and variations in sales across seasons. The paper explores how the economic and social conditions of street flower vendors relate to their ability to maintain their livelihoods. It illustrates the significance of the informal workers when discussing the economy and development of the city. By using the actual experiences of the flower vendors, the study reveals the importance of informal workers when discussing the city's economy.

Keywords: *Livelihood, Livelihood Challenges, Coping Strategies, Street Flower Vendors*

AHOP71

A STUDY ON THE ROLE OF EMOTIONAL INTELLIGENCE IN EMPLOYEE WELL-BEING AND WORK-LIFE BALANCE IN HYBRID ORGANIZATIONS

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ABSTRACT

The digital transformation of work and the rapid adoption of hybrid work models have significantly changed the boundaries between professional and personal life. Employees today face increased job stress due to factors such as high digital connectivity which often compels employees to work beyond regular working hours. Emotional intelligence (EI) refers to an individual's ability to understand and manage emotions in themselves and others to function effectively.

This study focuses on key EI dimensions such as self-awareness, self-regulation, motivation, empathy and social skills and explores how these competencies help employees navigate digital overload, role ambiguity and virtual collaboration challenges. The findings reveal that flexible working arrangements and family support significantly contribute to improved work-life balance, while higher levels of emotional intelligence enhance employee's ability to manage stress and perform effectively under pressure. The study also identifies a significant relationship between employee's demographic characteristics, emotional intelligence and work performance. Overall, the results indicate that emotional intelligence and work-life balance together contribute to employee well-being and organizational effectiveness. The study emphasizes the importance of integrating emotional intelligence into leadership development and human resource practices to enhance productivity, job satisfaction, service quality and employee retention in hybrid workplaces.

Keywords: *Emotional Intelligence, Work-Life Balance, Hybrid Work.*

AHOP72

DEVELOPING A CONCEPTUAL FRAMEWORK TO RENDER HOLISTIC HEALTHCARE SERVICES FOR OLDER ADULTS THROUGH COMPASSIONATE TECHNOLOGY IN INDIA

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ABSTRACT

Compassionate Technology focuses on usage and innovation of digital tools, artificial intelligence and systems to reduce suffering and promote well-being. It is one of the niche areas that can aid in patient care in the health sector. Geriatric population includes individuals above 60 years of age. Aging can cause multifaceted challenges such as health decline, risk of fall, reduced mobility, isolation, loss of partner etc. India is a country with an increasing number of ageing population and therefore, the demand for providing healthcare services is high in the country. Holistic healthcare emphasises on the interconnection between the physical body, psychological states, emotions, social relationships and spiritual well-being. Holistic healthcare improves health outcomes by catering to the diverse needs of the person. However, the increasing demand significantly impacts the healthcare system and the provision of holistic care to all older adults becomes a challenge. This study aims to provide a conceptual framework by highlighting the challenges in geriatric care and the merits of integrating compassionate technology.

The study reviews the existing literature and brings out the research gap on integration of compassionate technology in geriatric care. It highlights the practical applications of technology in order to provide holistic care and promote well-being of older adults. The implications of this study provide a platform for further research and development of healthcare innovations to improve health outcomes. It also emphasises on the importance of academia, industry and healthcare system collaboration to enhance accessible healthcare facilities.

Keywords: *Compassionate Technology, Geriatric Care, Holistic Health, Ageing in India, Healthcare Innovations, Older Adults*

AHOP73

DECOLONISING, DECONSTRUCTING AND RECONSTRUCTING THE HISTORY OF KATTUNAYAKAN: AMBEDKARITE AND MARXIST FRAMEWORKS

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ABSTRACT

Tribal historiography in India has often been shaped by colonial anthropology and Brahmanical frameworks. In India, the understanding of tribal histories is complex in nature and often documented without adequate ethnographic accounts or archival grounding through externally imposed narratives. Kattunayakan, a particularly vulnerable tribal group (PVTG) from Southern India is struggling to establish their autonomous identity because of the distorted historiographical and anthropological accounts during the British and post colonial period. This leads to the refusal of community certificates to the Kattunayakan and further hinders them to avail reservation in schools and jobs and ultimately constrains the social and economic mobility of the community. This paper tries to understand the history, socio-cultural status, geographical location, customs and religious practices of the Kattunayakan community through the lens of Ambedkarite and Marxist frameworks in constructing the historiography of the community. This paper offers a critical historiographical review of colonial, postcolonial, and contemporary writings on the Kattunayakan through the theoretical framework of Ambedkarite and Marxist anti oppressive approach. The reasons for the adaptation of the frameworks are to decolonise and deconstruct the historical accounts due to its predominant nature of brahmanical and bourgeois narratives of the community's history. The paper argues that an Ambedkarite Marxist lens enables a decolonial reconstruction of Kattunayakan history, challenging dominant caste-class narratives, supporting struggles for recognition and rights and their plight in not receiving the community certificate due to their distorted history.

Keywords: *Kattunayakan; Tribal Historiography; Decolonisation; Ambedkarite Framework; Marxist Analysis*

AHOP74

SEMIOTIC DISINTEGRATION AND THE FRAGILITY OF MEANING IN *THE MEMORY POLICE*

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ABSTRACT

This paper offers a structuralist reading of *The Memory Police*, analysing disappearance as a semiotic crisis that collapses the very structure of meaning. Based on the linguistic theory of Ferdinand de Saussure, the study argues that meaning is created through difference within a structured system of signs. The theory insists that nothing has meaning by itself; meaning exists only within a structure of relationships. In this novel, the systematic disappearance of objects and the enforced erasure of people's memories reveal how the regime suppresses not only individual speech but also obliterates language itself, and show the ways in which meaning thins due to the prevalence of a narrowed structure. Each disappearance generates a rupture between signifier and signified, which leads to unstable or chaotic signs. When objects vanish, words lose their referents, and the relational network that helps to strengthen meaning collapses. The collapse of difference serves as a catalyst to change the perspective from a political act into a structural crisis. Through this lens, the novel is not just dystopian but semiotic.

It proves that the collapse of structure leads to language disintegration, and when language disintegrates, the whole of reality becomes unstable. Eventually, *The Memory Police* depicts meaning as fragile, sustained only by structural relations, but continuously broken by occurrences of disappearance.

Keywords: *Semiotic disintegration; Disappearance; Structural relations; Fragility of meaning.*

AHOP75

DIGITAL TRANSFORMATION OF BUSINESS: INNOVATING STRATEGIES FOR SUSTAINABLE IMPACT

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ABSTRACT

Digital transformation has emerged as a key driver of innovation and sustainable growth in modern business organizations. The integration of digital technologies such as artificial intelligence, cloud computing, big data analytics, and digital platforms has reshaped traditional business models and operational strategies.

This paper examines how businesses are adopting innovative digital strategies to achieve sustainable impact in terms of economic growth, customer satisfaction, and organizational efficiency. The study is based on secondary data collected from journals, reports, and conference publications. It highlights major opportunities such as improved decision-making, global market access, enhanced customer engagement, and cost efficiency. At the same time, the paper identifies challenges including cybersecurity threats, digital skill gaps, resistance to change, and ethical concerns related to data privacy. The findings suggest that successful digital transformation requires not only technological adoption but also organizational readiness, leadership support, and continuous learning. By integrating innovation with sustainability principles, businesses can create long-term value for stakeholders while contributing to economic and social development. The paper concludes that digital transformation is not merely a technological shift but a strategic process that fosters innovation, integration, and sustainable impact in the evolving business environment.

Keywords: *Digital Transformation, Customer Satisfaction, Cybersecurity Challenges, Data Privacy.*

AHOP76

DIGITAL PAYMENTS AS A TOOL FOR FINANCIAL INCLUSION IN RURAL INDIA: OPPORTUNITIES, CHALLENGES AND SOCIO-ECONOMIC IMPACT

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ABSTRACT

Over the past few years, digital payment systems have brought a noticeable change to everyday life in rural India. For a long time, people in villages had limited access to formal banking services due to distance, lack of awareness, and dependency on cash transactions. With the growth of digital platforms such as UPI, mobile banking applications, Aadhaar-enabled payment systems, and government initiatives like Jan Dhan Yojana and Direct Benefit Transfers, financial services have become more accessible and convenient for rural communities. This descriptive study explores how digital payments are helping small vendors, farmers, and self-employed individuals participate more actively in the formal financial system. Digital transactions not only reduce the need to carry cash but also improve transparency in welfare schemes, encourage savings, and support small-scale business activities. The paper also discusses the practical challenges faced in rural areas, including limited digital literacy, poor internet connectivity, and concerns about online fraud. By focusing on real-life developments and everyday experiences, the study highlights how digital payments are gradually bridging the financial gap

between rural and urban India. It emphasizes that strengthening digital infrastructure and increasing awareness are essential steps toward achieving sustainable and inclusive economic growth.

Keywords: *Digital Payments, Financial Inclusion, Rural Development, UPI and Mobile Banking, Socio-Economic Impact, Digital Literacy.*

AHOP77

THE FINANCIALISATION OF YOUTH CONSUMPTION: CREDIT-LED LIFESTYLE FORMATION IN EMERGING ECONOMIES

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ABSTRACT

In emerging economies, young people's spending habits are changing significantly. Buying smartphones with equated monthly installments, financing fashion through buy-now-pay-later apps, booking travel on credit cards with deferred payment options, and adopting subscription-based digital lifestyles have become more common. For many young consumers, access to a certain lifestyle depend not just on current income but also on access to structured credit. This change reflects a bigger trend where financial markets, institutions, and credit systems are becoming part of daily economic life. Digital lending platforms, algorithm-based credit scoring, instant loan approvals, and aggressive marketing have connected young consumers to financial systems earlier in their earning years. Behavioral factors like present bias, optimism about future income, and social comparison fueled by social media visibility further support this change. Increasing debt among young people, delayed savings, and heightened exposure to economic shocks raise concerns about long-term financial vulnerability and the perpetuation of inequality. By linking economic theory to actual consumption practices, this study views youth not just as market players but as key actors in a finance-driven development model. This paper looks at how growing retail credit systems and fintech environments are changing youth consumption in these economies.

Keywords: *Financialisation; Youth Consumption; Credit Expansion; Emerging Economies; Fintech;*

AHOP78

A STUDY ON AI-BASED PERSONALIZATION AND ITS IMPACT ON CONSUMER BUYING BEHAVIOUR IN E-COMMERCE PLATFORM

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ABSTRACT

The expansion of digital commerce has transformed the way consumers interact with brands and make purchasing decisions. In this technology-driven environment, Artificial Intelligence (AI) plays a crucial role in delivering personalized shopping experiences tailored to individual preferences and behaviours. The present study, titled "A Study on AI-Based Personalization and Its Impact on Consumer Buying Behaviour in E-Commerce Platforms", examines how AI-enabled personalization strategies influence consumer attitudes, engagement levels, and buying decisions in online marketplaces. The research focuses on AI applications such as recommendation algorithms, chatbots, predictive analytics, customized promotions, and dynamic pricing systems that analyse consumer data to provide relevant product suggestions and content. The study investigates the impact of these personalization techniques on customer satisfaction, perceived value, trust, purchase intention, and brand loyalty. It also explores whether personalized digital experiences encourage impulse buying and improve long-term customer retention. A quantitative research design is adopted, with primary data collected through structured questionnaires distributed to online shoppers. Statistical tools are used to assess the relationship between AI-driven personalization and consumer buying behaviour. The findings aim to provide meaningful insights into the effectiveness of AI-based strategies in enhancing customer experience and influencing purchasing patterns in the competitive e-commerce sector.

Keywords: *Artificial Intelligence, AI-Based Personalization, Consumer Buying Behaviour, E-Commerce.*

AHOP79

SUSTAINABLE BUSINESS PRACTICES AND THEIR EFFECT ON CORPORATE FINANCIAL PERFORMANCE

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ABSTRACT

Sustainable business practices have become a key part of modern corporate strategy as companies increasingly focus on environmental, social, and governance (ESG) responsibilities. This study looks at the effect of sustainable business practices

on a company's financial performance. The research aims to find out if adopting sustainability initiatives leads to better profits and long-term value creation. Using secondary data gathered from annual and sustainability reports of selected companies, the study assesses financial indicators like Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin. The researchers use statistical tools such as ratio analysis and correlation analysis to explore the connection between sustainability practices and financial results. The findings are expected to show a positive link between strong ESG performance and financial stability. The study emphasizes how sustainability not only improves a company's reputation but also boosts investor confidence and competitive edge. It concludes that sustainable business practices can act as a strategic tool for achieving both social impact and industrial growth.

Keywords: *Return on Equity (ROE), Net Profit Margin, Sustainability Reporting, Investor Confidence.*

AHOP80

A STUDY ON IMPACT OF MSMES ON EMPLOYMENT GENERATION IN INDIA

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ABSTRACT

Micro small and medium enterprises (MSME) play a vital role in strengthening the Indian economy more than just economic units, they represent the ambitions and hard work of millions of entrepreneurs across the country MSME cover a wide range of activities including small scale manufacturing, service business, trading firms and emerging start-ups even with the financial resources these enterprise generate large scale employment and support economic development .This study examines the contribution of MSME to employment generation in India especially in rural and semi urban areas where opportunities in large industries are often limited compared to big corporation that rely heavily on capital and technology MSME are more labour oriented and lower initial investment .this makes them highly effective in creating job opportunities for diverse group of people. Government reports indicate that the MSME sector contributes around 30% to India s gross domestic product and provides employment to over 110 million individuals beyond job creation MSME promotes entrepreneurship, encourage women participation in business, support self-employment and help in reducing regional economic imbalance this data is based on secondary data gathered from government documents, policy papers and articles. Although

MSME significantly contribute to inclusive growth and labour absorption they face challenges such as restricted credit access, technological limitations, and competitive market pressure.

This study suggest that improved policy measures, easier financing options, digital transformation and skill enhancement programs can further strengthen the employment potential of MSME and ensure sustainable and inclusive economic development in India. It strengthens national development and economic stability

Keywords: *Employment Generation, Small Scale Business, Self- Employment, Entrepreneur.*

AHOP81

THE INCOMPLETE ECONOMY: SHRINKFLATION AND THE RISE OF PERMANENT BETA MARKETS

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ABSTRACT

Today's markets are moving away from complete products and full ownership. Instead, they are gravitating toward fragmented and time-based value systems. This paper describes this change as the Incomplete Economy. In this economy, companies focus on delivering reduced, modular, or continuously evolving value rather than offering complete products in a single transaction. Shrinkflation is a clear example of this shift in physical markets. During recent inflationary periods marked by significant global price hikes, companies reduced the quantities of their products but kept prices the same. This practice led to hidden inflation and masked the true decline in purchasing power. Economically, this makes it harder to assess inflation, and commercially, it reflects efforts to maintain profit margins through behavioural pricing. At the same time, permanent beta model sin digital sectors are shifting markets from ownership to access. This change is driven by the rapid growth of subscription-based revenue. Companies are moving to feature-tiering, continuous updates, and recurring billing structures. By maximizing customer lifetime value (CLV) and breaking value into smaller portions across quantity, functionality, and time, businesses maintain profitability. They are also changing transparency, consumer welfare, and the concept of ownership in modern capitalism.

Keywords: *Incomplete Economy; Shrinkflation; Permanent Beta Markets; Hidden Inflation.*

AHOP82

DIGITAL TRANSFORMATION AND ITS SOCIO-ECONOMIC IMPACT

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ABSTRACT

Digital transformation is rapidly reshaping economic systems and social structures, creating both opportunities and challenges for modern societies.

The major problem lies in managing the unequal distribution of digital resources, job displacement due to automation, and concerns over data security, which can widen socio-economic gaps if left unaddressed. This study examines how emerging technologies such as artificial intelligence, digital platforms, and cloud computing are integrated into business, education, and governance to drive economic growth and social development. Using interdisciplinary analysis and real-world examples, the paper evaluates strategies that support inclusive digital adoption and sustainable progress.

Keywords: *Digital Transformation, Internet of Things (Iot), Digital Economy, Innovation Entrepreneurship*

AHOP83

THE CASHLESS TRANSITION -FINANCIAL TECHNOLOGY AND THE RECONFIGURATION OF ECONOMIC EXCHANGE

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ABSTRACT

Financial Technology (FinTech) has transformed not only the financial sector but also marketing and commerce by driving innovation in digital payment solutions, Consumer experience and personalized financial services. The financial services include the mobile banking, digital payment system, online lending platform and Block chain based applications. With the evolution of fintech, the handling of money has changed by the digital payment system, it includes basic transaction to the investment opportunities, this makes it simple and efficient for consumers and businesses. This continues to shape future growth of the fin tech driven marketing eco systems.

Keywords: *Financial Technology, Consumer experience, investment opportunities, financial services.*

AHOP84

STRESS MANAGEMENT AMONG WOMEN ENTREPRENEURS

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ABSTRACT

Women entrepreneurs face numerous challenges in managing their businesses while balancing personal and social responsibilities. These pressures often lead to significant stress, which can affect their decision-making, productivity, and overall well-being. This paper presents a descriptive study on the causes of stress among women entrepreneurs and explores the strategies they use to manage it effectively. Key stress factors such as financial constraints, work-life imbalance, societal expectations, and gender bias are discussed. The paper also highlights coping strategies including time management, delegation, mindfulness, social support, and professional networking. By understanding the sources of stress and effective management techniques, this paper aims to provide insights that can help women entrepreneurs maintain productivity, resilience, and long-term success. Women entrepreneurs face unique challenges in the business environment, often juggling multiple roles in their personal and professional lives. These challenges can lead to significant stress, affecting their decision-making, productivity, and overall well-being. This descriptive paper aims to provide an overview of stress factors commonly experienced by women entrepreneurs, such as financial pressures, work-life imbalance, societal expectations, gender discrimination, and limited access to resources and networks.

Keywords: *Women Entrepreneur, Stress Management Social Wellbeing Financial Stability*

AHOP85

THERUKOOTHU: A MAGNIFICENT PLAY AND THE VULNERABILITY OF IT, IN CURRENT SCENARIO

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ABSTRACT

Therukoothu is a Tamil Street Theatre Form, practiced in Tamil Nadu and also in Tamil speaking regions of Sri Lanka. The ultimate purpose of this performance art is to make the people entertained and aware of their surroundings and also stir them to raise pertinent questions related to social, economic and political issues. By performing in public space, it reaches a wide audience. This influences masses to provoke against their pauperized status in the society by raising their consciousness to afflicting social issues like inequality, injustice, environmental concerns etc.

By voicing for this they show their commitment to bring the required change. Therukoothu is the traditional art of staging that reached its peak a while ago. Today, in most regions of the world, many forms of folk art are no more a part of the ethnic tradition of the people, at present generations are not aware of those forms of folk art. Therukoothu was one such ethnic folk art indigenous to India. It is now virtually a dying art form. This is because of the popularity of cinema and other forms of entertainment. The artists were not able to run their family with their scanty wages from their performances. Majority of them were unable to provide the adequate requirements for their family. In conclusion, that how Therukoothu was a powerful tool for community engagement and social change. But in this modern age the Therukoothu artists are under insecure economic status and relying on unstable job nature. The study concludes that the folk artists need support and encouragement in the society to save this distinct art from diminishing.

Keywords: *Magnificent, Vulnerability, Pauperized, Distinct, Indigenous.*

AHOP86

A CONCEPTUAL ANALYSIS OF WOMEN'S EMOTIONAL LABOUR AS INVISIBLE WORK: PATHWAYS TO GENDER EQUITY INNOVATION

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ABSTRACT

Emotional labour as invisible work remains a central yet frequently unrecognized dimension in women's lives across domestic, social and professional spaces. Despite increased participation in education and employment, women continue to bear disproportionate responsibility for emotional regulation, caregiving and maintaining harmony. This conceptual paper examines emotional labour as a gendered social construct shaped by structural expectations and cultural beliefs that position women as primary emotional caregivers. Using insights from emotional labour theory, gender role socialization and feminist perspectives on unpaid care work, this paper analyses how women's invisible emotional labour sustains family cohesion and social functioning, while remaining undervalued. It further explores the psychological consequences of sustained emotional regulation and the persistence of gendered inequality. Aligned with the conference theme Innovate, Integrate and Impact, this paper explores how innovation can enable a more equitable distribution of emotional work, how shared responsibility can be integrated across genders, and how meaningful impact can be achieved through policy interventions, cultural shifts and gender equity innovations. By making women's invisible labour more visible, this study contributes to interdisciplinary dialogue on gender equity, mental health and sustainable social development.

