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ICCET 2026

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CORRESPONDENT's MESSAGE

It gives me immense pleasure to extend my warm greetings on the occasion of releasing the Souvenir of the International Conference on Cognitive Informatics, Engineering and Technology.

A souvenir serves as a valuable record of the collective knowledge, research contributions, and scholarly efforts presented during the conference. It reflects the intellectual richness and collaborative spirit of the participants, bringing together innovative ideas and advancements in the interdisciplinary domains of cognitive informatics, engineering, and emerging technologies.

In today's knowledge-driven world, the integration of cognitive science with computational and engineering paradigms is shaping the future of intelligent systems and smart solutions. I am confident that this souvenir will stand as a testament to the high-quality research work and will serve as a useful reference for academicians, researchers, and practitioners.

I sincerely appreciate the dedicated efforts of the organizing committee, editors, authors, and reviewers whose contributions have made this publication possible. Their commitment and meticulous work have ensured the success of this endeavor.

I congratulate all the contributors and extend my best wishes for the grand success of the conference. May this souvenir inspire further research, innovation, and collaboration in the years to come.

Best regards,
Dr. T.O. Singaravel, M.Sc., M.Ed., M.Phil., Ph.D.
Correspondent, VVEI

PRINCIPAL's MESSAGE

It is a matter of great pride and privilege to present the Souvenir of the International Conference on Cognitive Informatics, Engineering and Technology.

This souvenir is a reflection of the intellectual contributions, innovative research, and collaborative efforts of scholars, academicians, and industry experts from across the globe. It encapsulates the essence of the conference by bringing together significant findings and emerging trends in the interdisciplinary fields of cognitive informatics, engineering, and advanced technologies.

In an era driven by intelligent systems and digital transformation, the integration of cognitive science with engineering applications plays a pivotal role in shaping the future. The articles and papers compiled in this souvenir stand as a testament to the dedication and scholarly excellence of the contributors, offering valuable insights and directions for future research.

I commend the organizing committee, editors, reviewers, and authors for their tireless efforts in bringing out this publication successfully. Their commitment has ensured that this souvenir will serve as a lasting academic resource and a source of inspiration for researchers and students alike.

I extend my heartfelt congratulations to all those involved and wish the conference every success. May this souvenir continue to inspire innovation, collaboration, and academic growth.

Best regards,
Dr. K. Pooranapriya, B.E., M.E., Ph.D., AMIE., IETE
Principal, VVCET

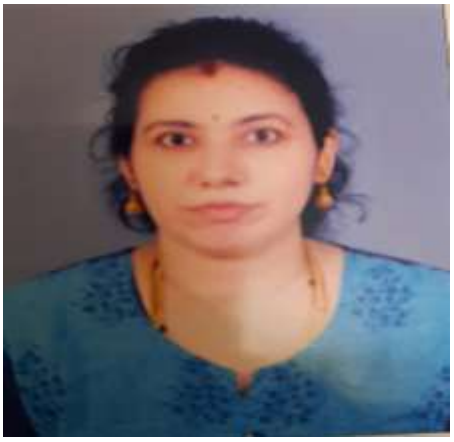
It's an honour for me to be a part of ICCET 2026 - the International Conference on Cognitive Informatics Engineering and Technology a Hybrid Conference organized by Vidyaa Vikas College of Engineering and Technology, Tiruchengode, Tamil Nadu, India. The objective of this conference is to share knowledge, innovative ideas, various streams experiences and innovations in research and academia.

It's our privilege to have eminent personalities across the globe to enlighten and provoke about the advances in engineering and medical sciences.

I believe that this conference will provide valuable, useful and informative ideas to participant students, researchers and other experts.

I convey my best wishes for success of event.

DR. ANTENEH MESFIN YENENEH
ASSOCIATE PROFESSOR
CHEMICAL ENGINEERING
INTERNATIONAL MARITIME COLLEGE OMAN, SOHAR, OMAN



Dear Colleagues and Friends,

It is a great pleasure that VVCET is conducting International Conference on Cognitive Informatics Engineering and Technology 2026 at Tiruchengode, TN.

This international conference aspires to provide a platform for researchers, academicians and other experts to share their views, experience and information on recent advances with colleagues and other working in field of modern technology and trends. I firmly believe that this conference will contribute towards betterment of industrial development, future development and eventually development of nation.

I extend my warm welcome to delegates of conference and I am sure the knowledge shared will propel the growth of new ideas. Finally, I take this opportunity to request you to actively participate to add the richness of this conference and make it memorable event.

I wish this conference a grand success.

DR DEEPTHA R
ASSISTANT PROFESSOR, DEPARTMENT OF IT, CET
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103	ICCETVID260410	IMAGE STEGANOGRAPHY WITH DUAL-LAYER INTEGRITY VERIFICATION USING AES-GCM AND HMAC-SHA3-512
104	ICCETVID260364	MALICIOUS URL DETECTION SYSTEM USING MACHINE LEARNING AND BERT
105	ICCETVID260375	MACHINE LEARNING-BASED ENERGY MANAGEMENT STRATEGY FOR GRID-CONNECTED MICRO GRIDS
106	ICCETVID260330	AGRO-ECOLOGY :AN AI BASED CROP RECOMMENDATION SYSTEM FOR FARMERS
107	ICCETVID260400	UNIFIED DEEPFAKE DETECTION IN MULTIMEDIA CONTENT
108	ICCETVID260356	AN EVIDENTIAL HYBRID DUAL-STREAM FRAMEWORK FOR DIABETIC RETINOPATHY GRADING USING FUNDUS IMAGES
109	ICCETVID260455	HEALTH RISK PROFILING DASHBOARDS FOR PREVENTIVE CARE AND EARLY DISEASE DETECTION
110	ICCETVID260390	GESTROBOT : SMART GESTURE-CONTROLLED OMNIDIRECTIONAL ROBOT WITH OBSTACLE DETECTION AND DYNAMIC PATH PLANNING
111	ICCETVID260465	SKIN LESION CLASSIFICATION WITH EXPLAINABLE AI
112	ICCETVID260440	A COGNITIVE-AWARE MULTIMODAL SCENE INTERPRETATION AND SEMANTIC NARRATION FRAMEWORK FOR ASSISTIVE VISUAL PERCEPTION
113	ICCETVID260308	HARNESSING MULTISENSOR NON-MOTOR BIOMARKERS VIA MACHINE LEARNING FOR EARLY DETECTION AND PROGRESSION MODELING IN PARKINSON'S DISEASE
114	ICCETVID260310	IOT-BASED SMART AQUACULTURE SYSTEM USING SOLAR POWER
115	ICCETVID260387	STOCKS PRICE PREDICTION USING LSTM WITH INTEGRATED FINANCIAL ANALYSIS
116	ICCETVID260355	MITIGATION OF DDOS ATTACK IN CLOUD COMPUTING
117	ICCETVID260442	ECHODRIFT : THE BUTTERFLY EFFECT
118	ICCETVID260478	AGROVET ASSISTANT : A GENERATIVE AI BOT FOR IDENTIFYING AGRICULTURAL AND LIVESTOCK DISEASES
119	ICCETVID260368	SATRI: SATELLITE IMAGE SUPER-RESOLUTION AND CROP HEALTH MONITORING

120	ICCETVID260397	PHYSIOWAVE: WIRELESS HAND RECOVERY-TECH USING HYBRID 1D CNN–BILSTM MODEL FOR INTELLIGENT PHYSIOTHERAPY MONITORING
121	ICCETVID260447	A UNIFIED FRAMEWORK FOR SCALABLE AND SECURE MICROSERVICES DEPLOYMENT USING CI/CD, GITOPS, AND PREDICTIVE AUTOSCALING
122	ICCETVID260682	SMART HEALTHCARE REAL-TIME RISK PREDICTION FOR DIABETES
123	ICCET26619	CONVERSATIONAL AND IMAGE RECOGNITION CHATBOT
124	ICCETVID260423	AN ANONYMOUS AND PRIVACY-PRESERVING FEDERATED LEARNING FRAMEWORK USING RING SIGNATURES AND OBLIVIOUS TRANSFER
125	ICCETVID260499	ECOBRIDGE: AN AGENTIC AI-DRIVEN SUSTAINABLE ITEM MATCHING SYSTEM USING GRADIENT BOOSTING OPTIMIZATION
126	ICCETVID260406	IOT-DRIVEN SMART HOME ENERGY MONITORING, FAULT DETECTION, AND LSTM-BASED ELECTRICITY BILL FORECASTING
127	ICCETVID260479	KERALA EPIDEMIC FORECASTING FRAMEWORKS AND THEIR APPLICABILITY TO REGIONAL HEALTH SURVEILLANCE
128	ICCETVID260407	A MULTIMODAL DEEP NEURAL SPATIO-TEMPORAL CNN GRU FRAMEWORK FOR DYNAMIC SIGN LANGUAGE INTERPRETATION AND AUDIO GENERATION
129	ICCETVID260448	SMART HELMET-LITE: IOT BASED SAFETY HELMET FOR CONSTRUCTION SITE
130	ICCETVID260446	AI-POWERED SYSTEM FOR DETECTING ELDERLY FALL AND HEALTH ANOMALIES IN SMART HOMES
131	ICCETVID260391	REMEDYROOT: LIGHTWEIGHT DEEP LEARNING FOR MEDICINAL PLANT IDENTIFICATION USING LEAF IMAGES
132	ICCETVID260403	REAL-TIME AIR QUALITY MONITORING AND PREDICTION FOR INDUSTRIAL AND URBAN ENVIRONMENTS
133	ICCETVID260463	AUTOMATED RAILWAY TRACK INSPECTION USING COMPUTER VISION AND DEEP LEARNING
134	ICCETVID260405	STEGO IMAGE DETECTION AND REGION MAPPING
135	ICCETVID260435	AUTOMATED BLUE GREEN DEPLOYMENT
136	ICCETVID260591	OPTIMIZED OCR SYSTEM FOR SANSKRIT MANUSCRIPTS WITH CROSS LINGUAL TRANSLATION USING GENERATIVE AI
137	ICCETVID260449	SMART CRIB:AI-POWERED SMART BABY CRIB WITH ANDROID APP
138	ICCETVID260858	EMPLOYEE ATTRITION USING HYBRID MACHINE LEARNING MODELS:
139	ICCETVID260453	LOW-COST AUTONOMOUS ROBOTIC SEEDER FOR PRECISION FARMING
140	ICCETVID260444	DEEP LEARNING FRAMEWORK FOR PEST AND DISEASE DIAGNOSIS WITH PESTICIDE RECOMMENDATIONS
141	ICCETVID260450	SESAURA: A REAL-TIME ACOUSTIC ALERT SYSTEM FOR ASSISTING HEARING-IMPAIRED INDIVIDUALS
142	ICCETVID260546	QUANTUM-ENHANCED PORTFOLIO OPTIMIZATION: A COMPREHENSIVE SURVEY OF HYBRID ALGORITHMS AND IMPLEMENTATION FRAMEWORK

143	ICCETVID260485	ANIMAL INTRUSION DETECTION SYSTEM WITH REAL-TIME VIDEO SURVEILLANCE (AI + COMPUTER VISION)
144	ICCETVID260480	YAALIR: A HYPERLOCAL TRAVEL PLANNER FOR PRESERVING AND PROMOTING TAMIL NADU HERITAGE
145	ICCETVID260481	REAL-TIME AUTOMATED WEIGH BATCHING SYSTEM FOR PLASTERING APPLICATIONS USING LOAD CELLS AND TEENSY 4.1
146	ICCETVID260586	WEB BASED INTERACTIVE QUIZ APPLICATION FOR ACADEMIC EVALUATION
147	ICCETVID260660	RESEARCH AND DEVELOPMENT DIGITAL TWIN FRAMEWORK FOR EEG-BASED DETECTION OF EPILEPSY AND ADHD USING DEEP LEARNING MODELS
148	ICCETVID260587	HCRL-UIE: HYBRID CNN AND REINFORCEMENT LEARNING BASED UNDERWATER IMAGE ENHANCEMENT
149	ICCETVID260454	SPEECHMATE: AN AI-DRIVEN PLATFORM FOR INTEGRATED SPEECH THERAPY MANAGEMENT
150	ICCETVID260665	HYBRID ZIGBEE–WI-FI AD-HOC NETWORK FOR REAL-TIME VICTIM LOCALIZATION AND RESCUE COORDINATION IN POST-DISASTER SCENARIOS
151	ICCETVID260519	SMART PERSONAL FINANCE MANAGEMENT: DESIGN AND EVALUATION OF A CROSS-PLATFORM BUDGETING SYSTEM
152	ICCETVID260594	SEAF: A SMART FRAMEWORK FOR SOCIAL ENGINEERING ATTACKS
153	ICCETVID260601	STUDY BUDDY: AN AI-POWERED MULTIMODAL STUDY ASSISTANT FOR AUTOMATED GENERATION OF PERSONALIZED LEARNING MATERIALS
154	ICCETVID2601104	AI-POWERED REAL-TIME SIGN LANGUAGE DETECTION AND TRANSLATOR USING DEEP LEARNING
155	ICCETVID260798	A HYBRID CNN-QUANTUM FRAMEWORK FOR AUTOMATED MALIGNANCY DETECTION IN LYMPH NODE HISTOPATHOLOGY PATCHES
156	ICCETVID260567	FINMATE: AN INTELLIGENT PERSONAL FINANCE MANAGEMENT PLATFORM USING NLP-BASED FINANCIAL ASSISTANCE AND SPENDING ANALYTICS
157	ICCETVID260593	AN ENSEMBLE LEARNING FRAMEWORK FOR ENHANCED CERVICAL CANCER DETECTION USING PAP SMEAR IMAGES
158	ICCETVID260603	EVALMODEL: A HYBRID META-EVALUATOR FOR MACHINE LEARNING MODELS WITH LLM MENTOR
159	ICCETVID260940	DESIGN AND IMPLEMENTATION OF A LIGHTWEIGHT MINI-SOAR FRAMEWORK FOR AUTOMATED CYBER INCIDENT RESPONSE
160	ICCETVID260654	PERSONALIZED HEALTHCARE AI ADVISOR: AROGYAM.AI
161	ICCET261130	HYBRID MACHINE LEARNING FOR INTELLIGENT THREAT DETECTION
162	ICCETVID2601108	AD CLICK FRAUD DETECTION BASED ON PREDICTIVE MODELLING
163	ICCETVID2601097	DISTRIBUTED PATTERN EMERGENCE DETECTION IN HUMAN-CENTRIC HEALTH DATA STREAMS
164	ICCETVID260670	SOLGEN: AN AUTOMATIC CLEANING ROBOT FOR SOLAR PANELS
165	ICCETVID260690	KNITINSPECT: REAL-TIME KNITTING ANOMALY DETECTION POWERED BY COMPUTER VISION
166	ICCETVID260530	ADAPTIVE CYBER RISK ASSESSMENT FOR INDUSTRIAL IOT USING DYNAMIC RISK SCORING