Keywords: *Emotional Labour, Invisible Work, Gender Equity, Gender Sensitive Innovation, Unpaid Care Work*

AHOP87

A STUDY ON THE INFLUENCER VLOG-MEDIATED BUYER BEHAVIOUR PATTERN IN MADURAI CITY

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ABSTRACT

With the mushrooming of social media and the rapid increase in the fan base followers, social media marketing seems to be an effective buzz word. It is the hub where the buyer-seller meet happens. Though several digital marketing means are there, vlogs generated by the influencers, has a distinct USP in transforming the consumer-decision processes. Amongst the different formats of social media advertising, video blogs (vlogs) in form of shorts, reels is a proven strategy to create the impulse-buying behaviour. Content marketing plays a pivotal role in the vlogs. Vlogs may enhance the brand loyalty and trust gained through the electronic word of mouth (eWOM). This study identifies the effectiveness of video blogs or vlogs on the buyer behaviour pattern in the Madurai city. A stratified random sampling was conducted. The study reveals there is a strong relationship between the vlog and the purchase behaviour and this varies between the different age groups and genders. Also vlog seems to build a personal engagement with the viewers. The findings reveal that influencer trustworthiness, expertise, and entertainment value significantly affect consumer engagement and purchase intention. It was observed that buyers are often fascinated by the promotional measures, which prompt for cross selling. The study offers practical implications for marketers, brands, and influencers seeking to leverage vlog-based marketing strategies.

Keywords: *Vlogs, Buyer behaviour, Digital marketing, Influencer Marketing, social media marketing, content marketing.*

AHOP88

EMERGING APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THE INDIAN BANKING SECTOR

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative force in the Indian banking sector, significantly enhancing operational efficiency, risk management, fraud detection, customer relationship management, and decision-making processes.

This study investigates the emerging applications of AI in Indian banks from the perspective of bank employees. Primary data were collected from 250 bank employees across public and private sector banks using a structured questionnaire. Statistical tools such as descriptive analysis, Structural Equation Modeling (SEM), and multiple regression analysis were employed to examine the relationship between AI adoption, operational efficiency, customer service enhancement, risk management capability, and employee productivity. The findings reveal that AI adoption significantly influences operational efficiency and risk management, which in turn positively affect overall banking performance. The study provides strategic recommendations for strengthening AI integration in Indian banks.

Keywords: *Artificial Intelligence, Indian Banking Sector, AI Adoption, Structural Equation Modeling, Operational Efficiency*

AHOP89

A STUDY ON IMPACT OF USAGE OF AI TOOLS TOWARDS SELFESTEEM AMONG COLLEGE STUDENTS IN MADURAI

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ABSTRACT

The title “**A Study on Impact of Usage of AI Tools Towards Self-Esteem Among College Students In Madurai**” This study examines the impact of the usage of Artificial Intelligence tools on the self-esteem of college students in MADURAI. With the rapid integration of AI tools such as chatbots, content generators, and learning support systems into academic activities, students’ learning experiences and psychological perceptions are undergoing significant changes. Our study have a research gap that although several studies have examined the impact of artificial intelligence tools on academic performance and skill development among college students , limited research has focused on their psychological impact , particularly on self-esteem. The research focuses specifically on 3rd year B.Sc. Information Technology students, as they frequent users of AI tools for academic assignments, problem-solving, and skill development. Primary data for the study will be collected by using self-structured questionnaire, this study used sample size of 200 students. The researcher used quantitative method and the researcher adopts a descriptive analysis and using simple random sampling technique. Statistical tools such as percentage analysis, correlation analysis and independent sample T-test will be applied to interpret the data.

AHOP90

ALGORITHMIC AUTHORITY VERSUS HUMAN AGENCY: FORECASTING ORGANIZATIONAL CULTURE

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ABSTRACT

The transformation of workplace system, organizational structure, decision making process, organizational culture is undergoing a shift in many corporate environment and others are still in the transformational process with the integration of Artificial Intelligence. When AI enhances efficiency and data driven management, it replaces the authoritative rights and position of human resource managers to algorithmic systems raising concerns regarding inclusion, autonomy and fairness. This paper examines the struggles between Algorithmic authority and human agency within AI enabled workplace. Adopting a conceptual research analysis based on recent literature reviews based on AI on HRM, organizational culture and future work studies, this study produces a clear analytical framework.

This study states that, if algorithmic authority is equipped without proper checks, it can lead to heavy culture of surveillance, increase employee anxiety and reinforce hidden biases. However, these risks can be reducing if there was higher preference given to Human agency with ethical AI intervention policies, transparent decision making, reskilling programs and workforce development. It highlights the emergency need for Indian organizations to commit with ethical AI governance and inclusive workforce strategies to support and accomplish national vision of Viksit Bharat. The study concludes by stating that, the future of work must will not be determined with heavy reliance on technology alone but by how HR managers guide and govern its usage.

Keywords: *Artificial intelligence (AI), Algorithmic Authority, Human Agency, reskilling programs, Viksit Bharat.*

AHOP91

FROM IDEAS TO IMPACT: MANAGERIAL INNOVATION AS A CATALYST FOR INCLUSIVE INDUSTRIAL GROWTH

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ABSTRACT

In the current era, where economic development must align with social equity, managerial innovation has emerged as an essential mechanism for transforming ideas into measurable advantages for both businesses and society.

This study explores how managerial innovation contributes to Inclusive Industrial Growth (IIG), emphasizing the enhancement of organizational capabilities, the integration of diverse employee groups, skill development, and the creation of cooperative industrial networks. The findings reveal that managerial innovation has a notable and beneficial impact on inclusive industrial growth, operating both directly and indirectly through improved organizational capabilities, inclusive workforce initiatives, and collaborative environments. Importantly, the inclusion of diverse workforces and skill enhancement are highlighted as key indicators of IIG, stressing the critical role of human capital investments in achieving equitable and sustainable industrial outcomes.

The increasing explanatory power shown in the regression analyses, coupled with statistically significant F-statistics, confirms the model's reliability and suitability, while diagnostic evaluations indicate no evidence of autocorrelation. From a practical perspective, these insights offer essential direction for managers aiming to adopt inclusive and innovative management practices to secure a competitive edge, as well as for policymakers focused on developing institutional frameworks that promote managerial skills, workforce training, and inter-firm collaboration. Ultimately, this research frames managerial innovation as a strategic tool that bridges theoretical concepts with practical economic and social results.

Keywords: *Managerial Innovation; Inclusive Industrial Growth; Organizational Capability Development; Workforce Inclusion and Skills Enhancement; Collaborative Industrial Networks; Sustainable and Ethical Governance; Developing Regions.*

AHOP92

CULTIVATING COMMITMENT: EVALUATING THE MEDIATING ROLES OF JOB SATISFACTION AND EMOTIONAL COMMITMENT IN CLAN CULTURE

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ABSTRACT

Organizational culture is a fundamental driver of employee behaviour and productivity within the IT sector. Despite its importance, the specific relationship between cultural dimensions, emotional commitment, and job satisfaction remains under-researched in Chennai's IT industry. This study addresses this gap by examining how various cultural traits influence employee outcomes.

Utilizing Python-based Structural Equation Modelling (SEM), the research evaluates the mediating effects of emotional commitment and job satisfaction on overall performance.

The findings indicate that a Clan Culture significantly boosts emotional commitment, which subsequently elevates performance. Furthermore, job satisfaction was identified as a critical mediator in this process. These results underscore the necessity of cultivating supportive work environments to drive engagement, suggesting that future research should expand these findings to broader industries and diverse cultural frameworks.

Keywords: *Organizational culture, emotional commitment, job satisfaction, Clan Culture, engagement.*

AHOP93

UNDERSTANDING THE CAUSES OF CONFLICTS AMONG COLLEGE STUDENTS

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ABSTRACT

College students are regarded as the future pillars of a nation and the foundation of its upcoming workforce. Their ability to collaborate, communicate effectively, and maintain unity during their academic years plays a crucial role in shaping their professional competence and social responsibility. A harmonious college environment encourages personal growth, academic achievement, and the development of teamwork skills that are essential in the workplace. However, conflicts among college students are common and often unavoidable due to a variety of internal and external pressures. This paper explores the primary factors contributing to conflicts among college students, emphasizing mental health challenges, academic and peer pressures, and financial stress. Mental health issues such as anxiety, depression, eating disorders, and addiction to social media and gaming significantly affect students' emotional stability and interpersonal relationships. These challenges may lead to misunderstandings, withdrawal, irritability, and reduced tolerance in social interactions. Academic demands, including heavy workloads, frequent examinations, project deadlines, and class presentations, further intensify stress levels.

Performance anxiety and constant comparison with peers can create unhealthy competition, insecurity, and strained relationships among students.

In addition, financial stress plays a major role in generating tension. Rising tuition fees, student loans, and daily living expenses increase pressure on students, sometimes requiring them to balance part-time work with academic responsibilities. Understanding these underlying causes is essential for institutions to implement supportive measures that promote mental well-being, academic balance, and financial assistance. Addressing these factors can help reduce conflicts, foster unity, and prepare students to become cooperative and resilient members of the future workforce.

AHOP94

THE IMPACT OF YOUTUBE MARKETING ON GEN Z INTENTION TO PURCHASE COSMETIC PRODUCTS

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ABSTRACT

Social media platforms such as Facebook, YouTube, Snapchat, and Instagram act as an effective channel for the cosmetic industry in influencing Gen Z's purchase decisions. Among various social media platforms, YouTube plays a predominant role in shaping Gen Z preferences. YouTube is a video-sharing platform that allows users to upload both short and long videos. With the Interactive content, attractive features, and storytelling ability, many YouTube influencers and dermatologists make use of YouTube to promote their brands. YouTube Shorts cater to the Gen Z preference for engaging and interactive content, often showcasing quick beauty hacks or product highlights. The main purpose of this study is to identify how the various factors in the YouTube marketing, such as entertainment, informativeness, influencers' credibility, impact the purchase intention of Gen Z for cosmetic products.

The results of the study will help marketers to design effective marketing strategies, to increase sales, and enhance the brand's visibility.

Keywords: *YouTube Marketing, Purchase intention, Entertainment, Cosmetic Products*

EDUCATION, PUBLIC AWARENESS, AND BEHAVIOURAL CHANGE FOR SUSTAINABILITY

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ABSTRACT

The accelerating environmental crisis, manifested in climate change, pollution, biodiversity loss, and ecological degradation, necessitates urgent rethinking of development models. Although policies and scientific advances provide solutions, a research gap exists in understanding how media, ethics, and governance shape public awareness and behavioural change, which are fundamental to sustainability.

Problem Statement: Despite multiple environmental policies and campaigns, weak public engagement, misinformation, media bias, and limited ethical accountability hinder effective behavioural transformation toward sustainability.

Research Questions: How can media influence public awareness and mobilize collective environmental action? What role does ethics play in promoting ecological responsibility across individuals, governments, and corporations? How can governance frameworks effectively enforce sustainable practices? To what extent can education and behaviour models transform environmental awareness into action?

Objectives: To examine the interconnected role of media, ethics, and governance in addressing environmental challenges; to assess how education and behavioural models foster awareness; and to propose recommendations for strengthening sustainable practices.

Hypothesis: Media, ethics, and governance, when synergistically applied, significantly enhance public awareness, ethical responsibility, and behavioural transformation toward sustainability.

Methodology: The study uses qualitative content analysis of global and Indian case studies, supported by theoretical frameworks including the Theory of Planned Behaviour, Nudge Theory, and Community-Based Social Marketing.

Findings: Ethical media practices counter greenwashing and shape awareness; governance ensures accountability; ethics fosters responsibility; and education nurtures long-term behavioural change. Challenges include weak enforcement and cultural barriers, but opportunities emerge from youth activism, digital mobilization, and participatory governance.

Suggestions: "For a truly sustainable transformation, it is essential to strengthen environmental education, incentivise ethical media practices, integrate behavioural models into policymaking, and reinforce governance mechanisms."

Keywords: *Media, Ethics, Environmental Governance, Education, Public Awareness, Behavioural Change, Sustainability*

PSYOP01

PSYCHOLOGICAL FREEDOM AMONG YOUTH: AN EMPIRICAL STUDY AMONG COLLEGE STUDENTS IN MADURAI

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ABSTRACT

Psychological freedom is conceived as a multidimensional construct including autonomy of choice, cognitive flexibility, emotional self-regulation, and values based action. Reflecting an individual's capacity to think, feel, and act in alignment with personally endorsed values rather than external pressures or rigid internal constraints. Psychological freedom is grounded in humanistic and self-determination perspectives and it represents an important developmental component during young adulthood. Freedom to make a decision for their choices among college students is influenced by the socio-cultural factors, family systems, and personality make up. The present study examined psychological freedom among 300 college students in the Madurai region using a self-developed scale based on four dimensions within a cross-sectional descriptive comparative design. Statistical analyses indicate significant differences based on gender and educational level, with male and undergraduate students reporting higher levels in their psychological freedom, whereas family type showed no significant variation in it.

These findings highlight the importance of independent decision making, supportive educational environments and interventions that develop cognitive flexibility and emotional regulation to promote student wellbeing and growth.

Keywords: *Psychological Freedom, Youth, Autonomy, Emotional Regulation, Self-Determination, College Students*

PSYOP02

GRIT AND FLOURISHING AMONG COLLEGE STUDENTS

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ABSTRACT

College students experience multiple academic, social, and personal challenges during their educational journey. These challenges include managing academic pressure, planning future careers, maintaining relationships, and developing a sense of purpose. During this period, psychological strengths such as grit and overall wellbeing play an important role in how effectively students cope with daily demands. Grit was defined by Duckworth et al. (2007) as perseverance and passion for long-term goals, helps students remain committed and resilient despite setbacks.

Flourishing was explained by Diener et al. (2010), refers to a state of positive psychological functioning characterized by meaning, engagement, positive relationships, and personal growth. This study examines the relationship between grit and flourishing among college students. A quantitative correlational research design was done with a sample of 150 undergraduate and postgraduate students aged between 18 and 25 years. Grit was measured using the Short Grit Scale (Grit-S) developed by Duckworth and Quinn (2009), and flourishing was assessed using the Flourishing Scale developed by Diener et al. (2010). These tools were selected due to their strong psychometric properties and relevance in assessing perseverance and psychological well-being. The main objective of the study is to explore whether levels of grit are associated with greater flourishing among college students. It is assumed that students who demonstrate sustained effort and consistency in their goals are more likely to experience the levels of well-being and personal growth.

Keywords: *Grit, Flourishing, College Students, Psychological Well-Being, Perseverance*

PSYOP03

RELATIONSHIP BETWEEN DIGITAL INTIMACY, NOMOPHOBIA AND CYBERLOAFING AMONG YOUTH

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ABSTRACT

The present study investigated the interrelationship among Digital Intimacy, Nomophobia and Cyberloafing among youth aged 15–29 years within the context of increasing digital engagement in India. Employing a quantitative, cross-sectional correlational design, data were collected from 515 youth selected through simple random sampling using standardized self-report measures: the Digital Intimacy Scale, Nomophobia Questionnaire (NMP-Q), and Cyberloafing Scale. Descriptive statistics indicated moderate to relatively elevated levels of digital intimacy, nomophobia and cyberloafing among participants. Inferential analyses revealed significant differences across selected demographic variables, particularly gender, type of family and residence, while no significant differences were observed for certain subgroups such as relationship status. Pearson’s correlation analysis demonstrated significant positive associations among digital intimacy, nomophobia and cyberloafing, indicating that higher emotional closeness through digital platforms and greater anxiety related to mobile phone unavailability were associated with increased engagement in non-academic digital activities. Further, multiple regression analysis established that digital intimacy and nomophobia jointly and significantly predicted cyberloafing behavior, accounting for a meaningful proportion of variance.

The findings highlight the intertwined psychological mechanisms underlying contemporary youth digital behavior and underscore the importance of integrated digital well-being strategies addressing emotional dependence, device-separation anxiety and academic digital self-regulation.

Keywords: *Digital Intimacy, Nomophobia, Cyberloafing, Youth, Digital Behavior.*

PSYOP04

IMPACT OF CHILDHOOD FANTASY PRONENESS ON COPING STYLES OF YOUNG ADULTS

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ABSTRACT

Childhood fantasy proneness refers to the ability of children to imagine mental pictures leading to deep inner experience. Coping styles refers to different ways people use to manage stress. This study focuses on the impact of childhood fantasy proneness on coping styles of young adults. Although previous studies talk about the connection between fantasy proneness and dissociation, traumatic experiences, personality traits and creative abilities, only limited research has explored its impact on coping styles among adulthood which remains limited in the Indian context. The present study bridges the gap by talking about whether present coping styles as a young adult are connected to childhood fantasy proneness. This study adopted a quantitative research design and 210 data were collected from young adults using convenience sampling. Participants completed self report questionnaire through Google forms. The creative experience questionnaire was used to measure fantasy proneness and Mini-COPE was used to assess coping styles. The responses were then coded and analysed using SPSS using suitable statistical methods. The result suggests that there a strong positive relationship between fantasy proneness and coping styles thereby contributing to the future research. These findings helps in understanding stress management patterns among young adults. However the study has a limitation like use of convenience sampling, self report measure and online data collection. Overall the study concludes it by suggesting childhood fantasy proneness plays a meaningful role in adult coping styles.

Keywords: *Fantasy proneness, coping styles, young adults.*

PSYOP05

SELF-COMPASSION, COPING STYLES, AND RESILIENCE: A COMPREHENSIVE STUDY ON YOUNG ADULTS

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ABSTRACT

Self-compassion, coping styles, and resilience are important psychological constructs that influence mental health and well-being among young adults. Self-compassion involves treating oneself with kindness and understanding during times of failure or distress. Coping styles refer to cognitive and behavioral strategies used to manage stressful situations, while resilience is the ability to adapt positively in the face of adversity. The present study aimed to examine the relationship among self-compassion, coping styles, and resilience in young adults. A correlational research design was adopted. The sample consisted of 200 young adults aged between 18 and 25 years selected through simple random sampling. Among the participants, 87% were aged 21–23 years, 10% were 24–25 years, and 3% were 18–20 years. The sample included 47.5% males and 52.5% females; 88.5% were students and 11.5% were working individuals. Data were collected using the Self-Compassion Scale–Short Form, Brief Resilience Scale, and Brief COPE through online questionnaires. Statistical analysis was conducted using Pearson’s correlation and Chi-square tests. The findings revealed significant positive relationships between self-compassion, adaptive coping styles, and resilience. Gender-based associations were also observed across the study variables. The results suggest that enhancing self-compassion and effective coping strategies may strengthen resilience and promote better psychological well-being among young adults.

Keywords: Self-compassion, Coping styles, Resilience, Young adults, Mental health

PSYOP06

MINDFUL EATING AND MENTAL WELL – BEING: A SYSTEMATIC REVIEW

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ABSTRACT

Mindful eating refers to the practice of paying full attention to the experience of eating, including awareness of hunger and satiety cues, emotions, taste, and bodily sensations without judgment. It is derived from the concept of mindfulness proposed by Jon Kabat-Zinn, who described mindfulness as paying attention in a particular way on purpose, in the present moment, and non-judgmentally.

Mental well-being refers to a state of an individual where they realize their abilities, cope effectively with normal life stressors, work productively and contribute to their community according WHO. With the increasing prevalence of stress, anxiety, emotional dys regulation in modern lifestyles, understanding the psychological benefits of mindful eating has become essential. This study aims to explore the association between the variables mindful eating and mental well-being through systematic review of the relevant studies that are identified and analyzed. Overall findings indicate a positive association between mindful eating and mental well-being. These findings highlight the psychological importance of mindful eating and suggest its potential role in promoting mental health particularly among young adults facing increasing psychological stress.

Keywords: *Mindful eating, mental well-being, systematic review.*

PSYOP07

CORRELATION BETWEEN NOMOPHOBIA AND CLASSROOM ENGAGEMENT AMONG COLLEGE STUDENTS

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ABSTRACT

Smartphones play a significant role in the daily lives of college students, supporting communication, academic coordination, and social interaction. While their use offers many benefits, excessive dependence on mobile phones may result in nomophobia, which refers to the fear or discomfort experienced when individuals are unable to access their devices. This growing reliance on smartphones has raised concerns about its possible influence on students' behaviour and engagement in academic settings. Classroom engagement is an important aspect of effective learning and reflects students' attention, interest, participation, and involvement during classroom activities. When students are actively engaged, they are more likely to remain focused, motivated, and involved in the learning process. However, frequent thoughts about mobile phone use or the urge to check devices may interfere with concentration and classroom participation. The present study aims to examine the relationship between nomophobia and classroom engagement among college students by using a normative survey method with 100 samples. Nomophobia will be measured using the Nomophobia Questionnaire (NMP-Q), and classroom engagement will be assessed using the Utrecht Work Engagement Scale - Student Version (UWES-S). Understanding this relationship is important within the field of psychology and behavioural studies, as it helps explain how technology-related anxiety may influence academic involvement.