167	ICCETVID260545	CROWDSEC SENTINEL: A COLLABORATIVE REAL-TIME THREAT INTELLIGENCE AND VISUALIZATION PLATFORM
168	ICCETVID260577	A COMPARATIVE ANALYSIS OF MACHINE LEARNING AND ENSEMBLE MODELS FOR PHISHING DETECTION USING DIVERSE DATASETS
169	ICCETVID260600	A COMPACT PLANAR MONOPOLE ANTENNA AT 2.4 GHZ FOR MULTISTANDARD
170	ICCETVID2601050	PREDICTIVE ANALYSIS OF EMPLOYEE ATTRITION USING MACHINE LEARNING
171	ICCETVID260680	SIGN LANGUAGE TRANSLATOR FOR HEARING IMPAIRED USING MACHINE LEARNING
172	ICCETVID2601098	SIMULATION-BASED LEO MICROSATELLITE DEFENCE SYSTEM USING SIMU-CIC, VTS, PYTHON, AND CELESTIA
173	ICCETVID260756	BIDIRECTIONAL INVESTOR - STARTUP MATCHMAKING PLATFORM WITH RETRIEVAL-AUGMENTED GENERATION AND EXPLAINABLE RATIONALES
174	ICCETVID260931	DESIGN AND IMPLEMENTATION OF RF MIXER FOR FR1 AND CRN APPLICATIONS
175	ICCETVID2601083	A COMPREHENSIVE SURVEY OF FLEXIBLE DCT HARDWARE ARCHITECTURES FOR HEVC: FPGA VS. ASIC IMPLEMENTATIONS
176	ICCETVID260596	SMART RAILWAY GATE STATUS AND TRAIN DISTANCE ALERT SYSTEM FOR RURAL SAFETY
177	ICCETVID260521	SMARTSPEND: AN AI-DRIVEN EXPENSE TRACKING AND FINANCIAL ANALYTICS SYSTEM
178	ICCETVID260508	IOT BASED SMART PARKING SPOT MANAGEMENT SYSTEM
179	ICCETVID2601035	NEXT GENERATION MACHINE LEARNING MODEL FOR DETECTING ADVERSE DRUG REACTIONS IN DRUG-DRUG INTERACTIONS VIA GRAPH NEURAL NETWORKS AND SELF-SUPERVISED LEARNING
180	ICCETVID260529	PREDICTIVE DEVOPS: FORECASTING BUILD AND DEPLOYMENT FAILURES
181	ICCETVID260492	SMART GLOVE COMM: AN IOT-BASED ASSISTIVE COMMUNICATION AND HEALTH MONITORING SYSTEM
182	ICCET267913	GENAI VISION: UNIFIED REAL-TIME IMAGE UNDERSTANDING
183	ICCETVID260712	SMART DIRECT TORQUE CONTROL OF BLDC MOTOR FOR ELECTRIC TRANSPORTATION SYSTEM
184	ICCETVID260958	CLASSIFICATION OF ORGANIC AND INORGANIC FRUITS USING MACHINE LEARNING ALGORITHMS
185	ICCETVID260868	AI-BASED ASL (AMERICAN SIGN LANGUAGE) INTERPRETER
186	ICCETVID260604	BLOCK DL-IDS: A BLOCKCHAIN AND DEEP LEARNING POWERED INTRUSION DETECTION SYSTEM FOR INTELLIGENT ENVIRONMENT
187	ICCETVID260738	REVOLUTIONING HOME DESIGN: AI-POWERED HOUSE PLANNING AND VISUALIZATION
188	ICCETVID260977	DECONSTRUCTING A JAVA PACKET SNIFFER: A DEEP DIVE INTO MAVEN AND PCAP4J
189	ICCETVID260792	IOT-BASED SMART AGRICULTURE FOR EFFICIENT CULTIVATION IN TERRAIN-CONSTRAINED AREAS
190	ICCETVID2601058	HYBRID ML-LLM FRAMEWORK FOR INTELLIGENT DECEPTIVE REVIEW DETECTION IN E-COMMERCE

191	ICCETVID260697	ADAPTIVE PRIORITY BASED ALGORITHM SELECTION FOR TASK SCHEDULING IN CLOUD SIDE DISTRIBUTED NETWORKS
192	ICCETVID2601013	LEAF SENSE : IDENTIFICATION OF DIFFERENT MEDICINAL PLANTS
193	ICCETVID2601030	AUTOMATED ANTENNA ALIGNMENT SYSTEM
194	ICCETVID2601161	ADAPTIVE SEQUENTIAL DECISION INTELLIGENCE USING META-REINFORCEMENT LEARNING AND UNCERTAINTY-AWARE POLICIES
195	ICCETVID2601033	LIBRAIRY - AN AL POWERED E - LIBRARY SYSTEM
196	ICCETVID260879	A DEEP HYBRID LEARNING MODEL FOR INTRUSION DETECTION IN IOT NETWORK TRAFFIC USING CNN- TRANSFORMER WITH PSO TUNING
197	ICCETVID260544	FINANCIAL FRAUD DETECTION USING HETEROGENEOUS GRAPH NEURAL NETWORKS
198	ICCETVLD260657	AI-BASED DYNAMIC PRICING WITH MARKETING TREND FORECASTING
199	ICCETVID260666	AI-DRIVEN PERSONALIZED NUTRITION AND FITNESS SYSTEM
200	ICCETVID260645	AZT - SAFE - ADAPTIVE ZERO TRUST SECURITY FRAMEWORK FOR ACCESS WITH FACIAL AUTHENTICATION & ANOMALY ESTIMATION
201	ICCETVID260913	A LOW-CODE FRAMEWORK FOR CONVERSATIONAL AI ASSISTANTS LEVERAGING RETRIEVAL-AUGMENTED GENERATION AND LLMS
202	ICCETVID260305	DECISION DRIVEN DEEP LEARNING FOR STRUCTURED PATHOLOGICAL IMAGE CLASSIFICATION
203	ICCETVID2601091	IOT & ML ENABLED SMART STORAGE FOR ONION PRESERVATION”
204	ICCETVID2601160	RISK FACTOR–INTEGRATED DEEP LEARNING FRAMEWORK FOR BREAST CANCER PREDICTION USING THERMAL IMAGES
205	ICCETVID2601018	AI-DRIVEN PROCTORING: REAL-TIME EXAM MALPRACTICE DETECTION WITH PRIVACY-PRESERVING CRYPTOGRAPHIC MEASURES
206	ICCETVID260672	COMPACT CIRCULARLY POLARIZED FILTERING DIPOLE ANTENNA FOR 2.4 GHZ ISM APPLICATIONS
207	ICCETVID260717	A PERSONALIZED FULL STACK SAAS SOLUTION WITH AI-DRIVEN INSIGHTS FOR MSME-FOCUSED END-TO-END SMART RETAIL OPERATIONS
208	ICCETVID260656	AI-POWERED OPTIMIZATION OF CRICKET BATTING ORDER FOR REAL-TIME DECISION MAKING
209	ICCETVID2601254	SMART FRIDGE COMPANION: A MOBILE- BASED SYSTEM FOR FOOD INVENTORY MANAGEMENT AND EXPIRY
210	ICCETVID260578	CYCLICAL LEARNING RATE OPTIMIZED AI MODEL FOR DETECTING FREEZING OF GAIT IN PARKINSON DISEASE
211	ICCETVID260663	MACHINE LEARNING BASED KIDNEY STONE PREDICTION USING COMPARATIVE STUDY OF CNN AND SVM
212	ICCETVID260837	USER PERCEPTION ON AI-POWERED GREEN NUDGE MESSAGES IN FOOD DELIVERY PLATFORMS
213	ICCETVID260655	MAESTRO – MULTI-AGENT ENGINE FOR SMART TASK ROUTING AND OPTIMIZATION
214	ICCETVID2601166	NUMERICAL STUDY ON THE BENDING RESPONSE OF SWCNT FUNCTIONALLY GRADED PLATES WITH AN IMPROVED SHEAR DEFORMATION THEORY
215	ICCETVID260898	AI-POWERED TRIAGE AND APPOINTMENT SCHEDULING: INTEGRATING MACHINE LEARNING AND LARGE LANGUAGE MODELS

216	ICCETVID260749	ONION CONDITION ANALYSIS AND SHELF LIFE PREDICTION USING MACHINE LEARNING TECHNIQUES
217	ICCETVID2601072	ECO-VISION AI: INTELLIGENT WASTE CLASSIFICATION AND SHAPE-PRESERVING GENERATIVE ART USING DEEP LEARNING
218	ICCETVID260699	DATA-DRIVEN PROGNOSTICS AND MACHINE LEARNING-BASED FORECASTING OF LITHIUM-ION BATTERY AGEING IN ELECTRIC VEHICLES
219	ICCETVID2601014	DUAL-BACKBONE CNN FUSION FOR MULTI-CLASS GASTROINTESTINAL DISEASE CLASSIFICATION
220	ICCETVID260692	AN INTEGRATED AI-DRIVEN FRAMEWORK FOR SEMANTIC RESUME INTELLIGENCE AND ADAPTIVE VIRTUAL INTERVIEW SYSTEMS
221	ICCETVID260985	AI POWERED WEBSYNTHESIZER USING WEBCONTAINER: A NOVEL APPROACH TO IN-BROWSER CODE GENERATION AND EXECUTION
222	ICCETVID260681	FAIL-SAFE MOTORCYCLE SECURITY SYSTEM WITH PHYSICAL IMMOBILIZATION USING DUAL-COMPLIANCE CONTROL
223	ICCETVID260659	AUTONOMOUS INDUSTRIAL ROVER
224	ICCETVID260815	DECENTRALIZED TRUSTLESS FREELANCING ECOSYSTEM LEVERAGING ETHEREUM SMART CONTRACTS AND AI- DRIVEN SKILL MATCHING FOR TRANSPARENT AND AUTOMATED WORKFLOWS
225	ICCETVID260964	AI-POWERED CUSTOM COURSE GENERATOR FOR PERSONALIZED LEARNING
226	ICCETVID2601044	HYBRID PHISHING MODULE IN A SECURE PASSWORD MANAGER
227	ICCETVID260748	REAL-TIME SOCIAL MEDIA ANALYTICS FOR E-COMMERCE TRENDS USING BERT, LSTM, AND GEMINI-ASSISTED INSIGHTS
228	ICCETVID2601129	A QA/SA REMOTE AUTONOMOUS MOBILE INSPECTION SYSTEM USING SLAM AND ROS 2 NAV2
229	ICCETVID260742	ADAPTIVE COMBAT AGENT USING REINFORCEMENT LEARNING
230	ICCETVID260872	DESIGN AND IMPLEMENTATION OF A SUPERVISED MACHINE LEARNING FRAMEWORK FOR TEXT-BASED SENTIMENT ANALYSIS
231	ICCETVID2601021	ROADSENSE: AI-POWERED MOBILE SYSTEM FOR AUTOMATED POTHOLE DETECTION AND GEOSPATIAL MAPPING
232	ICCETVID260796	INTELLIAGENT: A RESEARCH GRADE ADAPTIVE MULTI-DOMAIN AI- SYSTEM
233	ICCETVID2601048	GEOINFORMATICS DRIVEN SMART URBAN ROAD NETWORK PLANNING WITH RENEWABLE ENERGY ROAD ELEMENTS AND ACCIDENT HOTSPOT ANALYSIS
234	ICCETVID260381	PERFORMANCE EVALUATION OF VARIOUS MODULATION TECHNIQUES FOR UNDERWATER WIRELESS OPTICAL COMMUNICATION SYSTEM
235	ICCETVID2601042	CYBER THREAT DISCOVERY IN CLOUD-INTEGRATED CPS USING COGNITIVE DEEP LEARNING FUSION
236	ICCETVID260744	LANDSLIDE DETECTION USING CONVOLUTIONAL NEURAL NETWORKS (CNNS)
237	ICCETVID2601106	PREDICTING DISEASE RISK FROM ELECTRONIC HEALTH RECORDS USING ATTENTION-BASED TEMPORAL CONVOLUTIONAL NETWORKS FOR HEALTHCARE MANAGEMENT
238	ICCETVID260760	NEXTGEN HIRING: AN AI-DRIVEN PLATFORM FOR ROLE-BASED CAREER READINESS AND SMART JOB MATCHING
239	ICCETVID260769	A GENERAL PURPOSE AI AGENT AUTOMATED TASK EXECUTION