The findings of this study are expected to offer useful insights for educators and institutions in encouraging balanced mobile phone use while promoting active engagement and positive learning experiences in higher education.

Keywords: Nomophobia, Classroom engagement, College students, Digital behaviour, Academic involvement.

PSYOP08

EXPLORING THE RELATIONSHIP BETWEEN SOCIAL MEDIA USAGE AND MENTAL-WELL BEING AMONG COLLEGE STUDENTS

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ABSTRACT

The present study examines the relationship between social media usage and mental well-being among college students. The objective of the research is to determine whether the extent of social media use predicts levels of mental well-being in young adults aged 18–25 years. A quantitative research design was adopted. Using convenience sampling, a sample of 100 college students was selected. Data were collected using a Social Media Usage Questionnaire (Author: Xanidis and Brignell Year: 2016) to assess patterns and intensity of use, and the Warwick–Edinburgh Mental Well-Being Scale (WEMWBS) (Authors: Tennant, Hiller, Fishwick, Platt, Joseph, Weich, Parkinson, Secker, and Stewart-Brown Year: 2007) to measure psychological well-being. Statistical analysis was conducted using correlation and regression techniques to examine the association and predictive effect of social media usage on mental well-being. The findings are expected to provide insight into how digital engagement relates to psychological health among college students and may help inform awareness programs and mental health interventions in academic settings. The study is expected to enhance understanding of how social media usage influences mental well-being among young adult college students.

Keywords: Social media usage, Mental Well-being, College students

THE ROLE OF AI ALGORITHMIC-DRIVEN CONTENT AWARENESS ON SOCIAL COMPARISON AND LONELINESS AMONG SOCIAL MEDIA USERS

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ABSTRACT

Social media platforms increasingly rely on artificial intelligence (AI)-driven algorithms to curate and personalize content for users. While such algorithmic systems enhance user engagement, they may also influence psychological processes such as social comparison and feelings of loneliness. Individuals' awareness of algorithm-driven content curation may play a crucial role in shaping how social media experiences are interpreted and emotionally processed. However, limited research has examined the role of AI algorithm-driven awareness in relation to social comparison and loneliness, particularly among social media users. Hence, the present study examined the role of algorithmic media content awareness (AMCA) in shaping upward and downward social comparison and its subsequent impact on emotional and social loneliness among social media users. A quantitative, cross-sectional survey design was adopted. The sample consisted of 200 social media users aged 18 years and above, selected using convenience sampling. Participants completed the Algorithmic Media Content Awareness Scale (Zarouali et al., 2021), the Upward and Downward Social Comparison Scale (Buunk and Ybema, 1997), and the De Jong Gierveld Loneliness Scale (2006).

Descriptive statistics, correlation analysis, and regression analysis were used to analyze the data. Results may indicate that higher algorithmic media content awareness was associated with lower upward social comparison and reduced emotional loneliness, whereas higher downward social comparison was associated with increased social loneliness. These findings suggest that awareness of algorithmic content functions as a protective factor against negative social comparison and loneliness. The study underscores the importance of promoting digital literacy and algorithmic awareness to mitigate the psychological risks of social media use.

Keywords: *algorithmic media content awareness, social media, social comparison, upward comparison, downward comparison, loneliness, emotional loneliness, social loneliness.*

HEALING IN CONVERSATION: FRIENDSHIP AS INFORMAL THERAPY

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ABSTRACT

Friendship establishes emotional connections which enable people to support each other when they need assistance with their daily activities. Through friendship relationships people develop social connections which enable them to share their problems while they receive essential therapeutic help during their most difficult life situations. The research study uses qualitative research methods to investigate how friendship operates as a healing method which enables people to practice listening actively and showing empathy and validating others while developing emotional co-regulation skills through positive psychology and relational perspectives. The research study investigates how young adults experience emotional support through their friendship connections when they need help during difficult times through semi-structured interviews. Thematic analysis shows that friendships create safe spaces which friends establish to trust each other and avoid judgment while showing their needs and caring for each other. Friends help participants express their emotions through conversations which enable them to comprehend their feelings and discover their authentic selves and develop successful coping methods. Resilience developed through relationships which required people to spend time together while facing difficulties and motivating each other through their challenges.

The study results show that emotional burden together with boundary negotiation and reciprocity expectations create major obstacles for study participants. The study demonstrates that friendship functions as a daily healing environment which enables people to learn about therapeutic methods that occur outside clinical settings while showing how relationships with peers support mental health and relationship health.

Keywords: *Friendship, Informal therapy, Emotional support, Safe space, Resilience.*

PSYOP11

NEED FOR APPROVAL IN THE DIGITAL AGE: SOCIAL REJECTION SENSITIVITY, DIGITAL VALIDATION SEEKING, AND CYBER-RISK BEHAVIOUR AMONG EARLY ADOLESCENTS

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ABSTRACT

Early adolescence is a developmental stage marked by heightened peer influence, increased sensitivity to social evaluation, and expanding engagement with digital environments. For early adolescent boys in middle schools, online spaces such as gaming sites and social media are a vital area for connection, validation, and identity development. Although prior research indicates that male adolescents are more likely to engage in online risk-taking behaviours, the psychological mechanisms underlying this tendency, particularly within the Indian school context, remain insufficiently examined. The present study aims to investigate the relationship between social rejection sensitivity, online validation needs and cyber risk behaviour among male early adolescents aged 12 to 14 years. A total of 150 male adolescents will be selected using convenience sampling method. Data will be collected using the Online and Offline Social Sensitivity Scale, the Online Social Feedback Scale, and the Problematic and Risky Internet Use Screening Scale, and will be analyzed using correlation and regression analyses. The findings will have an impact on school counseling practices and internet safety education programs in the promotion of healthy online behaviours in early adolescent boys.

Keywords: Social rejection sensitivity, Digital validation seeking, Cyber risk behaviour, Early Adolescence.

PSYOP12

MORAL IDENTITY AS A PREDICTOR OF SOCIAL INCLUSION AND ORGANIZATIONAL CITIZENSHIP BEHAVIOUR AMONG IT PROFESSIONALS

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ABSTRACT

In the contemporary IT workplace environment work pressure, interpersonal conflicts, role ambiguity, poor communication, lack of trust among employees can negatively influence inclusive workplace relationships and employee's voluntary contributions beyond their formal job responsibilities.

The present study aims to investigate moral identity as a predictor of social inclusion and organizational citizenship behavior. The participants for the study were chosen using a convenient sampling method and comprised 200 IT professionals working in different organizations. The instruments used for data collection were the Moral Identity Questionnaire, the Experience of Social Inclusion Scale, and the Organizational Citizenship Behaviour Scale. The study will use a cross-sectional research design and a correlational method to investigate the relationships between the variables. The findings are expected to provide insights into the development of employee's moral identity can foster relationships in workplace and increase discretionary work behaviors within IT organizations.

Keywords: *Moral Identity, Social Inclusion, Organizational Citizenship Behavior, IT Professionals*

PSYOP013

EXPLORING THE ROLE OF PSYCHOLOGICAL CAPITAL AND WORK ENGAGEMENT IN SHAPING JOB CRAFTING AMONG CAREER PROFESSIONALS

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ABSTRACT

The contemporary Indian workplace is marked by rapid economic growth, digital transformation, and increasing professional expectations, requiring employees to engage in proactive behaviours to maintain organizational effectiveness.

Career professionals are increasingly expected to demonstrate adaptability, initiative, and resilience in response to evolving work demands. The present study examines the role of Psychological Capital and Work Engagement in shaping Job Crafting among career professionals. Psychological Capital is conceptualized as a vital personal resource that enhances positive motivational states such as Work Engagement, which may subsequently promote proactive job redesign behaviours. A correlational research design will be employed with a sample of 100 career professionals from various occupational sectors, selected using a convenience sampling method. Data will be collected using standardized measures of Psychological Capital (Luthans et al., 2007), Work Engagement (Schaufeli et al., 2002), and Job Crafting (Tims et al., 2012). Correlational analysis will be conducted to examine the relationships among the study variables. The findings will be discussed in the full paper, highlighting theoretical and practical implications for organizational and career development contexts.

Keywords: *psychological capital, work engagement, job crafting, career professionals*

PSYOP14

EXPLORING THE RELATIONSHIP BETWEEN EMOTIONAL INTELLIGENCE AND PERCEIVED STRESS IN YOUNG ADULTHOOD

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ABSTRACT

Emotional intelligence plays a significant role in how individuals perceive, manage, and respond to stressful life situations, particularly during young adulthood - a developmental stage characterized by academic demands, social transitions, and emerging career responsibilities. The ability to recognize, understand, and regulate emotions may function as a protective psychological resource that reduces the negative impact of stress. The present study aims to examine the relationship between emotional intelligence and perceived stress among young adults aged 18–25 years. A correlational research design will be adopted for the study. Data will be collected from a sample of 150 young adults selected through convenience sampling. Emotional intelligence will be assessed using the Schutte Emotional Intelligence Scale (Schutte et al., 1998), and perceived stress will be measured using the Perceived Stress Scale (Cohen et al., 1983). Correlational analysis will be conducted to examine the relationship between emotional intelligence and perceived stress among the participants.

Detailed statistical findings and their implications for mental health and emotional skills development will be presented and discussed in the full paper. The study is expected to contribute to the understanding of emotional regulation as an important factor in promoting psychological well-being among young adults.

Keywords: Emotional intelligence, perceived stress, young adults.

PSYOP15

COMPARATIVE ANALYSIS ON FOMO AND ANXIETY AMONG UG AND PG FINAL YEAR STUDENTS

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ABSTRACT

Today's generation, especially college students are most used to social media. So, fomo and Anxiety are increased. This study focuses on UG and PG final year students. Then, compared to the levels.

Totally 185 students are in Participate, data is collected google forms and data is Analysed in Mann- Whitney the findings showed a significant Positive between relationship Fomo and Anxiety. I share the full findings and results are shared to the conference.

Keywords: *FOMO, Anxiety, final year students.*

PSYOP16

EXAMINING THE ASSOCIATION BETWEEN SOCIAL MEDIA USE, SELF-ESTEEM AND FEAR OF MISSING OUT AMONG COLLEGE STUDENTS

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ABSTRACT

The sudden rise of social media has greatly influenced the psychological well-being of all students. Social media platforms offer chances for social connection, communication and self-expression, enabling individuals to stay in touch with friends, spread experience and examine personal interests.

Also, extreme use may result in negative consequences like isolation, disturbed sleep and emotional impacts like fear and stress. The present study aims to examine the relationship between social media use, self-esteem and fear of missing out among college students through a quantitative correlational research design. This study adopted simple random sampling, and data will be collected from 200 college students aged 18 to 25 using standardized tools, such as the Social Media Use Questionnaire by Kim (Cronbach's alpha 0.85), Self-esteem scale by Rosenberg (Cronbach's alpha 0.88) and FOMO questionnaire by Przybylski et al (Cronbach's alpha 0.87). SPSS ver.20 student trial version will be used to analyse the correlation between variables. It is expected that a higher level of social media use will be associated with a lower level of self-esteem and a higher level of Fear of Missing Out. The findings will provide greater insight into the growing literature on social media and might help in developing interventions for maintaining healthy and balanced digital habits for college students.

Keywords: *Social media, Self-esteem, Fear of Missing out, Social psychology.*

PSYOP17

A COMPARATIVE ANALYSIS OF JOB STRESS, BURNOUT AND AFFECTIVE WELL-BEING AMONG SCHOOL TEACHERS AND COLLEGE PROFESSORS IN MADURAI

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ABSTRACT

Job stress is common among teaching professionals. The emotional well-being is important for maintaining academic quality and institutional effectiveness. Higher level of workload demands, persistent changes in academic regulations, and job-related pressures contribute to higher level of stress and burnout, which may affect their well-being. However, limited comparative studies have investigated these variables between school teachers and college professors across academic settings. The present study aims to find the difference and association between job stress, burnout and affective well-being among school teachers and college professors. A descriptive analytical research design was adopted. The sample comprised 300 participants; 150 from school teachers, and the other 150 from college professors selected using stratified sampling.

The Work Stress Questionnaire, Oldenburg Burnout Inventory, and Job-Related Affective Well-Being Scale are used to collect data. Data were analyzed using Chi-square tests and Spearman's correlation to examine group differences and associations among these variables. Results revealed a significant association between occupation and stress levels. Age and family type were also significantly associated with stress. Occupation demonstrated a significant association with burnout levels, while family type was significantly related to affective well-being. The Spearman's correlation states the significant positive relationship between disengagement and exhaustion and significant negative correlation between negative affect and total stress. The findings state the importance of stress management interventions and support system to promote emotional well-being.

Keywords: *Job stress, Burnout, Affective well-being, School teachers, College professors.*

PSYOP18

TEACHER – STUDENT RELATIONSHIP AND ACADEMIC PERFORMANCE: A COMPARATIVE STUDY BETWEEN FRONT BENCHERS AND BACK BENCHERS

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ABSTRACT

This study examined how the quality of teacher-student relationships is connected to academic performance, with special focus on differences between students who sit on the front benches and those who sit at the back in secondary school classrooms. It explored three key questions: whether academic achievement differs based on seating position, whether seating influences the nature of teacher-student relationships, and whether relationship quality is associated with students' academic success. Using a quantitative cross-sectional design, data were collected from 300 students in Grades 8, 9, and 10 through stratified random sampling to ensure balanced representation. Standardized measures assessed students' perceptions of closeness and conflict with teachers, along with their academic performance. Non-parametric statistical analyses were used to examine differences and relationships. The findings revealed that front bench students generally reported warmer, less conflictual relationships with teachers and achieved higher academically compared to back bench students. Greater closeness was positively linked to achievement, while higher conflict was associated with lower performance. Overall, the results suggest that supportive teacher interactions significantly shape students' learning experiences and outcomes. The study highlights the importance of inclusive classroom practices, while noting that self-reported data and limited context require cautious interpretation and further research.

Keywords: *Teacher-Student Relationship, Academic Performance, Seating Position, Front Benchers, Back Benchers, Classroom Interaction.*

PSYOP19

TASTE PREFERENCE AND CRAVING PATTERNS DURING MENSTRUATION: AN EXPLORATIVE STUDY USING SIX TASTE FRAMEWORK

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ABSTRACT

Menstruation is a cyclical physiological process accompanied by hormonal, emotional, and behavioural changes that may significantly influence eating behaviour and taste preferences.

Although existing literature has examined menstrual food cravings primarily from hormonal and psychological perspectives, limited research has explored these patterns through a structured taste-based framework. The present study aimed to investigate variations in taste preferences and food craving patterns during menstruation using the Six Taste Framework, and to examine their association with emotional regulation and daily functioning among young women. A qualitative exploratory research design was adopted. The sample consisted of 40 women aged 18–25 years selected through convenience sampling. Data were collected using structured interviews focusing on six taste categories—sweet, sour, salty, bitter, pungent, and astringent—and were analysed using thematic analysis. The findings revealed increased preference for sweet and salty tastes during menstruation, primarily associated with mood enhancement, emotional comfort, and energy restoration. Participants also reported avoidance of bitter, oily, and strongly flavoured foods due to physical symptoms such as cramps, bloating, and nausea. Emotional eating emerged as a conscious and adaptive coping strategy rather than impulsive behaviour. The study highlights the multidimensional relationship between menstruation, taste perception, and emotional well-being. Implications include the development of menstrual-sensitive dietary recommendations and the integration of holistic nutritional frameworks in health education. However, limitations such as small sample size, reliance on self-report data, and limited generalizability must be acknowledged.

Keywords: *Menstruation, taste preferences, food cravings, emotional regulation, Six Taste Framework, qualitative study.*

PSYOP20

**FAMILY AS THE FOUNDATION FOR HOLISTIC WELLNESS:
A COMPARATIVE STUDY OF NUCLEAR AND
JOINT FAMILIES ON PERCEIVED SOCIAL SUPPORT,
SENSE OF BELONGING, AND GRATITUDE**

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ABSTRACT

Family provides a primary source of environment that nurtures holistic wellness through emotional, social, and psychological support. The current study examines the family as the foundation for holistic wellness by comparing individuals from nuclear and joint families on perceived social support, sense of belonging and gratitude. The quantitative and comparative research design was used. The sample consist of 300 each family type 150 participants on each family type that is nuclear and joint family and age ranged from 18-40 years. Participants were categorized into two groups based on family structure: nuclear family and joint family. Data were collected using standardized tools: the Multidimensional Scale of Perceived Social

Support by Zimet, Dahlem, Zimet, and Farley (1988). The reliability is Cronbach's alpha is 0.91 and family subscale reliability is 0.87 and it has strong construct validity. It contains 12 items. The Sense of Belonging scale by Hoffman, et al, (2002-2003). It contains 16 items. The reliability is Cronbach alpha is 0.92 and it also has content validity. Gratitude Questionnaire (GQ-6) by McCullough et al (2002). It contains 6 items. The reliability is 0.87 and it has good convergent validity. Descriptive statistics and independent samples t-tests were employed to analyze the data. The findings show that Perceived social support, sense of belonging and gratitude has significant difference among both family types.

The three variables also have positive correlation to each other. The research gap shows that previous research is focused on individual settings of all these variables, therefore this research provides the novel outcome of comparing these variables with the nuclear and joint family settings.

Keywords: Nuclear family, joint family, Perceived social support, Sense of belonging, Gratitude.

PSYOP21

RELATIONSHIP BETWEEN IMPOSTER SYNDROME AND PERFECTIONISM AMONG YOUNG ADULTS

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ABSTRACT

Young adulthood is a period characterized by increasing occupational, academic and social expectations that influence individuals' perception of their abilities and achievements. During this stage, many individuals experience persistent self-doubt despite having adequate competence, a psychological experience known as imposter syndrome. According to Clance and Imas (1978) who described it as a tendency among high achieving individuals to doubt their abilities and fear being exposed as intellectual frauds. Young adults often strive to meet unrealistically high standards and evaluate themselves critically, reflecting perfectionistic tendencies. According to Frost et al. (1990) Perfectionism is the setting of excessively high performance standards accompanied by overly critical self-evaluation. The present study aims to examine the relationship between imposter syndrome and perfectionism among young adults aged 18-35. A quantitative correlational research design will be employed for the study. Data will be collected from young adults belonging to both academic and working populations using standardized self-report questionnaires assessing imposter feelings and perfectionistic traits. Appropriate Statistical analysis will be conducted to determine the strength and direction of relationship between the two variables. Understanding the interaction between imposter feelings and perfectionism may provide insight into the psychological pressures experienced by young adults in competitive environments. The findings of this study may contribute to the development of counseling intervention, academic support

strategies and workplace mental health programs aimed at improving self-confidence, reducing maladaptive perfectionism and promoting psychological well-being among young adults.

Keywords: *Imposter Syndrome, Perfectionism, Young adults, Psychological well-being.*

PSYOP22

THE INFLUENCE OF FORGIVENESS AND SPIRITUAL PRACTICES ON LIFE SATISFACTION

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ABSTRACT

Forgiveness and spiritual practices are increasingly acknowledged as important components of psychological well-being and overall life satisfaction. This systematic review synthesizes findings from existing qualitative and quantitative studies to explore how forgiveness toward oneself and others and engagement in spiritual practices such as meditation, prayer, mindfulness, and reflective rituals influence life satisfaction. Relevant studies published between 2000 and 2024 were identified through systematic searches in Google Scholar, PubMed, and PsycINFO. Articles examining emotional well-being, interpersonal functioning, spiritual development, and subjective life satisfaction were included. The review reveals consistent evidence that forgiveness reduces negative emotions, supports emotional healing, and improves interpersonal harmony, while spiritual practices enhance meaning, purpose, inner peace, and cognitive clarity. Together, these factors show a strong positive association with higher life satisfaction. The findings suggest that integrating forgiveness-based interventions with spiritual practices may offer a holistic pathway to improved psychological well-being. This review also highlights gaps in existing literature and provides recommendations for future research focusing on culturally diverse populations and longitudinal outcomes.

Keywords: *Forgiveness, Spiritual Practices, Life Satisfaction, Well-being, Positive Psychology, Mindfulness, Emotional Healing, Inner Peace, Spiritual Well-being, Psychological Adjustment*

PSYOP23

EXAMINING THE RELATIONSHIP BETWEEN SOCIAL MEDIA ADDICTION AND SELF-ESTEEM IN FIRST GENERATION COLLEGE STUDENTS

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ABSTRACT

The use of social media has grown rapidly, especially among young adults and has become integral parts of daily life for college students. Self-esteem refers to an
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individual's overall subjective evaluation of their own worth. In this study, effects of Social media addiction and Self-esteem among First generation college students of age between 18 to 23 have been investigated with a cross-sectional quantitative design, the data was collected from 150 first generation College going students. Standardized questionnaires for measuring Social media addiction and Self-esteem are studied. Statistical tools like correlational analysis will be used to explore the relationship between the variables. These findings highlight the excessive social media use and emphasize the need for educational institutions to implement digital literacy programs and self-esteem enhancement interventions.

Keywords: *Social media addiction, Self-esteem, First generation college students*

PSYOP24

FEAR OF MISSING OUT IN RELATION TO ACADEMIC TIME MANAGEMENT AND STUDY ENGAGEMENT AMONG COLLEGE STUDENTS

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ABSTRACT

Fear of Missing Out (FoMO), characterized by anxiety arising from the perception that others are having rewarding experience without oneself, may lead to distraction, procrastination. In the digital era, the pervasive use of social media and constant connectivity have intensified the experience of FoMO among college students, potentially disturbing the academic functioning. The present study aims to examine the role of FoMO on academic time management behaviours and study engagement among college students. 100 College students (50 Males and 50 Females) from various places of Tamil Nadu, India were selected as a sample for the research using convenience sampling method. The tools used to collect data were Fear of Missing Out Scale, Time Management Behaviour Scale and Utrecht Work Engagement Scale (Student version). The Finding will have impact on promotion of college student's healthy academic behaviour and strengthen student engagement in higher education.

Keywords: *Fear of Missing Out, Academic Time Management Behaviour, Study Engagement, College Students.*

PSYOP25

A STUDY ON THE PSYCHOLOGICAL CONSEQUENCES OF WARS ON CIVILIANS LIFE

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ABSTRACT

The study emphasizes the psychological impact of wars on civilians life. It encloses the hidden trauma and long-term struggles faced by those affected by war, extending far beyond what is visible on the surface. The methodology constitutes the qualitative data that are collected through secondary data collection. The objectives of this study aim to delve into the complex psychological repercussions of war, it sheds light on the interplay between war- induced trauma and other prevalent mental health disorders like depression and anxiety, recognizing the complex relationship between them. The study also aims to identify effective coping mechanisms and resilience factors that can help to reduce the psychological consequences of wars and to propose strategies that fosters healing, reconciliation, and peacebuilding within war-torn societies, emphasizing the importance of collective efforts towards recovery and restoration. War profoundly impacts civilians' mental health, with factors like gender and urban residence increasing vulnerability to PTSD and depression. Survivor's and privilege guilt link to depression and aggression, while bereavement can lead to PTSD and Prolonged Grief Disorder. Migration and displacement heighten stress, powerlessness, and identity loss. Resilience is strengthened by positive worldviews, community support, and coping strategies. Healing and peacebuilding require trauma recovery, reintegration, and international aid.

Keywords: *Trauma, Depression, Aggression, PTSD, Healing and Coping.*

PSYOP26

THE DUAL ROLE OF AI COMPETENCY AND DEPENDENCY IN PREDICTING RESEARCH SELF-EFFICACY, IMPOSTOR PHENOMENON AND BURNOUT AMONG RESEARCH SCHOLARS

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ABSTRACT

In the Rapid enhancement of Technological world, integration of AI in academic research have brought significant psychological changes in research scholars. This evolution of change can be a boon or a bane for the research community.

The present study aims to predict the role of AI competency and dependency in research self-efficacy, burnout and impostor phenomenon among PhD Scholars. A cross-sectional quantitative design, where the study will employ 100-150 PhD scholars from various fields. Standardized questionnaires such as AI Competency and Self-efficacy scale, Generative AI Dependency scale, self-efficacy in research measure, Burnout Assessment tool and Clance Impostor syndrome self-assessment tool will be used to collect the data. Statistical tools like regression and correlation analysis will be carried out for the predictive roles of the variables. This study addresses a significant research gap accounting for various actions regarding AI integration in academic research.

Keywords: *AI dependency, AI competency, Research Self-Efficacy, Burnout, Impostor Phenomenon, Academic Researchers*

PSYOP27

FRAGMENTED PAYMENTS AND FRAGMENTED PEACE: THE PSYCHOLOGICAL PATHWAY FROM IMMEDIATE GRATIFICATION TO FINANCIAL ANXIETY

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ABSTRACT

The rise of Equated Monthly Installment (EMI) plans and Buy-Now-Pay-Later options have greatly impacted how and when consumers choose to make purchases today. Young adults, in particular, have been drawn to use these financing methods to increase their purchasing power and make shopping much easier; however, they are also encouraging a reward-seeking mentality and combination of instant quickly received rewards at the expense of planning for one's long-term financial stability. The purpose of the present study is to explore the relationship between EMI users' immediate gratification tendencies and their level of financial anxiety. Immediate

gratification refers to a desire for immediate reward and not considering any future implications of one's decisions, while financial anxiety involves an individual's continuous feelings of concern, worry, tension, and emotional distress related to their own financial situation. A quantitative correlational research design will be used to examine the relationship between the two constructs in EMI users between the ages of 18 and 40 years through convenience sampling methods. Assessment of immediate gratification will be made using a validated measure of consideration of future consequences scale and financial anxiety will be assessed through the use of the Financial Anxiety Scale. Data will be analyzed using descriptive statistics and Pearson correlation analysis. It is hypothesized that there will be a positive relationship between higher levels of immediate gratification and higher levels of financial anxiety among the EMI users studied.

Results from this study may aid in understanding how consumers' purchase decisions are influenced by/through installment based consumerism and provide much needed information to help improve financial literacy and education related interventions.

Keywords: *Immediate gratification, Financial anxiety, EMI users, Impulsivity.*

PSYOP28

IMPACT OF FAMILY SUPPORT, INDIVIDUAL COPING, AND INNOVATIVE PARENTING PRACTICE ON SPEECH-RELATED PROBLEMS: A PRE-POST EXPERIMENTAL QUALITATIVE STUDY

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ABSTRACT

This study explores the family support, individual coping, and innovative parenting practices of individuals with speech-related problems using a pre-post experimental study with a qualitative design. A purposive sampling of 15-20 speech-related problems for individuals and their parents. Pre-intervention with semi-structured interviews measuring emotional response, communication, and family pattern. Participants have to undergo a 7-day intervention. Thematic analysis will be used in this study. Innovative novel qualitative experimental model to improve speech. Integration of developmental, coping, and family systems to examine psychosocial influence on speech enhancement. The impact of this study is to develop family-based psychological intervention.

Keywords: *Family Support, Individual Coping, Parenting Practice, Speech Problems.*

PSYOP29

ALGORITHM EXPOSURE AND PERCEIVED AUTONOMY: A MIXED – METHOD STUDY AMONG GEN Z WOMEN.

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ABSTRACT

The rapid growth of algorithm driven social media platforms has shaped digital engagement among Gen Z women aged 18-25 years. Based on Reinforcement Theory, Cognitive Load Theory, and Self Determination Theory, this mixed method study explores how algorithm exposure may lead to reduced perceived autonomy. Algorithmic feeds function through reward based mechanisms that encourage dopamine driven scrolling and immediate gratification. Through qualitative interviews, participants described experiences of mental overload, mental freeze, and decision paralysis after prolonged scrolling.

Long term exposure to personalized content appeared to overwhelm attention and reduce clarity in thinking. From a self-determination perspective, repeated engagement with externally structured content may weaken the sense of personal control. To examine this outcome, perceived autonomy was quantitatively measured using a standardized scale, findings indicating lower autonomy among women with higher algorithm engagement. This study brings together different psychological and technology-based perspectives to understand how digital platforms may influence young women's perceived agency and autonomy.

Keywords: *Gen Z women, Algorithm Exposure, Perceived Autonomy, Digital Space, Mental Health*

POSTER PRESENTATION

A COMPARATIVE STUDY ON ANTIBACTERIAL ACTIVITY OF MOLYBDENUM NANOPARTICLES PREPARED BY GREEN SYNTHESIS PROCESS

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ABSTRACT

Nanotechnology is an emerging and rapidly expanding field that explores materials at the nano scale (<100 nm), where they exhibit distinct physical, chemical, and biological properties that differ remarkably from their bulk counterparts. Green synthesized nano particles utilize plant extracts, microorganisms, and natural compounds as reducing and stabilizing agents which are the better choices when compared to toxic chemicals, high temperature, and energy consumption used in traditional physical and chemical methods. Molybdenum oxide nano particles (MoO_3 NPs) were synthesized using green synthesis approach using Chitrak plant extracts. XRD patterns of synthesized MoO_3 NPs exhibit low intensity peaks which correspond to the polycrystalline MoO_3 . SEM images of MoO_3 NPs exhibit rod-like morphology with diameters in the range of 0.2 μm to 0.6 μm and lengths varying between 0.5 μm and 2 μm . EDX result of the sample confirms that the prepared NPs are composed of only Mo and O and no trace of secondary impurities is observed. The maximum UV absorption band of MoO_3 nano particles is observed at 212nm and the estimated band gap value (4.33 eV) is slightly higher than that of the bulk (3.16 eV). PL spectra of the Samples show a peak approximately at 405.7 nm which is attributed to Mo^{5+} (d-d) band transition. FTIR spectra exhibits a dominant peak at 564cm^{-1} which corresponds to Mo-O vibrations. The antibacterial activity of the prepared MoO_3 nano particles is concentration-dependent against both gram-positive and gram-negative pathogens.

Keywords: *Molybdenum trioxide nano particles, Green synthesis, Chitrak plant extracts, Antibacterial activity*

PSPP2

SYNTHESIS AND CHARACTERISATION OF CALCIUM DOPED BISMUTH FERRITE BY SOL-GEL METHOD

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ABSTRACT

The structural and optical properties of calcium (Ca) doped bismuth ferrite (BFO) was synthesized using a sol-gel method and its characteristics were studied. BFO is a good multi ferroic material having simultaneous coexistence of both ferroelectric and magnetic properties. The substitution of calcium into the BFO lattice often leads to improved structural stability, reduced particle size, and enhanced surface area, all of which contribute to greater photocatalytic efficiency. The doped sample was calcined at a temperature of 600°C for 5 hours. The powdered sample was characterised by X-ray diffraction (XRD) analysis and the average crystalline size was calculated using Debye Scherrer formula as 4.64 nm and the corresponding miller indices were obtained. The UV absorption peak observed at 354 nm and the reduced band gap of 2.43 eV indicates enhanced light absorption in the visible spectrum, making the material more efficient for optoelectronic applications. These modifications, induced by calcium doping, improve its suitability for various uses, including photovoltaics, photocatalysis, and multi ferroic devices. The sample was subjected to XRD, Raman, UV and visible spectroscopy, FTIR and dye degradation process. Calcium doped Bismuth ferrite nanoparticles showed much enhanced photo catalysis and 74% of the dye degraded in 120 minutes owing to the excellent adsorption characteristics.

Keywords: *Multi ferroic; photo catalytic; dye degradation.*

PSPP3

VISIBLE-LIGHT-RESPONSIVE GREEN-SYNTHESIZED AG-DOPED CU/GRAPHENE OXIDE THIN FILMS PREPARED BY DOCTOR BLADE DEPOSITION FOR PHOTOCATALYTIC DEGRADATION

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ABSTRACT

An eco-friendly green synthesis of silver-doped copper (Ag-Cu) and silver-doped copper-graphene oxide (Ag-Cu-GO) nano composites was carried out using *Nelumbo nucifera* leaf extract as a reducing and stabilizing agent, and the fabricated thin films were characterized using UV-Visible spectroscopy, photoluminescence (PL), Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD),

scanning electron microscopy (SEM), and thickness measurements. The green-synthesized nano materials were deposited onto glass substrates by the doctor blade coating technique, followed by drying and annealing. XRD analysis confirmed the crystalline nature of the thin films, while SEM revealed uniform surface morphology. Enhanced visible-light absorption and reduced electron-hole recombination were observed, particularly for Ag-Cu-GO thin films. The photocatalytic performance of the prepared thin films was evaluated through the degradation of methylene blue dye under visible light irradiation. Among the samples, Ag-Cu-GO thin films exhibited superior photocatalytic efficiency due to improved charge separation and the synergistic effect of silver doping and graphene oxide, demonstrating their potential for sustainable wastewater treatment applications.

Keywords: *Green synthesis; Nelumbo nucifera extract; Doctor blade coating; Photocatalysis*

PSPP4

SPECTROSCOPIC INVESTIGATION OF SIZE – TUNABLE ZNO NANOPARTICLES

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ABSTRACT

Zinc oxide (ZnO) nano particles have gained significant attention owing to their size-dependent optical, structural, and electronic properties, which enable wide-ranging applications in optoelectronics, sensing, and photocatalysis. In this study, ZnO nano particles were synthesized via a coprecipitation method using varying precursor molar ratios of zinc acetate dihydrate and sodium hydroxide in a methanol medium, while maintaining constant temperature and stirring conditions. This synthesis strategy enabled controlled tuning of particle size through systematic variation of reactant concentrations. The structural and optical properties of the synthesized nano particles were investigated using UV-Visible spectroscopy, Fourier Transform Infrared (FTIR) spectroscopy, Photoluminescence (PL) spectroscopy, and X-ray Diffraction (XRD) analysis. UV-Vis absorption spectra exhibited a noticeable blue shift with decreasing particle size, confirming the quantum confinement effect, and particle sizes were estimated using the Brus equation. FTIR results verified the presence of characteristic Zn-O stretching vibrations, indicating successful formation of ZnO nano particles. PL spectra showed both near-band-edge and defect-related emissions, revealing the influence of particle size on luminescence behavior. Overall, the study demonstrates that the coprecipitation method offers an efficient, reproducible, and scalable route for synthesizing size-tunable ZnO nanoparticles, while spectroscopic analyses provide comprehensive insight into their size-dependent optical characteristics.

Keywords: *Nano particle, Spectroscopy, Co-precipitation, Size-tunable, ZnO, Synthesis*

PSPP5

SOLVING SIMPLE HARMONIC OSCILLATOR (SHO) USING QUANTUM ALGORITHMS AND DESIGNING QUANTUM CIRCUITS

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ABSTRACT

The simple harmonic oscillator (SHO) is a fundamental model in physics that provides essential insight into more complex quantum and molecular systems. As an initial step, this work involved developing practical familiarity with quantum circuit design by simulating classical electronic logic circuits, including half-adder and full-adder implementations, across multiple quantum computing platforms. Building on this foundation, the study demonstrates the implementation of two important quantum algorithms the Variational Quantum Eigen solver (VQE) and Quantum Phase Estimation (QPE) to compute the ground-state energy and eigen values of the quantum SHO. Using IBM Quantum Experience (Real Quantum Computing) and Qiskit, quantum circuits were designed and simulated to capture the system's quantum state evolution. The obtained results show good agreement with theoretical predictions, establishing a reliable and reproducible computational workflow. This work illustrates the potential of near-term quantum hardware for addressing foundational physics problems and offers a practical framework for extending these techniques to more complex molecular energy calculations.

Keywords: Quantum Algorithms, Quantum Circuits, SHO, VQE and QPE Algorithms.

PSPP6

SYNTHESIS, CRYSTAL GROWTH AND CHARACTERIZATION OF PIPERAZINE-1, 4-DIUM BIS (SALICYLATE) SINGLE CRYSTAL

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ABSTRACT

Single crystals of Piperazine-1, 4-dium bis (salicylate) (PSA) were grown successfully at room temperature using the slow evaporation solution method, with methanol as the solvent.

To determine the crystal structure and molecular arrangement, single-crystal X-ray diffraction (SXR) was carried out.

Optical properties were studied through UV-Vis NIR absorption measurements, which revealed that the crystal exhibits strong transparency in the 410-1100 nm wavelength range and this is an important factor for optical applications. The presence of various functional groups in the PSA crystal was confirmed using

Fourier-transform infrared (FTIR) spectroscopy. The structural analysis of grown crystal was examined by single crystal XRD and it is exposed that the piperazinium single crystal has a crystal triclinic system. Using powder XRD analysis, miller index and (h, k, l) planes were identified. The crystal has a sharp cutoff wavelength around 300nm and is transparent in UV region and the absorbance is around 350nm. Photoluminescence analysis revealed distinct emission peaks corresponding to ultraviolet (UV) light, indicating strong UV luminescence behaviour.

Additionally, the mechanical stability of the crystal was examined using Vickers micro hardness testing. The antibacterial activity of the PSA material was evaluated to explore its potential biomedical applications. These findings suggest that the PSA crystals could serve as promising materials for the use in photonics and nonlinear optical devices.

Keywords: *Single Crystal; Structural Analysis, Photoluminescence, mechanical stability*

PSPP7

GREEN SYNTHESIS AND CHARACTERIZATION OF CUO, CEO₂ NANOPARTICLES AND CUO-CEO₂ NANOCOMPOSITE FROM THE GUAVA EXTRACT

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ABSTRACT

CeO₂/CuO nano composite was synthesized using a cost-effective and environmentally friendly green method utilizing a natural extract of *Psidium guajava* L. The powder X-ray diffraction (XRD) patterns confirm the cubic and monoclinic phases for CeO₂ and CuO. The FTIR analysis confirms the existence of metal-oxygen stretching and other bonds present in the prepared samples. The band gap values CuO, CeO₂ and CeO₂/CuO were determined using tau plots. FE-SEM images of the synthesized CeO₂/CuO nano composite shows clustered surface morphology. EDAX spectrum confirms the presence of Ce, Cu, and O in the synthesized CeO₂/CuO NC.

The CeO₂/CuO nano composite exhibited excellent electrochemical properties owing to the typical pseudo capacitive nature of fast redox reactions from Ce³⁺/Ce⁴⁺ and Cu⁺/Cu²⁺ ions. The promising results of this study indicate that the CuO-CeO₂ nano composite could be used as an electrode material for super capacitors.

Keywords: *CeO₂/CuO, Psidium guajava, FE-SEM, pseudo capacitive nature*

PSPP8

ENHANCED PHOTOCATALYTIC ACTIVITY OF THIN COATINGS OF COBALT-DOPED ZINC OXIDE PRODUCED BY SPRAY PYROLYSIS

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ABSTRACT

The usage of organic dye compounds in the paint and textile industries, as well as in household chemicals, has led to water contamination and deadly consequences for living things in recent years. These days, semiconductor-assisted photocatalysts are quite popular in wastewater treatment due to their low cost, high photosensitivity, and non-toxic, ecologically friendly nature. ZnO is a semiconducting compound made up of the elements oxygen (group VI) and zinc (group IIb). The hexagonal wurtzite structure is ZnO's native crystal structure. Although zinc oxide is mostly synthesized, it does occur naturally as the rare mineral zincite. Because of its many qualities, ZnO has been employed in a variety of applications. The observed ferromagnetism in Co-doped ZnO may be caused by Co precipitates rather than carrier-mediated exchange in the ZnO matrix, according to some data.

This work uses a spray pyrolysis technique at an ideal substrate temperature to develop an undoped and cobalt-doped zinc oxide thin layer on a non-conductive glass substrate. UV-visible diffuse reflectance spectroscopy (UV-vis DRS), X-ray diffraction (XRD), scanning electron microscopy (SEM), atomic force microscopy (AFM), and photoluminescence techniques were used in a comprehensive experimental investigation of cobalt doped thin films.

Keywords: *Zinc Oxide, Cobalt, Transmittance, X-Ray Diffraction, photocatalytic activity.*

PSPP9

GREEN SYNTHESIS AND CHARACTERIZATION OF ZnO, CeO₂ NANOPARTICLES AND ZnO-CeO₂ NANOCOMPOSITE FROM THE GUAVA EXTRACT

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ABSTRACT

CeO₂/ZnO nano composite was synthesized using a cost-effective and environmentally friendly green method utilizing a natural extract of *Psidium guajava* L. The powder X-ray diffraction (XRD) patterns confirm the cubic and monoclinic phases for CeO₂ and ZnO.

The FTIR analysis confirmed the existence of metal-oxygen stretching and other bonds present in the prepared samples. The band gap values of ZnO, CeO₂ and CeO₂/ZnO were determined using tau plots. FE-SEM images of the synthesized CeO₂/ZnO NC showed a roughly stacked and clustered surface morphology. EDAX spectrum confirms the presence of Ce, Zn, and O in the synthesized CeO₂/ZnO nano composite. The CeO₂/ZnO nano composite exhibited excellent electrochemical properties owing to the typical pseudocapacitive nature of fast redox reactions from Ce³⁺/Ce⁴⁺ and Zn²⁺ ions. The promising results of this study indicate that the ZnO-CeO₂ nano composite could be used as an electrode material for supercapacitors.