240	ICCETVID260723	WEARABLE SMART BIOMEDICAL SENSOR NETWORK FOR ACTIVE AGING SUPPORT AND HEALTH MONITORING
241	ICCETVID260758	ENSEMBLE EXPLAINABILITY FRAMEWORK WITH XAI CONSISTENCY SCORE FOR PNEUMONIA DIAGNOSIS USING DENSENET-121
242	ICCETVID260836	MACHINE LEARNING–DRIVEN PROPHET-BASED FORECASTING OF FINANCIAL INCLUSION USING DIGITAL PAYMENT SYSTEMS
243	ICCETVID2601001	AUTOMATED DELIVERY BOT INTEGRATED ONLINE SHOPPING PLATFORM
244	ICCETVID2601085	DEEP LEARNING-BASED INTELLIGENT FRAMEWORK FOR EARLY DETECTION OF VITAMIN DEFICIENCY USING MEDICAL IMAGE ANALYSIS
245	ICCETVID260983	REAL TIME SIGN LANGUAGE TO VOICE CONVERTER
246	ICCETVID260662	MEMORYVAULT: A MULTIMODAL AI SYSTEM FOR PERSONALIZED MEMORY AND HEALTH ASSISTANCE IN ALZHEIMER'S AND DEMENTIA CARE
247	ICCETVID260570	A COMPARATIVE STUDY OF MACD AND RSI INDICATORS IN INVESTMENT DECISION MAKING IN THE INDIAN STOCK MARKET
248	ICCETVID260966	AI-BASED CRIME PATTERN ANALYSIS AND EVIDENCE MATCHING SYSTEM USING NLP AND DEEP LEARNING
249	ICCETVID2601009	A CONSENT LOCKED QR IDENTITY FOR PRIVACY PRESERVING CLINICAL RECORD ACCESS
250	ICCETVID260954	AI DIAGNOSING RESPIRATORY DISEASE USING COUGH SOUNDS COMBINING CNN AND RNN
251	ICCETVID260704	NIMBUS: AN INTELLIGENT WEARABLE ASSISTIVE SYSTEM FOR VISUALLY IMPAIRED INDIVIDUALS USING YOLOV5-BASED REAL-TIME OBJECT DETECTION AND FALL ALERT MECHANISM
252	ICCETVID260793	RAILWAY TRACK HEALTH MONITORING AND FAULT DETECTION ROBOT
253	ICCETVID2601041	DESIGN AND IMPLEMENTATION OF HUMAN MOTION INFORMATION COLLECTION SYSTEM
254	ICCETVID2601120	ENHANCED LANE DETECTION SYSTEM WITH INTELLIGENT SIGN VISION INTEGRATION
255	ICCETVID2601064	REAL-TIME AUTOMATED WEAPON DETECTION IN SURVEILLANCE FEEDS USING EFFICIENTDET-LITE WITH IMMEDIATE AUDIO ALERTING
256	ICCETVID260952	MULTIMODAL AI INTERVIEW SIMULATOR FOR COGNITIVE SKILL ENHANCEMENT IN COMPUTER ENGINEERING EDUCATION
257	ICCETVID2601090	EVALUATION OF PULSED CHARGING PROCEDURES AND THEIR IMPACT ON LITHIUM-ION BATTERY LIFETIME FOR ELECTRIC VEHICLE FAST CHARGING APPLICATIONS
258	ICCETVID2601116	REAL TIME DRIVER MONITORING SYSTEM FOR VEHICLE SAFETY USING DEEP LEARNING ALGORITHM
259	ICCETVID260961	PILL MATE: AN IOT-ENABLED SMART MEDICATION ADHERENCE SYSTEM WITH SENSOR-BASED VERIFICATION AND AUTOMATED DISPENSING
260	ICCETVID2601230	ENHANCED ELECTRIC VEHICLE CHARGING THROUGH PV INTEGRATION WITH HIGH GAIN SEPIC CONVERTER
261	ICCETVID260876	WAITLESS360: A SMART WEB-BASED REAL-TIME QUEUE AND TOKEN MANAGEMENT SYSTEM FOR HOSPITALS WITH PREDICTIVE WAIT-TIME INTELLIGENCE AND SMS NOTIFICATIONS

262	ICCETVID2601055	POSECHECKAI: REAL-TIME YOGA POSTURE ANALYSIS AND CORRECTION FEEDBACK SYSTEM
263	ICCETVID2601154	GENARETIVE AI FOR FINANCITIAL TIME SERIES FORECASTING A CASE STUDY ON CRUDEOIL
264	ICCETVID2601069	BROWSER SECURITY EXTENSION FOR WEB THREAT DEFENSE
265	ICCETVID2601112	DIGITAL IDENTITY WITHOUT EXPOSURE: A PRIVACY PRESERVING DECENTRALIZED APPROACH FOR BANKING SYSTEM
266	ICCETVID260805	BERT-BASED DEEP LEARNING FRAMEWORK(FEDERATED LEARNING) FOR ENHANCED ALZHEIMERS DISEASE AND BRAIN TUMOR CLASSIFICATION USING NEUROIMAGING DATA
267	ICCETVID260809	HERBAL PLANT ANALYSIS AND RECOMMENDATION SYSTEM USING DEEP LEARNING
268	ICCETVID260935	PETFED: AN IOT-ENABLED SMART PET FEEDING SYSTEM WITH VISION-BASED AUTOMATION
269	ICCETVID260352	(FUEL AND BATTERY TRACK) FBT: REAL-TIME FUEL AND BATTERY MONITORING SYSTEM FOR TWO-WHEELERS
270	ICCETVID260531	WEB APPLICATION VULNERABILITY SCANNER
271	ICCETVID260779	A HYBRID CNN-TRANSFORMER ARCHITECTURE FOR ROBUST NEURAL STEGANOGRAPHY: BALANCING LATENT PAYLOAD CAPACITY AND ADVERSARIAL RESILIENCE
272	ICCETVID2601153	AN INTERPRETABLE AI FRAMEWORK FOR DEMENTIA SCREENING
273	ICCETVID2601125	ADAPTIVE AI-BASED CRIMINAL INVESTIGATION FRAMEWORK WITH EVIDENCE-DRIVEN JUDICIAL REASONING AND EXPLAINABLE DECISION SUPPORT
274	ICCETVID2601070	CUSTOMIZABLE VIRTUAL NAVIGATION AND ASSET MANAGEMENT SYSTEM
275	ICCETVID2601133	REAL-TIME CLASSROOM ACTIVITY MONITORING USING YOLOV8 AND DISTRIBUTED STREAMING ARCHITECTURE
276	ICCETVID260864	MUTED VIDEOS TO AUDIO EXTRACTION USING LIP MOMENTS
277	ICCETVID2601256	AN AUTOMATED LUNG CANCER DETECTION SYSTEM USING SSA-BASED SEGMENTATION AND RESIDUAL DEEP CONVOLUTIONAL NETWORKS
278	ICCETVID2601079	A SCALABLE WEB FRAMEWORK FOR CERVICAL CANCER DETECTION USING ENSEMBLE MACHINE LEARNING
279	ICCETVID2601202	A HYBRID LEARNING AND OPTIMIZING AUTISM SPECTRUM DISORDER DETECTION USING NEUROFUSION PARALLEL ATTENTION FRAMEWORK
280	ICCETVID260783	EMERGENCY HEALTH ALERT SYSTEM USING MACHINE LEARNING AND DEEP LEARNING
281	ICCETVID2601110	REVIEW ON STRENGTH AND COMPACTION BEHAVIOUR OF SOIL REINFORCED WITH PALM KERNEL SHELLS AND HYBRID FIBERS
282	ICCETVID260986	FAKE DETECTION USING DEEP LEARNING MODELS
283	ICCETVID260711	ENHANCING SMART DIABETES PREDICTION USING MACHINE LEARNING ALGORITHMS
284	ICCETVID260988	SMART UNDERGROUND CABLE FAULT DETECTION USING IOT
285	ICCETVID260787	AI BASED TOOL FOR EARLY DEMENTIA DETECTION USING ELECTROENCEPHALOGRAPHY SIGNALS
286	ICCETVID260768	IOT-BASED SLIPPERY FLOOR DETECTION AND MONITORING SYSTEM