Keywords: CeO₂/ZnO, *Psidium guajava*, FE-SEM, pseudocapacitive nature

PSPP10

SYNTHESIS AND CHARACTERIZATION OF MOLYBDENUM SULFIDE FOR ENVIRONMENTAL APPLICATION

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ABSTRACT

Molybdenum disulfide (MoS₂) nano particles were successfully synthesized via a simple and cost-effective solvo thermal method. The structural and optical properties of the prepared material were systematically investigated using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), UV-Visible spectroscopy, and photoluminescence (PL) analysis. The XRD results confirmed the crystalline nature of MoS₂, and the average crystallite size was calculated to be 32.66 nm using the Scherrer equation. FTIR analysis verified the characteristic vibrational modes of Mo-S bonding, while UV-Visible and PL studies revealed favorable optical absorption and emission properties. The photocatalytic performance of the synthesized MoS₂ nano particles was evaluated through the degradation of Methylene Blue dye under visible light irradiation. The photocatalytic degradation efficiency was monitored using UV-Visible spectroscopy. The results demonstrate that the prepared MoS₂ nano particles exhibit promising visible-light-driven photocatalytic activity, highlighting their potential application in wastewater treatment and environmental remediation.

Keywords: MoS₂, Photocatalytic activity, Solvo thermal method, Nanoparticles

PSPP11

ENHANCEMENT OF PVA–STARCH BIODEGRADABLE POLYMER COMPOSITES USING CLAM SHELL POWDER AS BIO-FILLER AND GLYCEROL AS PLASTICIZER

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ABSTRACT

The development of composites made of biodegradable polymers has drawn more interest as a sustainable substitute for traditional plastics. By using clam shell powder (CSP) as a bio-filler and glycerol as a plasticizer, this study aims to improve a blend of polyvinyl alcohol (PVA) and starch-based polymers. Calcium carbonate (CaCO_3) rich clam shell powder was utilized to reinforce the polymer matrix and enhance its mechanical and thermal properties. Glycerol was added to increase flexibility and decrease brittleness. In order to evaluate the effect of different concentrations of CSP and glycerol on the material's structural, mechanical, thermal, and morphological properties, composite films were prepared using the solution casting technique. Because of the improved interfacial bonding between the filler and the PVA–starch matrix, mechanical testing showed that the incorporation of CSP increased tensile strength and Young's modulus. On the other hand, a high filler concentration led to reduced elongation at break and particle agglomeration.

Although higher plasticizer content resulted in a lower tensile strength, glycerol significantly improved flexibility by decreasing intermolecular hydrogen bonding within the polymer network. Overall, the PVA–starch composite's characteristics were effectively improved by the addition of clam shell powder and glycerol, indicating its potential for applications in biodegradable materials and environmentally friendly packaging.

Keywords: *Biodegradable polymers; Polyvinyl alcohol (PVA)-Starch based composites; Clam shell powder (CSP); Glycerol plasticizer; Bio-fillers; Sustainable packaging; Green materials.*

PSPP12

NOVEL PYRENE BASED FLUORESCENT DUAL SENSOR FOR SENSING OF CU (II) and FE (III) IONS

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ABSTRACT

Metals are absolutely necessary for all life forms since they are essential for many basic biological functions. Among variety of metal ions present in the human body, 2^+ and 3^+ are essential for our body.

Therefore, both a shortage and an abundance of these ions have led to a variety

of biological illnesses. Given the significance of these metal cations in our daily lives, fluorescence sensors that can recognise $2+$ and $3+$ are crucial. Most of the sensor detect one metal ion. Till date, a probe that can sense two metal ions are rarely reported. Hence, the design of a sensor for detection of multiple metal ions is meaningful. In this work, turn-on and turn-off sensing probes for $2+$ and $3+$ ions based on pyrene carboxaldehyde have been presented. Other metal ions do not interfere to this special dual sensing. A new pyrene based fluorescent probe was synthesized using 1-pyrene carboxaldehyde and 4-(2- aminoethyl) morpholine via a simple strategy using high yield. The probe itself displays a good amount of fluorescence. On addition of $2+$, it exhibited fluorescent enhancement and with $3+$ ion fluorescence quenching was observed.

Keywords: Pyrene, Fluorescence, Dual-sensing, Metal-ions

PSPP13

DEVELOPMENT OF A SYMMETRIC DIIMINE-DERIVED CHEMOSENSOR FOR SELECTIVE METAL ION SENSING

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ABSTRACT

Diimines are versatile molecular materials widely employed in chemoselective sensing enabling to their facile synthesis, tunable electronic properties, and strong coordination ability toward metal ions. The presence of imine nitrogen atoms combined with conjugated aromatic frameworks enables selective interaction with various analytes through metal coordination, hydrogen bonding, and charge-transfer mechanisms, resulting in measurable optical responses. Diimine-based sensors have been successfully utilized in environmental monitoring, biological imaging, and analytical chemistry, particularly for trace metal ion detection. Therefore, non-symmetrical diimines are also synthesized via transimination method to explore various applications. In this work, we report the synthesis, characterization, and metal-sensing properties of a symmetric diimine. The ligand was characterized by Fourier-transform infrared (FT-IR) spectroscopy, UV-Visible spectroscopy, high-resolution mass spectrometry (HRMS), and ^1H and ^{13}C nuclear magnetic resonance (NMR) spectroscopy. The sensing behavior of the diimine ligand was investigated in the presence of various metal ions, including Cr^{3+} , Fe^{2+} , Fe^{3+} , Co^{2+} , Ni^{2+} , Cu^{2+} , Zn^{2+} , and Pb^{2+} . The ligand exhibited high sensitivity and selectivity towards all the metal ions, accompanied by significant fluorescence enhancement.

These results demonstrate that the synthesized diimine serves as an efficient receptor for metal ion detection and provides a promising platform for the development of diimine-based metal sensors. The selective metal ion detection of the symmetrical diimines are under investigation.

Keywords: *Symmetric diimine, Chemosensors, Fluorescence sensing, Optical sensing*

PSPP14

SULFENAMIDES S (II): SYNTHETIC APPROACHES AND REACTIVITY PROFILES

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ABSTRACT

Sulfenamides as S(II) compounds, occupy an important role in synthetic chemistry driven by its diverse application across pharmaceutical, agrochemical and industrial sectors. As versatile intermediates making their debut as catalysts, it enables a wide spectrum of transformations including oxidation, thioamination, and sulfuration paving their utility in complex synthetic transformation. Notably sulfonimidoyl fluorides (recognised as SuFEx) are emerging as the next generation of click chemistry offering a versatile foundation for covalent drug discovery and chemical probe development. This review presents in depth analysis of sulfenamides synthesis, reactivity patterns and its application and also further research scope to explore next generation of sulfenamides chemistry.

Keywords: *Sulfenamides, Synthesis, Reactivity, SuFEx, Clickchemistry*

PSPP15

STRUCTURAL MODULATION AND STUDIES ON DIIMINE LIGANDS FOR C-H FUNCTIONALIZATION

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ABSTRACT

Diimine are diverse class of ligands and key structural moieties in the design of functional materials. The non-symmetrical diimine are also an interesting class of compounds made through the transamination process for variable applications.

This work explores the systemic structural modulation of acyclic and cyclic diimine for understanding the impact of steric, substituents, and electronic modifications on their property. The structural changes on the diimine were investigated using $^1\text{H-NMR}$, $^{13}\text{C-NMR}$, fluorescence, cyclic voltammetry, and single crystal X-ray diffraction analysis (SC-XRD). These studies infer that the steric factors not only modulate the molecular structure but also enables specific selectivity for the catalytic functionalization. The potential of these scaffolds were explored by transition metal free C-H arylation of benzene with *p*-iodoanisole. The acyclic ligands with electron-donating substituents and aryl substituents are more effective than cyclic counterparts in metal-free C- H arylation reactions, thus confirming the importance of optimizing the ligand's electronic and steric properties. The finely tuned diimine are concerted combination of electronic effects such as substituent roles and π -conjugation, steric hindrance through the bulky groups influencing molecular geometry, reactivity, and ring constraints, which affect planarity, conjugation, and dynamics are studied.

Keywords: *Opto-electronics, Conjugated Diimines, C-H Functionalization, cyclic and acyclic diimin*

PSPP16

FTIR AND XRD STUDIES OF EGG-SHELL DERIVED HYDROXYAPATITE

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ABSTRACT

Hydroxyapatite is a biocompatible calcium phosphate material widely used in biomedical applications such as bone tissue engineering and implants. In the present study, hydroxyapatite was successfully synthesized from waste eggshell using hydrothermal method. The synthesized material was characterized using Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) to confirm its functional groups and crystal structure. The FTIR spectrum exhibited characteristic phosphate vibration bands at 1025, 963, 605, and 558 cm^{-1} , confirming the presence of PO_4^{3-} groups. The carbonate bands observed at 1460, 1421, and 874 cm^{-1} indicate carbonate substitution in the hydroxyapatite lattice, forming carbonated hydroxyapatite similar to biological apatite. The XRD pattern showed characteristic diffraction peaks at 2θ values of 25.99° , 31.98° , 33.11° , and 34.25° , corresponding to the hexagonal structure of hydroxyapatite. The absence of impurity peaks confirmed the formation of phase-pure hydroxyapatite. The crystallite size was found to be in the range of 11.6–61.0 nm, indicating the nanocrystalline nature of the material.

The combined XRD and FTIR results confirm the successful synthesis of nanocrystalline hydroxyapatite from eggshell waste with high crystallinity and structural stability.

This study demonstrates that eggshell waste can be effectively utilized as an economical and eco-friendly precursor for hydroxyapatite synthesis for potential biomedical applications.

Keywords: *Hydroxyapatite, XRD, FTIR, Egg Shell*

PSPP17

HYDROTHERMAL SYNTHESIS OF CRAB-SHELL DERIVED HYDROXYAPATITE

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ABSTRACT

Hydroxyapatite (HAp), a calcium phosphate bioceramic with excellent biocompatibility, was synthesized using calcium carbonate derived from crab shell waste through a hydrothermal precipitation method. Crab shell was commonly known as a natural calcium precursor to promote sustainable and eco-friendly synthesis. The synthesized hydroxyapatite was characterized using X-ray diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FTIR). The XRD pattern revealed characteristic diffraction peaks corresponding to hexagonal hydroxyapatite crystal structure, confirming successful phase formation and good crystallinity. FTIR analysis showed prominent phosphate (PO_4^{3-}) vibrational bands at 1023, 961, 600, and 560 cm^{-1} , confirming hydroxyapatite formation. The presence of carbonate (CO_3^{2-}) peaks at 1468, 1418, and 874 cm^{-1} indicated carbonate substitution in the hydroxyapatite lattice due to the natural calcium carbonate precursor. The results demonstrate that crab shell waste can be effectively utilized as a low-cost and sustainable source for hydroxyapatite synthesis. The synthesized hydroxyapatite shows structural and functional properties similar to biological hydroxyapatite, making it suitable for biomedical applications such as bone grafts and tissue engineering.

Keywords: *Hydroxyapatite, crab shell, XRD, FTIR.*

PSPP18

SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF HYDROXYAPATITE FROM PEARL SHELL-DERIVED CaCO_3

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ABSTRACT

Hydroxyapatite (HA, $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) was successfully synthesized from pearl shell (CaCO_3) via wet chemical process, yielding phase-pure nanocrystalline powder as confirmed by X-ray diffraction pattern (XRD) and Fourier Transform Infrared spectral (FTIR) analyses. XRD data revealed sharp peaks matching hexagonal HA (JCPDS 09-0432), with $2\theta = 26.053^\circ$ (211, $d=3.417 \text{ \AA}$, 41.2%), 32.167° (112, $d=2.780 \text{ \AA}$, 100%), 33.302° (300, $d=2.688 \text{ \AA}$, 48.9%), and crystallite sizes of 13.7–39.9 nm (average $\sim 25 \text{ nm}$) via Debye-Scherrer analysis ($K=0.89$). FTIR displayed crystalline PO_4^{3-} existence from the peaks strong doublet ($563/602 \text{ cm}^{-1}$), very strong (1023 cm^{-1}) and a weak (961 cm^{-1}). The nano-scale, sharp diffraction, and resolved IR doublets confirm the synthesised HA is suitable for biomedical applications like bone scaffolds.

Keywords: hydroxyapatite, XRD, FTIR, CaCO_3

PSPP19

EXPLORATION OF CHALCONE ARCHITECTURES FOR NEXT-GENERATION ORGANIC MEMORY MATERIALS

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ABSTRACT

Chalcones possessing a 1,3-diaryl-2-propen-1-one framework are promising scaffolds for semiconducting materials with efficient charge transport. A series of chalcone-based small molecules was designed using naphthone and pyridine cores combined with engineered aromatic substituents to obtain extended π -conjugated systems. The compounds were synthesized via optimized Suzuki cross-coupling followed by aldol condensation, purified by column chromatography, and characterized by ^1H NMR, ^{13}C NMR, and HR-MS. Modification of the 1,3-diaryl units flanking the enone bridge tuned the electronic and optical properties of the donor-acceptor molecules. Electrochemical analysis showed anodic oxidation at 0.7–1.0 V and HOMO levels of -4.9 to -5.2 eV , indicating favorable charge injection. Uniform thin-film morphology enabled efficient carrier migration. ITO/active layer/Ag

devices exhibited stable non-volatile switching with an ON/OFF current ratio of 10^2 – 10^4 . Dibenzo-thiophene substitution created additional trapping centers, converting binary switching into ternary WORM behavior, with retention up to 5×10^3 s and endurance over 100 cycles. Molecular simulations confirmed cooperative intramolecular charge transfer and trapping produced distinct conductive states.

Keywords: *Chalcones, Organic small molecules, Organic memory devices, WORM, π - conjugated molecules*

GREEN DEFENCE: THE EMERGING ROLE OF PLANTS IN BIOSECURITY AGAINST AGRO-TERRORISM

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ABSTRACT

Biological threats arising from emerging infectious agents, deliberate misuse of pathogenic organisms, and agro-terrorism constitute a persistent challenge to national security, public health, and food system stability. The increasing complexity of these threats necessitates the development of resilient, sustainable, and multi-layered biodefence strategies. Plant-derived metabolites play a critical first line of defence due to their inherent biochemical diversity, ecological responsiveness, and expanding applications in molecular and defence biotechnology.

This study examines the strategic role of botanical innovation in strengthening national biosecurity within an interdisciplinary biodefence framework. It analyses plant-derived antimicrobial, antiviral, and immunomodulatory compounds as potential counter measures against biological warfare agents, of plants acts as bio-indicators for the early detection of environmental and biological hazards. Furthermore, the development of genetically resistant crop varieties is discussed as a key in mitigating agro-terrorism and ensuring food security. Recent advances in plant biotechnology, including molecular farming and plant-based expression systems for vaccines, diagnostic antigens, and therapeutic proteins, are evaluated for their scalability, biosafety, and operational relevance to biodefence preparation. These botanical interventions are integrated with inputs from environmental surveillance and defence research to demonstrate their contribution to early warning and response mechanisms. This study highlights that the systematic integration of plant-based technologies into national biodefence programmes can enhance threat detection, reduce systemic vulnerability, and support sustainable biosecurity infrastructure.

Keywords: *Biodefence, Agro-terrorism, Molecular Farming, Bio-indicators, National Security.*

PHYTOCHEMICAL SCREENING AND FTIR ANALYSIS OF SELECTED MEDICINAL PLANTS FROM ALAGARKOVIL HILLS, MADURAI DISTRICT

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ABSTRACT

Medicinal plants are rich sources of bioactive secondary metabolites that contribute to their therapeutic efficacy. The ethnomedicinal species *Cassia occidentalis*, *Synedrella nodiflora*, and *Blumea mollis*, traditionally used in the Alagarkovil Hills of Madurai District, Tamil Nadu, are widely employed in folk medicine for treating various ailments. However, detailed phytochemical validation of these species remains limited. Fresh leaves were collected, shade-dried, and powdered. Successive solvent extraction was carried out using chloroform, ethanol, and methanol in a Soxhlet apparatus.

Qualitative phytochemical screening was performed to detect secondary metabolites. Thin Layer Chromatography (TLC) was conducted using chloroform:ethanol: methanol (1:1:1) solvent system to determine R_f values. Functional group analysis of non-extracted leaf powders was carried out using FTIR spectroscopy in the range of 400–4000 cm⁻¹. Ethanol and methanol extracts exhibited a higher presence of phytoconstituents such as flavonoids, glycosides, tannins, saponins, steroids, terpenoids, phenolic compounds, resins, proteins, and acidic compounds compared to chloroform extracts. TLC profiling revealed distinct R_f values indicating multiple bioactive compounds with varying polarity. FTIR analysis confirmed major functional groups including alcohols (O-H), conjugated alkanes (C=C), carboxylic acids, sulfoxides (S=O), and halo compounds. The study validates the phytochemical richness of the selected species and supports their traditional medicinal use. The presence of diverse bioactive compounds highlights their potential for further pharmacological evaluation and drug development.

Keywords: *Phytochemicals; TLC; FTIR; Ethnomedicinal plants*

BSPP3

SUSTAINABLE PLANT-BASED DESSERT: OPTIMIZING COCONUT MILK–CORN FLOUR FOR LOW-CALORIE COCONUT PANNA COTTA QUALITY EVALUATION OF COCONUT PUDDING

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ABSTRACT

The present study aimed to optimize the formulation and evaluate the quality characteristics of coconut pudding prepared using coconut milk, corn flour, and sugar. Coconut milk (350 ml) and sugar (25 g) were kept constant, while corn flour concentration was varied between 7 g and 10 g to determine the best thickening ratio. The corn flour was dispersed in a portion of coconut milk to avoid lump formation and heated with continuous stirring at 85–90°C until gelatinization occurred and a uniform gel structure was formed. Different formulations were evaluated based on texture, consistency, appearance, and overall acceptability through sensory analysis. The results indicated that the pudding prepared with 8–9 g of corn flour showed optimal thickness, smooth texture, and higher sensory scores compared to other variations.

Lower levels resulted in thin consistency, while higher levels produced excessive firmness. The optimized coconut pudding was found to be smooth, mildly sweet, gluten-free, and suitable for vegetarian and vegan diets. This study demonstrates that proper ratio optimization and temperature control are essential for achieving desirable quality characteristics in coconut pudding.

Keywords: *Coconut pudding, Plant-based, Dessert formulation, Nutrition*

BSPP4

GENOME EDITING MRNA NANOTHERAPIES INHIBIT CERVICAL CANCER PROGRESSION FOR ADOPTIVE T-CELL THERAPY

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ABSTRACT

CRISPR/Cas9-based genome editing is promising for therapy of cervical cancer by precisely targeting human papillomavirus (HPV). To develop CRISPR/Cas9-based genome editing nanotherapies, a pH-responsive hybrid nonviral nanovector was constructed for co-delivering Cas9 mRNA and guide RNAs (gRNAs) targeting E6 or E7 oncogenes. The pH-responsive nanovector was fabricated using an acetalated cyclic oligosaccharide (ACD), in combination with low molecular weight polyethyleneimine. Thus obtained hybrid ACD nanoparticles (defined as ACD NP)

showed efficient loading for both Cas9 mRNA and E6 or E7 gRNA, giving rise to two pH-responsive genome editing nanotherapies E6/ACD NP and E7/ACD NP, respectively. Cellularly, ACD NP exhibited high transfection but low cytotoxicity in HeLa cervical carcinoma cells. Also, efficient genome editing of target genes was achieved in HeLa cells, with minimal off-target effects. In mice bearing HeLa xenografts, treatment with E6/ACD NP or E7/ACD NP afforded effective editing of target oncogenes and considerable antitumor activities. More importantly, treatment with E6/ACD NP or E7/ACD NP notably promoted CD8⁺ T cell survival by reversing the immunosuppressive microenvironment, thereby leading to synergistic antitumor effects by combination therapy using the gene editing nanotherapies and adoptive T-cell transfer. Consequently, our pH-responsive genome editing nanotherapies deserve further development for the treatment of HPV-associated cervical cancer, and they can also serve as promising nanotherapies to improve efficacies of other immune therapies against different advanced cancers by regulating the immunosuppressive tumor microenvironment.

Keywords: *CRISPR/Cas9 genome editing, Human papilloma virus (HPV), E6/E7 oncogenes, Cervical cancer, Tumor microenvironment.*

BSPP5

INTEGRATING ARTIFICIAL INTELLIGENCE FOR ADVANCING MULTIPLE-CANCER EARLY DETECTION VIA SERUM BIOMARKERS

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ABSTRACT

Governments worldwide have prioritized multicancer early detection (MCED) for the better management of cancers. Artificial intelligence (AI) is a promising technology to enhance the performance of MCED. Multicancer early detection (MCED) has emerged as a global priority in cancer prevention policy, particularly with the rapid advancement of artificial intelligence (AI). The integration of AI into MCED has led to the development of diverse diagnostic products; however, substantial heterogeneity exists across these systems. Differences arise from the selection of detection targets—including protein biomarkers, cell-free DNA, or multimodal biomarker combinations—as well as from variations in AI model development strategies. Training datasets range from case-control cohorts to real-world screening populations, and validation approaches include cross-validation, geographic validation, and temporal validation, all of which significantly influence predictive performance. Beyond model development, translating MCED AI systems into clinical practice introduces further complexities, such as report interpretation, tumour localization and classification, and coordination of follow-up care and treatment pathways.