287	ICCETVID2601028	A TYPE-AWARE STATIC FIREWALL ARCHITECTURE FOR SECURING SENSOR DATA IN IOT NETWORKS
288	ICCETVID260635	LECTUREMATE: AN AI LECTURE SUMMRIZER
289	ICCETVID2601077	DEEPCHECK: CROSS MODALITY FAKE DETECTION FOR AUDIO-VISUAL MEDIA: A COMPREHENSIVE LITERATURE REVIEW
290	ICCETVID260984	AN EXPLAINABLE MACHINE LEARNING FRAMEWORK FOR CYBER ATTACK CLASSIFICATION AND DEFENSE STRATEGY OPTIMIZATION
291	ICCETVID260981	GUIDE: A QUANTITATIVE FRAMEWORK FOR EVALUATING AI COLLABORATION PROFICIENCY IN SOFTWARE ENGINEERING CANDIDATES
292	ICCETVID2601253	A SELF-HEALING AIOPS FRAMEWORK FOR INTELLIGENT LOG ANOMALY DETECTION AND AUTOMATED REMEDIATION
293	ICCETVID2601004	WIRELESS APPLICATION CONTROL USING HAND GESTURES
294	ICCETVID2601169	OFFLINE VOICE ASSISTANT USING VOSK MODEL
295	ICCETVID260754	IOT BASED WATER QUALITY AND CONTAMINATION CONTROL DEVICE
296	ICCETVID260402	AI BASED QUESTION PAPER GENERATOR
297	ICCETVID2601076	INTELLIGENT VIDEO SURVEILLANCE FOR MONITORING INDUSTRIAL SAFETY COMPLIANCE
298	ICCETVID2601078	STARTUP FEASIBILITY OPTIMIZATION ENGINE
299	ICCETVID260767	REAL-TIME HYBRID DROWNING ALERT SYSTEM
300	ICCETVID260839	RANVIZ RANSOMWARE VISUALIZATION AND CLASSIFICATION

1. DEMAND–PRICE OPTIMIZATION OF COMPLEMENTARY AND SUBSTITUTE PRODUCTS IN IMPERFECT PRODUCTION WITH ADVERTISEMENT-INDUCED RETURNS

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This study develops optimal demand and green production models for complementary and substitute products under an imperfect production system with defective items and advertisement-induced sales returns. Consumer demand is modeled using Cournot's linear inverse demand framework, capturing interaction effects between products. Two models are proposed: one for complementary products and another for substitute products. Carbon emission costs and green investment technologies are incorporated to reduce environmental impact while maximizing profit. Optimal pricing, demand, and production lot sizes are obtained by solving a third-order optimization equation. Break-even prices are determined, the law of demand is verified, and maximum profit is evaluated under multiple demand scenarios. Numerical examples illustrate the applicability of the models, while sensitivity analysis examines the stability of optimal solutions. Results indicate that profitability is strongly influenced by the degree of complementarity and substitutability.

2. DATA SECURITY FOR CLOUD STORAGE SERVICES USING BLOCKCHAIN MANAGEMENT

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The conventional methods limit the number of transactions entering the global blockchain by applying a scalable local leader that compromises local and global validation by the pair in case of public auditing system. We analyze the security of inputwith a security algorithm using a public ledger model. The aim is to study blockchain as a possible alternative to secure inputdata security in cloud supply chains for storage services. It integrates a security algorithm to collect, validate, save and analyze data in the cloud. The inputdata acquisition algorithm, constructed from a closed-loop model, addresses the security concerns of inputdevices in the telehealth supply chains. The validation indicates that the security algorithm proposed offers better data safety and integrity compared to the other safety mechanisms.

3. HIERARCHICAL PRIVACY ORCHESTRATION OF FEDERATED HEALTHCARE DIAGNOSTICS: DYNAMIC COORDINATION OF DIFFERENTIAL PRIVACY, SMPC, AND HOMOMORPHIC ENCRYPTION

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Federated Learning (FL) has become aprivacy-sensitive training method to collaborative training of models in sensitive areas like the healthcare domain where direct sharing of data is not possible. Nevertheless, the current privacy solutions, including Differential Privacy (DP), Secure Multi Party Computation (SMPC), and Homomorphic Encryption (HE), are independent, which leads to privacy

protection that is not evenly distributed and a high level of energy and communication expenses. The paper introduces Hierarchical Privacy Orchestration of Federated Learning (HPO-FL) a new framework, which can be used to perform federated healthcare diagnostics, allowing hospitals to jointly train models without exposing patient data. The Privacy Orchestration Controller used by HPO-FL activates and tunes DP, SMPC and HE in real-time depending on the sensitivity of the data and the network conditions. There are experiments on the MedMNIST medical imaging dataset which show that HPO-FL can reach the diagnosis accuracy of 94.6% and 82% reduction in privacy leakage, and communication overhead of 15 percent, compared to the single-layer privacy approaches. The research results emphasize the fact that adaptive coordination of heterogeneous privacy layers improves the security and scalability of federated medical AI systems.

4. LEXI TAMIL: A GAMIFIED PLATFORM FOR PHONETIC TO NATIVE TAMIL CONVERSION AND SCRIPT PRESERVATION

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The increasing reliance on Phonetic Tamil has created significant challenges in maintaining proficiency in the native Tamil script and preserving cultural literacy. To address this issue, LexiTamil introduces an interactive, game-based platform that converts phonetic Tamil text into native Tamil script while simultaneously enhancing users' language learning experience. The system employs a lightweight Transformer model optimized for accurate and efficient transliteration. It integrates natural language processing (NLP) techniques, including sub word tokenization and preprocessing, to handle diverse and inconsistent user inputs. Furthermore, LexiTamil engages users through interactive learning components such as games, quizzes, and a structured Tamil dictionary designed to strengthen reading and writing skills. By combining machine learning methods, attention-based models, and gamification, the platform offers an innovative, accessible, and educational approach to promoting Tamil script literacy in the digital era.

5. ENERGY-EFFICIENT AND LOW-COMPLEXITY ROBUST BEAMFORMING FOR MIMO–NOMA–OFDM: A SUSTAINABLE 6G APPROACH

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The evolution toward sixth-generation (6G) wireless networks has shifted system design priorities beyond peak data rates toward energy efficiency, robustness, and scalable imple- mentation. This paper explores energy efficient transmission in downlink MIMO-NOMA- OFDM systems in presence of realistic impairments like imperfect channel state information (CSI) and residual successive interference cancellation (SIC). To address these challenges, a low-complexity alternating optimization with power control (LCAO-PC) framework is developed. In LCAO-PC, the beamforming vectors are updated using gradient-based pro- jection steps. Transmit power is adjusted separately using a bisection-based power control strategy. The proposed framework reduces the computational depth by avoiding interior- point solvers. System robustness is increased by bounded error modeling, leading to reli- able operation under imperfect channel knowledge. The simulation results show that the proposed framework achieves energy efficiency and sum-rate performance close to convex- optimization-based benchmarks. In addition, stable empirical convergence and significantly lower computational complexity are obtained. The proposed framework is suitable for large scale practical deployments due to low complexity and stable empirical convergence.