This review examines several commercially available and relatively mature MCED AI products, analysing their biomarker foundations, model training and validation strategies, and clinical implementation frameworks. By synthesizing these components, we highlight the current challenges and developmental barriers facing MCED AI technologies and provide perspectives for their future advancement.

Keywords: *Real-world datasets, Cell-free DNA (cfDNA), Cross-validation, promising technology.*

BSPP6

ENHANCED DIAGNOSIS OF MULTI-DRUG-RESISTANT MICROBES USING GROUP ASSOCIATION MODELING AND MACHINE LEARNING

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ABSTRACT

New solutions are needed to detect genotype-phenotype associations involved in microbial drug resistance. Herein, a Group Association Model (GAM) that accurately identifies genetic variants linked to drug resistance and mitigates false-positive cross-resistance artifacts without prior knowledge. GAM analysis of 7,179 *Mycobacterium tuberculosis* (*Mtb*) isolates identifies gene targets for all analyzed drugs, revealing comparable performance but fewer cross resistance artifacts than World Health Organization (WHO) mutation catalogue approach, which requires expert rules and precedents. GAM also reveals generalizability, demonstrating high predictive accuracy with 3,942 *S. aureus* isolates. GAM refinement by machine learning (ML) improves predictive accuracy with small or incomplete datasets. These findings were validated using 427 *Mtb* isolates from three sites, where GAM inputs are also found to be more suitable in ML prediction models than WHO inputs. GAM + ML could thus address the limitations of current drug resistance prediction methods to improve treatment decisions for drug-resistant microbial infections.

Keywords: *Drug-resistance, Genomics, Machine-learning, Bioinformatics, Prediction*

BSPP7

COMPARATIVE EVALUATION OF EXTRACTION TECHNIQUES INFLUENCING PHYCOCOLLOID YIELD AND GEL STRENGTH IN GRACILARIA VERRUCOSA and GELIDIUM SP. COLLECTED FROM RAMESHWARAM COAST, INDIA.

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ABSTRACT

Phycocolloids, particularly agar, derived from red seaweeds are widely utilized in food, pharmaceutical and biotechnology industries due to their gelling properties. The present study aims to comparatively evaluate the influence of different extraction techniques on phycocolloid yield and gel strength in *Gracilaria verrucosa* and *Gelidium* sp. collected from the Rameshwaram Coast, India. Freshly harvested and shade-dried samples were subjected to various extraction methods, including hot-water extraction, alkali pretreatment and alkali-acid pretreatment followed by thermal extraction. Extraction efficiency was assessed based on percentage yield, while gel quality was evaluated based on the time taken for gelling as well as through selected physicochemical parameters.

Results indicated significant variations in yield and gel strength between species and extraction techniques. Pretreatment of selected seaweeds enhanced the gel strength in both seaweeds by promoting structural modification of agar polymers, whereas hot water extraction reduced the processing time with comparable yield efficiency. *Gracilaria verrucosa* exhibited higher extraction yield, while *Gelidium* sp. demonstrated superior gel strength under optimized conditions. The findings highlighted the importance of selecting appropriate extraction methodologies depending on the intended industrial application. This study provides valuable insights into process optimization for sustainable and efficient phycocolloid production from locally available seaweed resources along the Rameshwaram Coast.

Keywords: Seaweed; Bioplastic; Phycocolloids; Extraction

NITROPLAST AS A MODEL FOR ARTIFICIAL NITROGEN FIXING EUKARYOTES

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ABSTRACT

Nitrogen is a key limiting nutrient for global crop productivity, and its industrial supplementation through the Haber–Bosch process consumes ~1% of global energy and contributes significantly to greenhouse gas emissions and water pollution. The recent discovery of a nitrogen-fixing organelle called nitroplast, present in the marine alga *Braarudosphaera bigelowii* has fundamentally changed the paradigm that nitrogen fixation is exclusive to prokaryotes. This organelle originated from the cyanobacterium UCYN-A (*Candidatus Atelocyanobacterium thalassa*) through endosymbiosis and exhibits organelle features, such as genome reduction, host-dependent protein import, synchronized division, and tight metabolic integration with the host cell.

Comparative metabolic and proteomic analysis reveals that the nitroplast has lost pathways for carbon fixation and central metabolism, relying instead on host-derived substrates, redox proteins, and antioxidant systems to sustain nitrogenase activity. Metabolic modelling demonstrates that the conserved size ratio between the nitroplast and host maximizes growth efficiency through optimized nutrient exchange. These properties provide a biological blueprint for engineering nitrogen-fixing compartments into non-legume crops. The direct transfer of nitroplasts into plants has not yet been achieved, advances in synthetic biology, systems biology, and artificial organelle design offer promising routes to recreate nitroplast-like systems. This study explores the conceptual and technological foundations required to translate nitroplast biology into engineered nitrogen-fixing eukaryotic systems. Successful implementation could significantly reduce fertilizer dependency, mitigate climate and water pollution, and strengthen global food security which aligns with the United Nations Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) positioning nitroplasts as a transformative model for sustainable agriculture.

Keywords: *Cyanobacteria, Nitrogen fixation, Endosymbiosis, Sustainable agriculture.*

SENSORY ANALYSIS OF CHICKPEA HUMMUS ENRICHED WITH MUSKMELON SEED

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ABSTRACT

The introduction of locally produced plant-based food products, rising consumer awareness of the link between food and health, and the desire for high-quality products are all stimulating innovation and encouraging beneficial changes in the food supply chain. Investigating different pulses and how knowledge about their origin influences consumers' willingness to try and pay for hummus made from them is the aim of this study. Cooked chickpeas, garlic, lemon juice, salt, and olive oil are blended to make hummus, a spread. Because of their many health benefits, such as lowering cholesterol, managing diabetes, having prebiotic effects, aiding in weight management, and preventing and treating cancer, diabetes, coronary artery disease, strokes, and gastrointestinal disorders, chickpeas are regarded as a functional food.

Interestingly, Muskmelon seed contained a variety of minerals, ascorbic acid, terpenoids, β -carotenes, flavonoids, apocarotenoids, chromone derivatives, carbohydrates, amino acids, phospholipids, glycolipids, fatty acids, and other phytoconstituents of the plant. Analgesic, hepato-protective, anti-inflammatory, anti-oxidant, diuretic, free radical scavenging, anti-fertility activity, anti-platelet, anti-microbial, anti-diabetic, anti-ulcer, anthelmintic, and anti-cancer are some of its other apparent beneficial culinary and therapeutic qualities. Nutritional qualities hummus and numerous health advantages make it a good fit for healthy eating habits. It is abundant in dietary fibre, antioxidants, and plant-based proteins. Muskmelon seed was added to different samples of chickpea hummus to produce a functional product enhanced with nutrients. One of the most crucial factors while developing a novel product was found to be sensory acceptance for the enriched items. The samples' texture, glossiness, mouthfeel, colour, smoothness, fragrance, and taste were all assessed.

Keywords: Chickpea; Muskmelon seed; Hummus; Sensory evaluation.

BSPP10

PRODUCT DEVELOPMENT OF GLUTEN FREE CASEIN FREE HEALTH MIX AS A DIETARY INTERVENTION FOR AUTISM

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ABSTRACT

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by deficits in communication, social interaction, and repetitive behaviors. Nutritional management plays an important supportive role in improving behavioral and gastrointestinal symptoms. The Gluten-Free Casein-Free Diet (GFCF diet) is widely adopted for children with ASD, as it eliminates gluten and casein that may aggravate gut inflammation and permeability in susceptible individuals. This study focuses on the development of a GFCF based health mix incorporating Red kidney bean flour and millet flour (pearl, finger, foxtail, barnyard, little, kodo millet). Red kidney beans are rich in protein, dietary fibre, iron, and bioactive phytochemicals such as flavonoids, phenolic acids, tannins, α -amylase inhibitors, saponins, and anthocyanin, which possess antioxidant, anti-diabetic, antimicrobial and anti-inflammatory properties. These phytochemicals may help reduce oxidative stress, which is commonly associated with ASD.

Millets, being naturally gluten-free, provide complex carbohydrates, B-complex vitamins, and essential minerals that support brain development and gut health. The developed health mix aims to enhance nutritional status, support cognitive function, and provide antioxidant benefits while complying with GFCF dietary principles. Such a functional food approach may serve as a cost-effective and nutritionally adequate dietary intervention for children with ASD.

Keywords: *GFCF diet, Autism, Red kidney bean, Multigrain formulation.*

BSPP11

SUSTAINABLE CHROMIUM REMOVAL FROM INDUSTRIAL WASTEWATER USING ERYTHRINA VARIEGATA SEEDS

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ABSTRACT

Environmental contamination is one of the most serious and emerging threats to human-kind, affecting ecosystems on a global scale. Extensive research has been conducted using various approaches to reduce pollution levels. Among different forms of pollution, heavy metal contamination is particularly hazardous due to its

persistent, non-biodegradable, and accumulative nature. Heavy metals such as zinc, cadmium, lead, and chromium pose severe health risks to humans even at low concentrations. To address the challenges associated with heavy metal pollution, biosorption has emerged as a cost-effective, efficient, and environmentally friendly technique. In the present study, coral tree (*Erythrina variegata*) seeds were selected as a natural bio-adsorbent for the removal of zinc ions from wastewater. Batch adsorption experiments were performed to evaluate the effects of various parameters including contact time, temperature, initial metal concentration, adsorbent dosage, pH, and agitation speed. The results demonstrated that coral tree seeds act as an efficient and promising bio-adsorbent for zinc ion removal. Chromium-contaminated wastewater was collected from a cracker industry in Sivakasi and treated using the biosorption process. Adsorption isotherm and kinetic studies were carried out to understand the adsorption mechanism. The equilibrium adsorption data showed the best fit in the order: Langmuir > Hill > Freundlich > Jovanovic > Temkin isotherm models for zinc ions. Kinetic studies revealed that the adsorption process followed a first-order kinetic model. Overall, the study highlights the potential of *Erythrina variegata* seeds as an effective and sustainable bio-adsorbent for the removal of heavy metals from industrial wastewater.

Keywords: Chromium, isotherms, kinetics, coral seed, bio-adsorbent

BSPP12

UTILIZATION OF WET KITCHEN WASTE FOR SUSTAINABLE BIO-ENZYME PRODUCTION

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ABSTRACT

In India, the environment has been impacted by the rise in garbage output that has coincided with population growth. Bio-enzymes are natural, non-toxic, and non-corrosive liquids, can help mitigate the issues of harsh chemicals and food waste. They are produced by adding microorganisms to water, fruit, vegetable, flower, or plant waste, and jaggery through anaerobic fermentation. Six samples were extracted from fruit, vegetable and plant peels to assess their effectiveness and suitability for various sectors. Qualitative biochemical assays were done too. Bio-enzymes were used as Natural Fertilizer and Household Cleaning. This research investigations and significant work done on the bio enzymes. It helps to reduce some waste and turn into a useful substance to the society which is economical and cheaply available and the end product can be completely useful.

The bio-enzymes demonstrated their versatility in various industries, reducing the use of harsh chemicals and improving people's quality of life.

Keywords: Bio-enzymes, Non-toxic, Anaerobic fermentation, Qualitative biochemical assay

BSPP13

BIODEGRADATION OF HIGH-DENSITY POLYETHYLENE (HDPE) USING BACTERIAL AND FUNGAL STRAINS ISOLATED FROM PARTIALLY DEGRADED E-WASTE SAMPLES

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ABSTRACT

Electronic waste (e-waste) and surrounding soil samples were collected from a dumpsite located in Karaikudi near Devakottai Road to explore indigenous microorganisms capable of degrading high-density polyethylene (HDPE). Bacterial and fungal colonies were isolated from the collected samples and maintained on Nutrient Agar (NA) and Potato Dextrose Agar (PDA) slants, respectively. The bacterial isolates were subjected to standard biochemical characterization and were tentatively identified as *Bacillus pumilis*, *Bacillus cereus*, and *Staphylococcus* spp. The fungal isolates were tentatively identified as *Aspergillus flavus* and *Aspergillus* spp. The biodegradation potential of the isolated strains was evaluated using commercially available pure HDPE films as the sole substrate. Among the isolates tested, *Bacillus cereus* and *Aspergillus flavus* demonstrated superior degradation efficiency. After the incubation period, HDPE films treated with *Bacillus cereus* and *Aspergillus flavus* exhibited weight losses of 20.079% and 9.523%, respectively. Based on these results, these two strains were selected for further characterization of degradation. Fourier Transform Infrared (FTIR) spectroscopy analysis of the treated HDPE films revealed noticeable alterations in functional group peaks compared to the control. Differences were observed at wavelengths corresponding to 2870.08, 723.31, 1463.97, and 2341.58 cm^{-1} , indicating structural modifications in the polymer matrix. Additionally, a new peak at 3028.21 cm^{-1} was detected in the film treated with *Aspergillus flavus*, suggesting the formation of new functional groups as a result of microbial activity. Scanning Electron Microscopy (SEM) analysis further confirmed the biodegradation of HDPE films by revealing surface erosion, cracks, and morphological irregularities in the treated samples compared to the smooth surface of the control film. The findings of this study demonstrate the potential of indigenous microorganisms isolated from e-waste contaminated environments for the biodegradation of HDPE. In particular, *Bacillus cereus* and *Aspergillus flavus* showed promising degradation capabilities, highlighting their possible application in bioremediation strategies for plastic waste management.

Keywords: High-density polyethylene, Microbial Biodegradation, *Aspergillus*, *Bacillus*

DETECTION OF EXTENDED SPECTRUM BETA LACTAMASES AND HEAVY METAL RESISTANCE IN *ESCHERICHIA COLI*.

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ABSTRACT

Gram-negative bacteria are a major cause of urinary tract infections, respiratory infections, and pyogenic infections. The major causative agent in various clinical samples was *E. coli*, followed by *Klebsiella* spp. and *Pseudomonas* spp. The prevalence of ESBL production is high among Gram-negative bacteria. *Escherichiacoli* from clinical specimens like pus, urine samples were isolated. The isolates were presumptively confirmed to be *E. coli* based on purple colour formation on UTI agar and lactose fermentation on MacConkey agar. The strains were identified as *Escherichiacoli* following microscopic and biochemical characterization. The isolated strains were found to contain the biochemical characteristics typical of *E. coli* strains- Indole positive, Methyl red positive, Voges Proskauer negative and Further Biochemical tests were positive for indole which indicates the ability of the organism to synthesis the tryptophan, positive for methyl red indicates the ability of the organism to produce and maintain acid end products from glucose citrate negative. The highly pathogenic *Escherichiacoli* were found to be resistant to the crucial life saving antibiotics such as third generation cephalosporins, ceftazidime, cefuroxime, cefazolin, ciprofloxacin, cefepime, cefotaxime. Thus they were confirmed to be ESBL producers. Like many multidrug resistant pathogens, our strains were resistant to several heavy metals such as lead, cadmium, zinc, and nickel. Metal resistance and antibiotic resistance genes are genetically linked and the co-resistance we have observed in our *E. coli* strains are increasingly common in the Indian scenario. Plasmid curing experiments using Acridine Orange revealed that the antibiotic resistance genes in our strains were present in the chromosomal DNA. This synergy between metal resistance and multiple antibiotic resistance is a reflection of the heavy pollution of Indian water bodies which act as reservoirs for the spread of these superbugs.

Keywords: *E. coli*, ESBL, Heavy metals, co-selection

BSPP15

EVOLUTIONARY ORIGINS OF PLANT DEFENSE MECHANISMS IN MARCHANTIA POLYMORPHA AND THEIR ROLE IN CLIMATE- RESILIENT AGRICULTURE

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ABSTRACT

Climate change is intensifying plant exposure to pathogens while altering host-microbe dynamics, thereby threatening global food security. Elevated temperatures, erratic precipitation, and extreme weather events are accelerating disease outbreaks and increasing reliance on chemical control measures. Understanding the evolutionary foundations of plant immunity is essential for developing sustainable, climate-resilient crop protection strategies. The liverwort *Marchantia polymorpha*, is one of the earliest diverging extant land plants, represents a key evolutionary lineage that emerged during the terrestrialization of plants nearly 470 million years ago. Early land plants encountered stresses, including desiccation, UV radiation, and microbial pathogens, necessitating the evolution of robust defense systems. It has thalloid body plan, haploid-dominant life cycle, and well-annotated genome, *Marchantia polymorpha* serves as a powerful model to investigate conserved and lineage-specific immune mechanisms bridging non-vascular ancestors and modern crops. Investigations of natural accessions exposed to the hemibiotrophic fungus *Colletotrichum nymphaeae* demonstrate, through genomic and transcriptomic analyses, that quantitative resistance in *Marchantiapolymorpha* integrates deeply conserved immune components with evolutionary innovations. Core responses include activation of phenylpropanoid metabolism, lipoxygenase-mediated oxylipin pathways, WRKY transcription factors, and pathogenesis-related proteins, indicating that fundamental immune modules were established early in land plant evolution. The resistance variation is strongly associated with terpene biosynthesis loci, including microbial-like terpene synthase genes likely acquired through ancient horizontal gene transfer. Deciphering these terpene-mediated defense pathways offers strong translational potential for sustainable agriculture by enabling climate-adaptive crop protection strategies and reducing dependence on chemical inputs. Thus, *Marchantia polymorpha* serves as both an evolutionary window into ancestral plant immunity and a forward-looking model for designing sustainable, climate-resilient agricultural systems.

Keywords: *Marchantia*, plant immunity, evolutionary biology, climate-resilient agriculture.

RATIONAL AND COMPUTATIONAL DESIGN STRATEGIES FOR FUNCTIONAL OPTIMIZATION IN PROTEIN ENGINEERING

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ABSTRACT

Biological processes like metabolism, signalling, immunity, transport, and structural integrity are governed by proteins. Enhancing the protein function directly impacts health, agriculture, and industry. Protein engineering is a rapidly evolving field of biotechnology that focuses on the intentional design, modification, and creation of proteins to enhance their stability, specificity, catalytic efficiency, or to generate entirely new functions. Proteins are complex macromolecules composed of 20 different amino acids linked by peptide bonds, and their unique three-dimensional structures determine their biological roles as enzymes, structural components, transporters, and signaling molecules. Advances in molecular biology and computational science have enabled scientists to manipulate protein sequences with increasing precision. Major approaches in protein engineering are rational design, directed evolution, and computational design. Rational design relies on structural and functional knowledge to introduce targeted mutations, while directed evolution mimics natural selection by generating random mutations and screening for improved variants. Computational methods, including artificial intelligence-based tools, now allow accurate prediction of protein structures and facilitate *de novo* protein design. In this process, it involves identifying desired traits, introducing genetic modifications, expressing engineered proteins in suitable host systems, and evaluating their performance through iterative optimization. Protein engineering has wide-ranging applications in medicine, agriculture, and industry, including the development of recombinant insulin, monoclonal antibodies, novel vaccines, herbicide-resistant crops, improved photosynthetic enzymes, and heat-stable industrial enzymes used in detergents and food processing. This study aims to integrate biological insight with technological innovation, to offer powerful solutions to global challenges in health, food security, and sustainable industrial development. **Keywords:** *Protein Engineering, Rational Design, Directed Evolution and Computational Protein Design.*

TREE SPECIES DIVERSITY AND POPULATION STRUCTURE OF THE AMERICAN COLLEGE CAMPUS, MADURAI, TAMIL NADU, INDIA.

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ABSTRACT

Tree species diversity and composition are key indicators of ecosystem health and ecological stability in urban green spaces. The present study assessed the tree diversity, composition and structural attributes of the campus of The American College, Madurai, Tamil Nadu, India (9.929740° N, 78.132103° E), covering approximately 1.68 ha within a total campus area of 35.69 acres. Tree species composition were analysed by randomly establishing Forty two plots (20mx20m) of 0.04ha each. Trees (≥ 10 cm GBH) within each quadrat were enumerated and diversity indices were calculated to evaluate species richness, dominance, and evenness. A total of 81 tree species belonging to 69 genera and 27 families were recorded, comprising 325 individuals with a cumulative basal area of 41.8 m² (1.68 ha). Among these, 39 species were evergreen, 39 species were deciduous and remaining 3 were semi-deciduous indicating a balanced floristic composition within the semi-arid urban landscape of Madurai. The most dominant families recorded were Fabaceae and Malvaceae. Species with highest IVI was *Peltophorum pterocarpum* (52.2). The Shannon–Wiener diversity index (H') was 3.43, reflecting moderately high species diversity. Simpson's dominance index (D) was 0.93, indicating low dominance and high diversity distribution among species. Fisher's alpha (α) value of 34.59 suggests very high alpha-diversity, characteristic of well-maintained heterogeneous green spaces. Pielou's evenness index (J) of 0.78 indicates relatively uniform species distribution across the study area. These findings reveal that the campus functions as an important urban biodiversity refuge, contributing to ecological stability, microclimatic regulation, and carbon sequestration within the city matrix. The diversity indices demonstrate that institutional campuses can serve as conservation microhabitats in rapidly urbanizing regions. The present study provides baseline data for long-term ecological monitoring, green campus planning, and sustainable biodiversity management strategies in urban educational institutions.

Keywords: *Tree diversity, Population structure, Random quadrat sampling, Diversity indices.*

THE ROLE OF NNT-AS1 ANTISENSE LNCRNA IN TUMORIGENESIS AND THERAPEUTIC RESISTANCE

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ABSTRACT

Antisense RNA technology has emerged as a transformative tool in molecular medicine by enabling sequence-specific regulation of gene expression through complementary binding to target RNA, leading to translational inhibition or RNA degradation. This idea forms the basis of advanced therapeutic platforms such as antisense oligonucleotides (ASOs), small interfering RNA (siRNA), and RNA interference (RNAi)-based strategies, which are currently applied in treating genetic disorders, viral infections, neurodegenerative diseases, and cancers. Recent applications have expanded into precision oncology, splice-modulating therapies, RNA-based vaccines, and personalized medicine approaches targeting disease-specific transcripts. In parallel, genome-editing technologies such as CRISPR-Cas systems have revolutionized targeted gene manipulation by enabling precise DNA-level modifications, epigenetic regulation, and RNA editing, thereby offering durable and highly specific therapeutic interventions. The convergence of antisense therapeutics and genome-editing tools represents a major advancement in next-generation targeted medicine. Among endogenous antisense transcripts, long non-coding RNAs (lncRNAs) have gained prominence as key regulators of tumour biology. Nicotinamide nucleotide transhydrogenase antisense RNA 1 (NNT-AS1), an oncogenic lncRNA located on chromosome 5 and transcribed opposite to the NNT gene, is aberrantly overexpressed in several malignancies, including breast, gastric, colorectal, and hepatocellular carcinomas. NNT-AS1 promotes tumorigenesis by enhancing proliferation, invasion, metastasis, and resistance to apoptosis and also it acts as a competing endogenous RNA (ceRNA), sponging tumor-suppressive microRNAs and activating oncogenic pathways such as PI3K/AKT and Wnt/ β -catenin, thereby facilitating epithelial-mesenchymal transition (EMT) and chemoresistance, particularly to cisplatin. This study attempts to provide a comprehensive overview of the molecular mechanisms underlying NNT-AS1-mediated tumour progression and therapeutic resistance, highlighting its potential as a diagnostic biomarker and a promising target for future anticancer interventions.

Keywords: *Antisense lncRNA, NNT-AS1, Tumorigenesis, EMT, Chemoresistance.*

PHYSIOLOGICAL AND ANTIOXIDANT RESPONSES DURING DESICCATION AND RESURRECTION OF ACTINIOPTERIS RADIATA

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ABSTRACT

Desiccation tolerance enables certain plants to survive extreme water loss and rapidly resume metabolic activity upon rehydration. Resurrection plants serve as valuable models for understanding drought resilience, particularly among early land plant lineages. *Actiniopteris radiata*, a xerophytic fern inhabiting arid rocky terrains such as Alagar Kovil Hills in Madurai District, exhibited classical resurrection characteristics. The present study investigated the morphological, anatomical, physiological, and antioxidant responses of *A. radiata* under three states: Fresh, Desiccated, and Resurrected. Anatomical observations revealed cellular shrinkage and compact tissue organization during dehydration, which were largely restored upon rehydration, indicating structural plasticity and membrane resilience. Physiological evaluation demonstrated a significant decline in Photosystem II (PSII) efficiency and Cell Membrane Stability Index (CMSI) in desiccated fronds, reflecting stress-induced impairment of photosynthetic machinery and membrane destabilization. Both parameters showed substantial recovery following rehydration, confirming effective repair and restoration of photosynthetic function. Biochemical analyses revealed variations in total protein content across the three states, suggesting induction of stress-associated proteins. Antioxidant enzymes, particularly catalase and peroxidase, showed elevated activity during desiccation, indicating activation of reactive oxygen species scavenging mechanisms. Enzyme activities moderated upon rehydration, reflecting re-establishment of redox balance. LC-MS profiling has been done to identify the stress-associated metabolites that contribute to cellular protection during dehydration-rehydration cycles. *Actiniopteris radiata* rapid recovery and efficient redox regulation highlighted its ecological resilience and reinforced its potential as a model system for investigating drought tolerance mechanisms in pteridophytes.

Keywords: *Desiccation tolerance, Actiniopteris radiata, Photosystem II, Cell Membrane Stability Index.*

BSPP20

SUSTAINABLE DEVELOPMENT AND QUALITY EVALUATION OF JACKFRUIT-BASED PLANT NUGGETS AS A MEAT ALTERNATIVE

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ABSTRACT

The increasing consumer demand for plant-based meat alternatives has accelerated research on sustainable and nutritious food substitutes. Raw jackfruit (*Artocarpus heterophyllus*) possesses a fibrous texture and neutral flavour that make it a promising meat analogue. The present study aimed to develop and evaluate raw jackfruit-based nuggets as a plant-based alternative to conventional chicken nuggets. Tender jackfruit was processed by peeling, cooking, shredding, and blending with suitable binders and seasonings to formulate nuggets at varying jackfruit concentrations. The developed products were evaluated for proximate composition, physical characteristics (cooking yield, water holding capacity, oil absorption capacity, and texture profile analysis), colour values (L^* , a^* , b^*), sensory attributes using a 9-point hedonic scale, microbiological quality, and shelf-life stability under frozen storage (-18°C). Results indicated that jackfruit-based nuggets exhibited significantly lower fat content and higher dietary fiber compared to control chicken nuggets, while maintaining acceptable protein levels. Sensory evaluation revealed good overall acceptability with desirable texture and flavour attributes. Microbial counts remained within permissible limits during frozen storage, indicating product safety and stability. The study demonstrates that raw jackfruit can be successfully utilized in developing value-added, plant-based nuggets with favorable nutritional and sensory characteristics. The developed product has potential as a sustainable, health-oriented alternative in the growing plant-based food market.

Keywords: *Plant-based nuggets, Meat analogue, Sensory evaluation, Proximate analysis.*

BSPP21

FORMULATION AND EVALUATION OF NO GRAIN FIBROUS JACK FRUIT NOODLES

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ABSTRACT

The increasing prevalence of gluten intolerance, metabolic disorders, and lifestyle-associated diseases has intensified the need for low-glycaemic, high-fibre functional foods. This study investigates the development and characterization of grain-free noodles formulated from green jackfruit (*Artocarpus heterophyllus*) flour.

Unripe jackfruit, rich in dietary fibre and resistant starch, was processed into flour through blanching, controlled dehydration ($\leq 60^{\circ}\text{C}$), milling, and sieving. Noodle formulations were standardized using varying concentrations of hydrocolloid binders to optimize dough rheology and extrusion stability. The developed products were evaluated for proximate composition (moisture, protein, fat, ash, and carbohydrate), total dietary fibre (enzymatic-gravimetric method), and resistant starch content. Functional properties including water absorption index, cooking loss, swelling power, and texture profile analysis (hardness, cohesiveness, elasticity) were determined. In vitro starch digestibility assays were conducted to estimate predicted glycaemic index (pGI). Microstructural characteristics were assessed to understand starch-fibre interactions influencing product quality. Sensory evaluation was performed using a 9-point hedonic scale with semi-trained panellists, and statistical analysis was conducted using one-way ANOVA ($p < 0.05$). Results are anticipated to demonstrate significantly elevated total dietary fibre and resistant starch levels compared to conventional wheat noodles, accompanied by reduced predicted glycaemic response. Optimized formulations are expected to exhibit acceptable cooking quality, minimal solid loss, and favourable sensory scores. The study establishes green jackfruit flour as a viable non-cereal functional ingredient for gluten-free noodle production, supporting sustainable utilization of tropical horticultural resources and expanding health-oriented food product innovations.

Keywords: *Unripe jackfruit, Grain free noodles, proximate composition, Sensory evaluation.*

BSPP22

FORMULATION OF CRACKERS USING SOLANUM TORVUM FOR ITS ANTIDIABETIC EFFECT

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ABSTRACT

Solanum torvum, commonly known as Turkey berry, Sundakkai (Tamil), Katakari, or wild eggplant, is a small perennial shrub belonging to the Solanaceae (nightshade) family. It thrives in tropical and subtropical regions, including India, Southeast Asia, Africa, and the Caribbean, producing small green berries valued as a vegetable and medicinal ingredient. Turkey berry is nutrient-dense, offering iron, dietary fiber, antioxidants (polyphenols, flavonoids), vitamins (A, C, B-complex), and bioactive compounds like solasodine and torvosides, which confer anti-inflammatory, antimicrobial, antidiabetic, and digestive health benefits. Traditionally used in Ayurvedic and folk medicine for anemia, infections, and gut wellness, it holds promise for functional foods targeting public health challenges. The objectives of the present study were to formulate crackers incorporated with *Solanum torvum* flour and to evaluate their sensory characteristics and potential

antidiabetic benefits. To provide nutrition education for teenagers who often face iron deficiency, poor dietary habits, and rising diabetes risk, this study developed crackers in four variations: V0, V1 (5g self-cleaned, shade-dried, powdered *Solanum torvum* per 1 cup flour batch), V2 (10g), and V3 (15g). The objectives of the present study were to formulate crackers incorporated with *Solanum torvum* flour and to evaluate their sensory characteristics and potential antidiabetic benefits. The formulation involved blending wheat flour, turkey berry powder, salt, cumin powder, black pepper, oil, and water into a firm dough, which was rolled thin (2-3 mm), cut into shapes, pricked, and baked at 180°C for 12-15 minutes until crisp. Sensory evaluation was conducted using a nine-point hedonic scale by 30 teenage panelists, assessing color, flavor, taste, texture (crispness), and overall acceptability. V2 achieved the highest scores, striking an optimal balance between mild berry tang, enhanced nutrient profile, and teen-friendly palatability, while V3 showed slightly lower acceptability due to bitterness despite superior iron content. These findings support *Solanum torvum*-fortified crackers as a natural, cost-effective, shelf-stable snack, ideal for school-based nutrition education in resource-limited settings like Tamil Nadu. Incorporating such functional foods into daily diets can promote preventive health, boosting iron for anemia, fiber for digestion, and antioxidants for diabetes management among youth.

Keywords: *Solanum torvum*, anti-diabetic, Turkey berry, functional foods.

BSPP23

FORMULATION OF PULKA USING CYAMOPSIS TETRAGONOLOBA FOR ITS ANTIDIABETIC EFFECT

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ABSTRACT

Cyamopsis tetragonoloba (L.) Taub., commonly known as cluster bean or guar, is a drought-tolerant annual legume belonging to the family Fabaceae. It is widely cultivated in arid and semi-arid regions of India due to its adaptability to harsh climatic conditions and minimal input requirements. Nutritionally, cluster bean is rich in dietary fiber, galactomannan, protein, vitamins, and essential minerals, which contribute to its functional and therapeutic properties. The presence of soluble fiber, particularly galactomannan, plays a significant role in glycemic control by delaying gastric emptying and reducing postprandial blood glucose levels. The objectives of the present study were to formulate chappathi incorporated with *Cyamopsis tetragonoloba* flour and to evaluate their sensory characteristics and potential antidiabetic benefits. The *Cyamopsis tetragonoloba* sample was procured from the local market, cleaned, dried, powdered, and stored in an air-tight container for further product development. Wheat flour with cluster bean powder in nine

different variations from 5gm to 30gm of incorporation. Sensory evaluation was conducted using a nine-point hedonic scale to assess color, appearance, texture, flavor, taste, and overall acceptability. The findings suggest that incorporation of *Cyamopsis tetragonoloba* at 5g level enhances the nutritional quality of chapathi without compromising sensory attributes. Among all variations 5g incorporation showed the highest mean sensory scores and was found to be highly acceptable compared to other formulations. Higher levels of incorporation slightly affected texture and taste due to increased fiber content. Therefore, the present study conclude that V2 formulation can be recommended as a functional food product with potential antidiabetic benefits and suitability for dietary management of diabetes mellitus.

Keywords: *Cyamopsis tetragonoloba*, anti-diabetic, Pulka, functional foods.

BSPP24

FORMULATION OF NANO ENCAPSULATED PROBIOTICS FOR GUT HEALTH

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ABSTRACT

Probiotics are a strong candidate for possible antibacterial and antioxidant agents. The encapsulation of the probiotics on nanoparticles or other support is a well-known method for the safe delivery of the probiotics. *Lactobacillus Rhamnosus* is found in fermented foods like yogurt, kefir, sauerkraut, kimchi. And sourdough bread and is also a common. nanoencapsulation of *L.rhamnosus* involves ensure their survival through harsh conditions of the gastrointestinal tract. Methods of nanoencapsulated include layer-by-layer assembly, emulsion techniques, electrospinning. *L.rhamnosus* adheres to the intestinal walls thus preventing pathogen. The probiotics promoting the expression and assembly of tight junction proteins (like Zo-1 and occludin) between epithelial cells which reduces gut permeability (leaky gut). they help Balance the hosts immune response by suppressing pro-inflammatory cytokines (e.g IL-6) and promoting anti-inflammatory mediators (e.g il-10) *L.rhamnosus* produce short chain fatty acids such as butyrate. The nano Encapsulation can include antioxidant materials (like tannic acid) that Scavenge reactive oxygen species (ROS), protecting both the host cells and probiotics. *L rhamnosus* provides improved barrier function, anti-inflammatory effects, microbial balance, treatment of gut disorders, SCFA production. Supports the gut brain axis by modulating the gut microbiota, producing Beneficial metabolites. Reducing inflammation and affecting neurotransmitter Pathways.

Keywords: ROS, Leaky gut, pro-inflammatory, anti - inflammatory, SCFA, affecting neurotransmitter.

BSPP25

MODULATING THE ORAL MICROBIOME WITH HERBAL MOUTHWASH: A PILOT STUDY

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ABSTRACT

The oral microbiome plays a vital role in maintaining oral health, and its imbalance is associated with dental caries, gingivitis, and periodontal diseases. This pilot study investigates the potential of a herbal mouthwash to modulate the oral microbiome and improve oral hygiene. The formulation was prepared using plant-based extracts known for their antimicrobial and anti-inflammatory properties, including *Azadirachta indica*, *Ocimum sanctum*, and *Syzygium aromaticum*. Participants were instructed to use the herbal mouthwash twice daily for two weeks. Salivary samples were collected before and after intervention to assess microbial load and diversity using standard culture-based methods. Results demonstrated a reduction in pathogenic bacterial count without significantly disturbing beneficial oral flora. Participants also reported improvement in breath freshness and gingival health. The findings suggest that herbal mouthwash may serve as a safe, natural alternative for maintaining oral microbial balance, warranting further large-scale clinical studies.

Keywords: *Oral microbiome, Herbal mouthwash, Microbial modulation, Antimicrobial activity*

BSPP26

EXTRACTION AND APPLICATION OF COCOS NUCIFERA-DERIVED POLYPHENOLIC ANTIOXIDANT EDIBLE COATING FOR SHELF-LIFE ENHANCEMENT OF BREAD

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ABSTRACT

Food spoilage, particularly fungal growth and staling in bakery products, remains a significant challenge in the food industry. This study investigates the potential of utilizing coconut (*Cocos nucifera*) husk powder as a sustainable source of natural polyphenolic antioxidants to develop an active edible coating for bread. The methodology focuses on a green, aqueous extraction process using a magnetic stirrer-assisted technique. To enhance the concentration of bioactive compounds, a sequential extraction was performed at 50°C, followed by stabilization with 10% maltodextrin. The resulting extract was subjected to lyophilization (freeze-drying) to

obtain a high-potency antioxidant powder. The edible coating was formulated by incorporating the freeze-dried coconut husk extract into a biopolymer matrix consisting of sodium alginate and glycerol. Freshly baked bread samples were treated with the coating using a dipping method and subsequently air-dried to form a protective thin-film barrier. As part of the comparative study, both coated and uncoated (control) samples were evaluated for microbial growth and fungal proliferation under ambient storage conditions. The efficacy of the coating was further assessed based on its ability to inhibit lipid oxidation over a 15-day storage period. Preliminary results revealed that the *Cocos nucifera*-derived edible coating significantly reduced moisture loss and delayed the onset of visible fungal growth compared to uncoated control samples. Microbial analysis demonstrated a marked reduction in colony-forming units (CFU) in the coated bread, confirming the antimicrobial activity of the coconut husk extract. The presence of high levels of tannins and flavonoids contributed to enhanced oxidative and microbial stability. This study highlights the potential of valorizing coconut husk waste into a functional, eco-friendly, and chemical-free edible coating, offering an effective alternative to synthetic preservatives for extending the shelf-life and maintaining the quality of bread.

Keywords: *Cocos nucifera*, Coconut husk powder, Edible coating, Bread preservation, Freeze-drying, Microbial growth analysis, Comparative study.

BSPP27

DEVELOPMENT OF A FUNCTIONAL SNACK: BITTER GOURD INCORPORATED RAGI LADDU FOR CHILD NUTRITION

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ABSTRACT

Child malnutrition and micronutrient deficiency remain major public health challenges due to inadequate intake of calcium, iron, vitamin-C and gut-supporting nutrients in daily diets. This study aimed to develop a functional traditional snack by incorporating bitter gourd powder into malted ragi laddu mix and to evaluate its nutritional, probiotic and sensory characteristics for child nutrition. Bitter gourd was selected for its high vitamin-C and bioactive compounds supporting immunity and glucose regulation, while ragi was chosen as a calcium-rich millet promoting growth and bone development. Different formulations were standardized and debittering treatments were applied to reduce bitterness without destroying phytochemicals. Sensory evaluation indicated good acceptability with a healthy taste perception. Nutritional analysis revealed increased fiber, protein and mineral content with reduced carbohydrate density, making the product suitable for children and metabolic health. Vitamin-C from bitter gourd enhances iron absorption from ragi

creating a synergistic nutritional effect. Malting and fermentation of ragi promoted lactic acid bacteria providing probiotic benefits including improved digestion, enhanced immunity and better nutrient absorption. The combination of millet minerals, vegetable antioxidants and probiotic activity converts the product into a nutraceutical functional food rather than a conventional sweet. The study concludes that bitter melon incorporated ragi laddu mix is a cost-effective, culturally acceptable supplementary snack that can address micronutrient deficiency, improve gut health and support immunity, and it has strong potential for school nutrition programs and preventive child healthcare diets.

Keywords: *Functional food, Child nutrition, Probiotic millet snack, Vitamin-C enriched ragi product.*

AHPP01

INNOVATIVE STRATEGIES AND TRENDS IN COMMERCE NAVIGATING THE FUTURE OF BUSINESS PRACTICES

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ABSTRACT

The global business geography is witnessing significant metamorphoses driven by technological advancements, evolving consumer behaviour, and changing request dynamics. This exploration paper explores crucial arising trends similar as artificial intelligence (AI), blockchain technology, omnichannel merchandising, and sustainable business practices. also, it delves into innovative strategies that businesses are espousing to maintain competitiveness, including digital metamorphosis, personalization, data- driven decision- timber, and nimble business models. Through a comprehensive analysis of recent developments, scholarly perceptivity, and assiduity case studies, this paper provides a forward- looking perspective on how businesses can acclimatize and thrive in an ever- changing marketable terrain. The paper also highlights the challenges and openings businesses face in enforcing these strategies and suggests areas for unborn exploration, particularly concerning ethical, nonsupervisory, and pool counteraccusations. In doing so, it emphasizes the significance of leadership, collaboration, and a visionary mindset in steering associations toward flexible and responsible growth in the digital age.

Keywords: *Artificial Intelligence, Blockchain, Omnichannel Retailing, Sustainability.*

AHPP02

ROLE OF MICROFINANCE IN WOMEN EMPOWERMENT IN MADURAI DISTRICT

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ABSTRACT

Microfinance has emerged as a critical tool for poverty reduction and women's empowerment in India. It offers small loans, savings accounts, and financial services to low-income women who do not have access to traditional banking institutions. The current study looks at how microfinance might help empower women in Madurai District. The study is descriptive in nature and is based on primary data collected from 50 female beneficiaries using a standardized questionnaire. Convenience sampling was utilized. Percentage analysis was used to interpret the data. The data show that microfinance considerably improves women's economic independence, decision-making power, saving habits, and social confidence. However, issues such as repayment pressure and limited financial knowledge persist. The study concludes that microfinance plays a vital role in enhancing women empowerment in Madurai District.