6. A COMPREHENSIVE REVIEW OF DATA-DRIVEN PULMONARY DISEASE PREDICTION USING MACHINE LEARNING AND DEEP LEARNING

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The increasing availability of healthcare data has accelerated the adoption of machine learning (ML) and deep learning (DL) techniques for disease prediction and clinical decision support. This review paper examines key components involved in intelligent healthcare systems, including data pre-processing techniques, commonly used ML and DL models, performance evaluation metrics, existing limitations, research gaps, and future research directions. Effective data preprocessing methods such as missing value imputation, outlier detection, feature scaling, and class imbalance handling are essential for improving model accuracy and reliability. The paper reviews traditional ML algorithms such as Logistic Regression, Decision Trees, Random Forests, Support Vector Machines, and ensemble methods, along with DL architectures including Artificial Neural Networks and Convolutional Neural Networks. Various evalua- tion metrics are discussed to assess model performance in medical datasets. Despite significant progress, challenges related to data quality, interpretability, generalizability, and clinical deployment remain. This review provides a structured overview of current approaches and highlights future opportunities for developing robust and clinically applicable predictive healthcare models.

7. OPTIMIZING SLIP RATIO IN ANTILOCK BRAKING SYSTEMS FOR VEHICLE PLATOONS USING DEEP LEARNING TECHNIQUES

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The Anti-lock Braking System (ABS) is an essential for maintaining optimal braking performance and ensuring safety across various road conditions such as dry, wet, snow or ice in vehicular platooning. However, it is difficult to select the optimal value of slip ratio for the ABS controller while vehicle encounters different road scenarios due to the dependency of optimal slip ratio on road conditions. While recent advancements have incorporated sophisticated algorithms to enhance ABS performance, a significant research problem is explored by applying deep learning techniques, specifically Convolutional Neural Network (CNN) to assist in selecting optimal slip ratios in platooning scenarios for different road conditions. The proposed work involves developing and testing advanced CNN models aimed at improving real time slip ratio findings on the road which are critical for maintaining braking efficiency in ABS and vehicle stability under dynamic road conditions. The usage of simulations and real-world data evaluates the effectiveness of these CNN models in enhancing slip ratio findings with high accuracy and helps braking control strategies with the primary objective of minimizing collision risks and improving overall platoon safety.

8. AN EXPLAINABLE HAWKES–GNN–GAT DIGITAL TWIN FRAMEWORK FOR POLICY-CONSTRAINED CYBER RISK REASONING IN SMART CITY IOT SYSTEM

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The increase in IoT devices in cities has resulted in a higher risk of cyberattacks, mainly because these devices rely heavily on each other. Currently, security systems are mainly geared towards attack detection after the event and mostly use static network analysis instead of early attack prediction. This paper explores a system that employs Hawkes, GNN and graph attention networks (GATs) to forecast the spreading of cyberattacks in smart city IoT networks. The Hawkes process allows understanding events by time, i.e., tracking the attack events temporal occurrence, while at the same time, the GNN component examines the spatial relation between various connected devices. GAT also assists in determining the degree of influence of each device in the attack scenario. The method performs a real, time step, by, step simulation to output metrics such as attack duration, attack intensity, and the overall network threat level. The authors demonstrated that their approach based on the combination of attention, based graph learning and time, based event modelling could outperform traditional network analysis methods in terms of speed and details level of the attack spread prediction.

9. HYPERSPECTRAL REMOTE SENSING FOR MARINE OIL SPILL DETECTION & MONITORING

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This paper presents totally automated software framework for efficient oil spill detection and marine environmental monitoring by the use of hyperspectral imaging and advanced deep learning scheme. The system aims to solve the problems encountered in current existing procedures, which often can consume time, labour and leads to human error. This paper suggested a hybrid approached based on the combination of a deep learning model with a density- based clustering algorithm into a single framework that allows for spectral discrimination and spatial structural interpretation. This proposed methodology has a well-defined two-step processing protocol. In the first phase, Principal component analysis (PCA) is used to extract reduced discriminating features from input image and designed Convolutional Neural Network (CNN) architecture for pixel-level classification of hyperspectral imagery. During the second stage, the output classification of CNN is refined through the use of Density-Based Spatial Clustering of Applications with Noise (DBSCAN). DBSCAN groups together classified pixels that are spatially contiguous to form distinct clusters to enhance the oil spill boundary delineation. Combining the power of spectral cameras with conventional cameras, this significant approach effectively produced reliable and accurate pixel-wise oil spill maps that are geospatially interpretable. The proposed framework has been validated using a real IEEE hyperspectral dataset. Validation-matches scenes performed better overall with an accuracy of 98.29% and an F1-Score of 0.9835. The end system provides a simple and easily interpretable color-coded thematic map along with measurable performance reports to facilitate environmental agencies, port authorities, and research organizations.

10. BHARATHAATH - A DIGITAL PLATFORM FOR HANDCRAFTED IDOLS WITH AI & AR EXPERIENCE

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The tradition of creating idols in India is a long- standing part of the culture and history of the country, providing a source of income for countless artisans who have developed the skills over time. The craft industry around the creation of idols is being challenged by the lack of access to digital platforms that can connect artisans with customers and help with marketing their work. Many times, artisans rely on intermediaries such as wholesale merchants to sell their items, allowing middlemen to take a large percentage of the total price, resulting in less profit from the sale for the artisan. Furthermore, since artisans do not have direct access to their customers, their overall profits are diminished, their geographic range is limited, and customers are less confident purchasing items directly from an artisan.

In response to these issues, BharatHaath was created as an eCommerce platform utilizing AI and AR technology to connect customers with artisans who create handcrafted idols. Artisans on BharatHaath can have both ready-made idols and custom-made idols sold directly to customers without the intermediary taking a portion of the sale price, creating a more equitable marketplace where artisans receive fair compensation for their work. By utilizing AI, potential customers can quickly and simply indicate the type of idol they want by entering their specifications, such as size, material, and pose, thus allowing customers to communicate more effectively what they want from a custom-made idol and providing additional support to artisans in delivering the idols.

11. SUBTYPE CLASSIFICATION OF ALS: DIFFERENTIATING BULBAR AND SPINAL ONSET USING VOICE SIGNALS WITH DEEP LEARNING

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Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disorder that causes motor and speech impairments. Traditional diagnostic procedures are subjective, slow, and limited in early detection. This study proposes a machine-learning–driven framework for ALS detection and sub- type classification using voice signals. Eight phonetic inputs (“a”, “e”, “I”, “o”, “u”, “ka”, “pa”, “ta”) were analyzed, and acoustic features including fundamental frequency, jitter, shimmer, and harmonic-to-noise ratio were extracted using Parselmouth. To address class imbalance, synthetic samples were generated using CTGAN. Models trained on combined real and publicly available datasets enabled both binary ALS detection and Bulbar vs. Spinal subtype classification. Deep-learning–based feature enhancement was integrated with traditional machine learning models, where Random Forest achieved the highest overall performance, followed by XGBoost and KNN. The system demonstrated high sensitivity for Spinal ALS (94%) and strong accuracy for Bulbar ALS (80%), with minimal misclassification. ROC analysis confirmed strong discriminatory capability across classes, and a real-time web application was developed to support immediate audio-based predictions.