Keywords: *Microfinance, Women Empowerment, Self-Help Groups, Financial Inclusion, Economic Independence.*

AHPP03

CUSTOMER SATISFACTION AND SERVICE QUALITY IN ONLINE RETAILING IN MADURAI DISTRICT

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ABSTRACT

The rapid expansion of online shopping has had a substantial impact on consumer purchasing behavior in India. This study investigates customer satisfaction and service quality in internet retailing among Madurai District residents.

The study uses an analytical research design and is based on primary data acquired from 50 online shoppers using a structured questionnaire. The convenience sampling strategy was applied. The data were interpreted using percentage and mean score analyses. According to the report, the most important factors influencing consumer satisfaction are delivery efficiency, product quality, and return policies. The data indicate that improving service quality parameters boosts consumer loyalty and long-term viability of online retail platforms.

Keywords: *Customer Satisfaction, Service Quality, Online Retailing, E-Commerce.*

AHPP04

A STUDY ON THE IMPACT OF SOCIAL MEDIA MARKETING ON CONSUMER BUYING BEHAVIOUR IN MADURAI CITY

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ABSTRACT

The rapid expansion of social media platforms has significantly transformed the marketing landscape across the globe. Businesses are increasingly utilizing digital platforms to influence consumer attitudes and purchasing decisions. This study examines the impact of social media marketing on consumer buying behaviour in Madurai City. The research is based on primary data collected from 50 respondents through a structured questionnaire and supported by secondary data from journals, reports, and articles. Analytical tools such as percentage analysis, Likert's five-point scale, ranking analysis, and Chi-square test were used for interpretation. The findings reveal that social media marketing plays a vital role in shaping consumer awareness, interest, and final purchase decisions. Platforms such as Instagram, YouTube, and Facebook were found to have a strong influence on young consumers. The study also identifies that promotional offers, influencer recommendations, and online reviews significantly affect buying behaviour. The Chi-square test confirms a significant relationship between age and influence of social media advertisements. The research concludes that social media marketing has become an essential promotional tool for businesses in Madurai City, especially in influencing the younger demographic. Effective content strategies and customer engagement are key determinants of success in digital marketing campaigns.

Keywords: Social Media Marketing, Customer Engagement, Madurai City

MCSP01

FAC-BUDDY AI - AI and CYBER TECHNOLOGIES

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ABSTRACT

Faculty members in American college higher education are facing increasing professional pressure from heavy teaching loads, administrative reporting, accreditation demands, constant digital communication, and performance evaluations. These cumulative responsibilities often lead to mental fatigue, reduced teaching effectiveness, and rising professional stress.

This study introduces Fac-buddy AI-Faculty website, a secure, institution-based AI digital copilot designed exclusively for faculty members. Unlike external platforms, the system operates entirely within a single institutional web domain, ensuring full data sovereignty and confidentiality. Fac-buddy integrates advanced natural language processing, predictive analytics, and secure computing to automate high-frequency academic tasks. Key features include real-time lecture capture and summarization, intelligent attendance tracking, AI-assisted grading with rubric-based feedback, automated academic reporting, and predictive course performance insights.

A built-in workload intelligence engine analyses grading volume, communication patterns, scheduling demands, and administrative commitments to provide adaptive recommendations that help reduce burnout. The platform also incorporates an academic integrity module using behavioural pattern analysis to detect anomalies in student submissions without relying on third-party tools.

Designed with end-to-end encryption, zero-trust access control, and secure institutional infrastructure, Fac-buddy AI-Faculty offers a comprehensive, faculty-centered solution that enhances productivity, protects data, and supports sustainable academic performance in higher education.

MCSP02

ETHICS IN AI-POWERED LEARNING ENVIRONMENTS: CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Artificial Intelligence (AI) is rapidly transforming education by enabling intelligent tutoring systems, adaptive learning platforms, and automated assessment tools. These technologies enhance learning efficiency, personalization, and accessibility. However, the widespread adoption of AI in education introduces significant ethical challenges that must be addressed to ensure responsible use. This paper investigates key ethical concerns in AI-powered learning environments, including algorithmic bias, data privacy, lack of transparency, and accountability issues. It further examines the impact of these challenges on students, educators, and institutions. The study proposes mitigation strategies such as explainable AI, robust data governance, bias reduction techniques, and human-in-the-loop approaches. Finally, future directions are discussed to promote the development of fair, transparent, and trustworthy AI systems in education.

Keywords: *Artificial Intelligence, AI in Education, Ethics, Algorithmic Bias, Data Privacy, Explainable AI, Responsible AI*

MCSPP03

A COMPARATIVE STUDY OF BFS AND DFS ALGORITHMS - PERFORMANCE ANALYSIS AND APPLICATIONS

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ABSTRACT

Graph traversal algorithms sit at the heart of countless computational systems we rely on every day – from finding the fastest route on a GPS to crawling the web, analysing social networks, and solving shortest path problems. Among the many algorithms that exist for this purpose, some of the most well-known include Breadth First Search, Depth First Search, Dijkstra's algorithm, Minimum Spanning Tree, Kruskal's algorithm, and Bellman-Ford. Two of these stand out as particularly foundational: Breadth First Search (BFS) and Depth First Search (DFS). Both are widely used across computer science and artificial intelligence, and while they share the same goal of exploring graph structures, they go about it in very different ways – each with its own behaviour, strengths, and trade-offs.

This paper takes a closer look at how BFS and DFS actually work, and how they perform across a range of real-world applications. We examine key performance metrics like time complexity and space complexity, and explore how each algorithm holds up against different types of problems. We also walk through the output sequences produced by each approach to make their differences more concrete and easier to understand. Ultimately, the goal of this study is to give practitioners a clearer picture of what each algorithm does well and where it falls short – so they can make more confident, informed choices when deciding which search strategy best fits the problem they're trying to solve.

MCSPP04

BLOCKCHAIN-INTEGRATED BILSTM AND TABNET FRAMEWORK FOR SMART CROP PREDICTION AND PRECISION FERTILIZER RECOMMENDATION

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ABSTRACT

Sustainable agricultural productivity is essential to ensure food security and advancing Sustainable Development Goals (Zero Hunger).

Existing smart agriculture models often lack in secure data governance, temporal robustness, interpretability in structured soil datasets. Large-scale adoption of conventional machine learning techniques is limited by their yield prediction RMSE values of 8.5-12.3 quintals/hectare, crop classification accuracies of 82-90% and fertilizer recommendation R² score below 0.85.

This study proposes a multi-layer deep learning architecture comprises data acquisition, predictive modeling, decision fusion and block chain security layers. for precise fertilizer recommendation and accurate crop prediction that is integrated with blockchain technology. The proposed architecture consists of an input layer receiving soil input which is obtained from the soil lab, Tamilnadu, India. A Bidirectional Long Short - Term Memory (BiLSTM) network layer captures bidirectional temporal dependencies in multi-season climatic and historical yield data for robust crop yield forecasting. TabNet uses its sequential attention mechanism to process structured soil laboratory datasets, such as N, P, K, pH, electrical conductivity, organic carbon, micro and macro nutrients for interpretable crop suitability classification and multi output fertilizer dosage regression.

Model training includes feature normalization, k-fold cross validation and Bayesian hyperparameter optimization. Experimental results demonstrated that crop classification accuracy of 94-96 %, RMSE for yield prediction is 18-22% lower than the Random Forest baselines and fertilizer recommendation R² values of 0.91-0.93.

Less than 6% computational overhead is ensured by a private blockchain layer with smart contracts guarantees that the tamper-proof storage of soil reports and prediction outputs.

The proposed framework delivers a secure, innovative, interpretable and impact-driven smart agriculture solution to promote sustainable nutrient management, productivity and transparent data governance.

Keywords: *Smart Agriculture, BiLSTM, TabNet, Blockchain Technology, Crop Yield Prediction, Precision Fertilizer Recommendation, Sustainable Farming.*

PSYPP01

POST-DIGITAL COGNITIVE AFTERTASTE IN YOUNG ADULTS (18-25)

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ABSTRACT

Gen Z, a rapidly expanding population raised within the digital era, presents an important group for examining how continuous interaction with social media, short-form video platforms, messaging systems, and multitasking digital tools leaves lasting cognitive imprints. The World Health Organization's 2025 policy brief on digital determinants of youth mental health highlights that digital environments shape young people's well-being in complex ways and call for evidence-informed approaches to mitigate negative psychological impacts. This underscores the relevance of examining cognitive aftertaste, the lingering cognitive effects after digital use to inform psychological understanding and promote healthier digital engagement. The study adopted a mixed-method exploratory design, integrating quantitative factor analysis with grounded theory informed conceptual development. The sample size could be 100 consisting of young adults aged 18 - 25 years. This age group was selected due to their high exposure to digital interfaces, including social media, short-form video platforms, messaging applications, and multitasking academic or work tools. Exploratory Factor Analysis will be conducted to identify underlying dimensions of cognitive aftertaste, which will then be conceptually integrated into a preliminary framework using grounded theory informed principles.

It is anticipated that the analysis may reveal experiential dimensions related to lingering cognitive activation following digital engagement. This study bridges psychology and user experience research, offering implications for humane interface design, digital well-being, and psychological approaches to cognitive recovery among Gen Z.

Keywords: *cognitive aftertaste, Gen Z, digital wellbeing, mental replay, digital interface*

PSYPP02

DIGITAL MENTAL HEALTH APPLICATION USAGE AND PERCEIVED STRESS AMONG COLLEGE STUDENTS: A DESCRIPTIVE SURVEY STUDY

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ABSTRACT

Stress has become a common issue among college students due to academic pressure, social changes, and expectations about future careers. At the same time, many students are turning to digital mental health applications such as meditation apps, mood-tracking tools, and stress management platforms to cope with their emotional difficulties. These applications are easily accessible and provide private support, which makes them popular among young adults. This study aims to understand how college students use digital mental health applications and to examine whether there is any relationship between app usage and their perceived stress levels. This study will follow a descriptive survey design. Around 50 undergraduate students will be selected using convenience sampling. Data will be collected using the Perceived Stress Scale (PSS-10) along with a structured questionnaire prepared to assess how often students use mental health apps, how much time they spend on them, and for what purposes they use them. The collected data will be analyzed using descriptive statistics such as mean and percentage. Pearson's correlation will also be used to examine the relationship between digital mental health app usage and perceived stress levels. The findings of this study are expected to provide a better understanding of whether the use of digital mental health applications is linked to changes in stress levels among college students. The study may also contribute to the growing discussion on how technology can support mental health and student well-being in higher education.

Keywords: *Digital mental health applications, Perceived stress, College students, Psychological well-being, Technology-based support*

**SCREENING FOR THERAPEUTIC POTENTIALS AND
ANTIPROLIFERATIVE ACTIVITY OF METHANOLIC EXTRACT OF
TECOMA STANS AGAINST LUNG CANCER CELL LINE (A549)**

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Tecoma stans, commonly known as yellow trumpetbush, is a medicinal plant widely distributed in tropical and subtropical regions and traditionally used for the management of diabetes and inflammatory disorders. The leaves of *Tecoma stans* were evaluated for their antidiabetic, antimicrobial, antioxidant, and anticancer potential using various in vitro assays. Methanolic extracts were prepared by Soxhlet and percolation methods. Preliminary phytochemical screening confirmed the presence of alkaloids, flavonoids, phenols, tannins, and steroids, which contribute to its biological activities. Antidiabetic activity was assessed using an α -glucosidase inhibition assay, demonstrating promising hypoglycemic potential. Antioxidant activity was determined by DPPH free radical scavenging assay, showing concentration-dependent radical inhibition. Antimicrobial activity was tested against *Staphylococcus aureus* and *Escherichia coli*, where both crude extracts and biosynthesized silver nanoparticles (AgNPs) exhibited significant inhibitory effects, with maximum inhibition observed against *Escherichia coli* by AgNPs. The biosynthesis of silver nanoparticles using aqueous leaf extract provided an eco-friendly and cost-effective approach. Characterization of the extract and nanoparticles was performed using FTIR and UV-Visible spectroscopy. Cytotoxic activity was evaluated by MTT assay against A549 lung cancer cell lines, revealing significant anticancer potential. The findings suggest that *Tecoma stans* leaf extract and its synthesized nanoparticles possess promising pharmacological properties and may serve as potential candidates for future biomedical and therapeutic applications.

Keywords: *Tecoma stans*, phytochemical screening, α -glucosidase inhibition, antioxidant activity, antimicrobial activity, silver nanoparticles, anticancer activity, A549 cell line.

EXPERIMENTAL AND AGENT-BASED MODELING OF SOIL PERCOLATION USING NETLOGO

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Based on experiments, it was observed that the percolation rate of water in soils depends on parameters such as soil type, particle size, pore structure, and particle packing. Experimental analysis of percolation was carried out for clay, sandy clay, and sandy clay loam from Kaveri delta basin, laboratory under specific boundary conditions. With only a limited number of trials performed, the results varied significantly across trials, showing no consistent trend for each soil type. To address the limitations of conducting a large number of physical trials, agent-based modelling (ABM) simulations using NetLogo software. The different soil types were modelled as different particle sizes. The simulations showed that results still varied significantly across trials. Histograms of wet percentage indicate varied distributions types for each soil type depending on their percolation threshold. The results of ABM help in understanding the inconsistent experimental results, establishing the need for a much larger sample size for experiments in soil percolation.

Keywords: *Soil, Clay, Software, Logo*

AHOP96

Managerial Empowerment, Governance Structure, and Working Capital Efficiency in Middle East Manufacturing Firms

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Abstract

This study's goal is to assess how a manufacturing company's working capital structure influences the relationships between the management team, audit committee, and board composition. The study offers novel insights by focusing on the unexplored moderating role of working capital management, in line with the MoA. The study introduces a paradigm rarely discussed in the literature by introducing dynamic elements into the working capital cycle, primarily in relation to developing Middle Eastern nations. Panel data from 35 publicly traded businesses in the Middle East Market are used in the study; however, the Dubai Stock Exchange, Abu Dhabi Stock Market, Saudi Arabia Market, Bahrain Market, Kuwait Market, and Oman Market will be used for sample purposes. The study spans the years 2018–2024. The corporate governance report that is published on the stock market site will give

managerial empowerment and governance structure within the organization. Additionally, the study uses a fixed-effects model as its primary methodology to confirm that the main conclusions are robust. The financial structure is positively and significantly impacted by audit committee characteristics, including size, efficacy, and audit quality. Furthermore, the favorable effects of the audit committee and board composition are reinforced by their interaction with the cash conversion cycle.
Keywords: Working Capital, Financial Performance, Governance Structure, Middle East.

BSPP28

STANDARDIZATION, DEVELOPMENT AND EVALUATION OF ORGANIC ELECTROLYTE POWDER ENRICHED WITH VITAMIN C.

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Abstract

Electrolytes are essential for maintaining fluid balance, muscle function, and overall physiological health, especially during physical activity, heat exposure, and dehydration. Many commercial electrolyte products contain artificial additives and high sugar levels, raising concerns among health-conscious consumers. Growing interest in clean-label and natural functional foods has created the need for plant-based electrolyte alternatives.

Natural ingredients such as tender coconut water, lemon, and amla provide electrolytes, vitamin C, and antioxidants, while monk fruit serves as a non-caloric natural sweetener. Tapioca starch can improve powder flow ability and prevent moisture-induced caking. Therefore, the development of an organic, vitamin C-enriched electrolyte powder using natural ingredients offers a healthier hydration alternative.

Keywords: *Organic electrolyte powder; Vitamin C enrichment; Tender coconut water powder; Amla powder; Lemon extract; Pink salt; Monk fruit sweetener; Tapioca starch; Anti-caking agent; Functional hydration*

When the World Sleeps, Who Cares for Them? Sleep Quality and Emotional Well-Being Among Night-Shift Nurses in Tirunelveli District, Tamil Nadu

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Abstract

Night-shift nursing is a global occupational reality that places nurses at heightened risk of sleep disruption and psychological distress. Despite growing awareness of occupational health challenges, the intersection of sleep quality and emotional well-being among night-shift nurses remains insufficiently addressed, particularly in the Indian context. This paper presents a mixed-methods study, primarily quantitative in orientation, examining sleep quality and emotional well-being among 50 night-shift nurses in Tirunelveli District, Tamil Nadu, India. Using validated structured questionnaires and thematic analysis of self-reported experiential accounts, the study explores sleep deprivation, emotional exhaustion, work-life conflict, and institutional inadequacy. Findings reveal that disrupted circadian rhythms, family responsibilities, and insufficient hospital support converge to create a persistent cycle of poor sleep and emotional deterioration. Participants reported significant fatigue, anxiety, and diminished personal well-being, reflecting the broader psychosocial toll of sustained night-shift work. The paper argues that addressing this issue requires not merely logistical adjustments but a fundamental reimagining of how healthcare institutions understand and respond to the psychosocial needs of their nursing workforce. Recommendations for nursing administration, hospital policy, and occupational social work intervention are discussed.

Keywords: *sleep quality, emotional well-being, night-shift nurses, circadian disruption, occupational stress*

In vitro selection and somaclonal variation as tool for abiotic stress tolerance in crop plants

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ABSTRACT

The accelerating impacts of climate change manifested as increased drought, salinity, and temperature extremes pose significant threats to global agricultural productivity and food security. Traditional breeding approaches, while essential, often struggle to keep pace with the complex and evolving nature of abiotic stress tolerance in crops. Plant tissue culture, particularly *in vitro* selection and the exploitation of somaclonal variation, offers a powerful alternative to rapidly generate and screen stress-tolerant variants under controlled conditions. Recent studies have demonstrated the successful application of *in vitro* somaclonal variation to obtain drought and salinity tolerant lines in leafy vegetables and cereals, such as water spinach and rice, under stress treatments with mannitol and NaCl, respectively, with promising regeneration outcomes. By imposing controlled abiotic stresses on callus cultures and selecting regenerants with improved survival and physiological traits, researchers can identify candidate lines with superior performance under drought and salt stress. Integrating molecular screening tools further refines the selection process, enhancing precision in identifying stress-responsive genotypes. Synthesizing tissue culture protocols with emerging genomic and phenotyping technologies can accelerate the development of climate-adapted crop varieties tailored to specific agroecosystems, bridging laboratory and field applications. The societal implications are substantial: deploying climate-resilient cultivars will bolster food production stability for vulnerable smallholder farmers, reduce dependency on irrigation and chemical inputs, and contribute to sustainable agricultural intensification. This research aligns with SDG 2 (Zero Hunger) and SDG 13 (Climate Action) by strengthening agricultural resilience and enhancing food security in the face of climatic uncertainty.

Keywords: *Climate resilient crops, Soma-clonal variations, Sustainable agriculture, SDGs.*

Development Of a Plant-Based Frozen BBQ Filling From Unripe Jackfruit (*Artocarpus Heterophyllus*)

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ABSTRACT

The growing demand for plant-based and convenience foods has increased interest in underutilized tropical crops such as unripe jackfruit (*Artocarpus heterophyllus*), which possesses a naturally fibrous texture suitable for use as a meat analogue. This study aimed to develop a frozen, ready-to-use unripe jackfruit-based barbecue (BBQ) filling and to evaluate the effectiveness of vacuum packaging in preserving product quality and safety during frozen storage. Fresh unripe jackfruit bulbs were processed, marinated with standardized BBQ seasoning, thermally treated, vacuum packaged, and stored at $-18\text{ }^{\circ}\text{C}$. Product quality was assessed periodically through physicochemical analysis, microbiological evaluation, and sensory assessment, with non-vacuum-packaged samples serving as controls. The results indicated that vacuum packaging significantly reduced oxidative deterioration and freezer burn, while effectively maintaining texture, flavor, and overall sensory acceptability throughout frozen storage. Microbiological analysis confirmed that vacuum-packaged samples remained within acceptable safety limits during the entire storage period. In contrast, nonvacuum- packaged samples showed greater quality degradation over time. The findings demonstrate that vacuum packaging is an effective preservation technique for frozen unripe jackfruit BBQ filling, enhancing shelf life and maintaining product quality. This study highlights the commercial feasibility and sustainability of vacuum-packaged frozen unripe jackfruit-based BBQ fillings as a novel plant-based convenience food with strong potential in the frozen food industry.

KEYWORDS: *Unripe jackfruit (Artocarpus heterophyllus); Plant-based meat analogue; Frozen convenience foods; Vacuum packaging; Quality evaluation; Shelf-life stability*



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