12. CAUSAL ENSEMBLE MODEL WITH CLASS IMBALANCE PROCESSING

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The severe class imbalance, the heterogeneous pa- tient profile, and intricate epidemiological dependencies make accurate disease prediction using real-world clinical data difficult. Conventional models tend to give preference to majority classes, which results in biased risk modeling and the lack of gener- alizability. The paper suggests a Causal Ensemble Model with Class Imbalance Processing (CECI-Model) which combines hy- brid sampling, cost-sensitive learning and ensemble-based causal inference to make strong disease predictions using the MIMIC- IV dataset. The model includes preprocessing, causal feature selection, imbalance redress by synthetic minority oversampling and a weighted combination of deep and statistical learners. Causal and epidemiological estimates are done with the help of Causal Forest and Targeted Maximum Likelihood Estimation (TMLE) in order to find out the significant risk factors. As the experimental results show, the proposed framework attains an accuracy of 91.3%, with 8- 12 percent higher F1-score and AUROC compared to the standard approaches, ensuring higher predictive accuracy, fairness, and epidemiological validity of the results to a wide variety of disease cohorts

13. GENOMIC PREDICTION OF YIELD AND YIELD-RELATED TRAITS USING MULTI-TRAIT USING APPROACHES AND MACHINE LEARNING MODELS

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Genomic prediction has become as a key strategy in contemporary plant breeding by supporting early-stage selection of superior genotypes using genome-wide molecular markers. In this research, we assessed machine learning algorithms for multi-trait genomic prediction of yield and yield-related traits using high-density single nucleotide polymorphism (SNP) markers. A total of 1,494 genotypes analysed using 47,488 linkage disequilibrium (LD)-pruned SNPs and best linear unbiased predictions (BLUPs) for yield per plant, grain number per panicle, and grain weight were used. Ridge regression, Random Forest, and Light Gradient Boosting Machine (LightGBM) algorithms were compared using five-fold cross-validation. The prediction ability was measured by based on the coefficient (R 2), root mean squared error (RMSE), and mean squared error (MSE)The results showed high trait-dependent variability in prediction ability. Grain weight had high predictability ($R^2 = 0.73$) using LightGBM, while grain number per panicle had moderate prediction ability ($R^2 = 0.34$). Yield per plant, a complex trait, had low predictability, and Random Forest had the highest prediction ability ($R^2 = 0.18$). These results show that machine learning algorithms combined with trait-specific optimization can greatly improve multi-trait genomic prediction and provide useful tools for accelerating genetic gain in plant breeding programs.

14. PREDICTING ALZHEIMER'S DISEASE PROGRESSION THROUGH LSTM-BASED ENSEMBLE LEARNING: AN INTEGRATED CLINICAL DATA ANALYSIS APPROACH

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The global healthcare system faces mounting challenges from Alzheimer's disease (AD), a debilitating neurodegen- erative condition affecting millions worldwide. This research intro- duces an innovative computational framework utiliz- ing Long Short-Term Memory (LSTM) architectures com- bined with ensemble learning techniques to forecast AD di- agnosis from multi-dimensional clinical datasets. Our inves- tigation ana- lyzed 2,149 patient records encompassing 34 distinct clinical parameters, including cognitive performance metrics through Mini-Mental State Examination (MMSE), functional capabil- ity assessments, behavioral patterns, and comorbidity indi- cators. The developed LSTM ensemble framework demon- strated exceptional predictive capabilities, attaining 95.35classification accuracy, 94.59ity, and an area under the receiver operating characteristic curve (AUC-ROC) of 0.9411. These results substantially sur- pass conventional machine learning benchmarks. Analysis of feature contribu- tions identified cognitive assessment scores, functional eval- uation metrics, and chronological age as pre- dominant pre- dictive indicators. Our findings underscore the potential of integrated deep learning methodologies for enhanced early- stage AD identification, offering significant im- plications for clinical decision-support frameworks and individualized therapeutic strategies in neurodegenerative disor- der management

15. DEVOPS PIPELINE FOR CONTINUOUS PERFORMANCE TESTING: A FRAMEWORK FOR INTEGRATING AUTOMATED PERFORMANCE EVALUATION IN CI/CD WORKFLOWS

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This paper presents a comprehensive framework for integrating continuous performance testing into modern DevOps pipelines. As organizations increasingly adopt agile development methodologies and continuous integration/continuous delivery (CI/CD) workflows, the need for automated, reliable performance testing has become critical. Traditional performance testing approaches, often executed manually and late in the development cycle, fail to address the rapid pace of modern software delivery. This research proposes a systematic approach to embedding performance testing within the CI/CD pipeline, enabling early detection of performance regressions and establishing clear performance baselines throughout the development lifecycle. The methodology incorporates both lightweight and comprehensive performance testing strategies, intelligent threshold management, and automated analysis and visualization of performance metrics. Evaluation through a case study demonstrates that the proposed framework reduces performance regression incidents by 72% while decreasing the mean time to resolution by 65%. These findings suggest that continuous performance testing integration represents a significant advancement in ensuring application reliability and performance in fast-paced DevOps environments.

16. HARNESSING ARTIFICIAL INTELLIGENCE AND BEHAVIORAL INSIGHTS TO IMPROVE MEDICATION ADHERENCE IN CHRONIC DISEASE MANAGEMENT: A FOCUS ON DIABETES AND HYPERTENSION

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Successful management of chronic conditions like diabetes and high blood pressure requires a patients medication adherence to be successful. Many of the existing studies are based upon smaller or narrower databases, are difficult to interpret, or do not provide enough information for a clinician to make use of

them in a clinical setting. The purpose of this review was to evaluate ten different studies of machine learning methods that predicted medication adherence in managing chronic diseases using 1091 studies. It appeared that many of the models developed were heavily reliant upon claims data from retrospective sources and electronic medical record systems, and most of the studies were based upon tree-based modeling techniques. Few of the studies addressed the issue of personalization or individualized medical treatments or strategies and practical interventions to support patient adherence, therefore limiting the utility of these models in a patient-centered approach to treating chronic disease. In summary, it appears that models need to be developed that do not only predict when patients will miss taking their prescribed medications but also provide the patient with personalized, contextualized advice to assist the patient in successfully adhering to long-term treatment regimens.

17. EVENT CORRELATION AND DEEP LEARNING FRAMEWORK FOR DETECTING SYNFLOODATTACKS

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Cloud computing has transformed contemporary IT infrastructure by providing scalable on-demand resources with a pay-per-use facility. This new paradigm offers unprecedented flexibility and economy, leading to extensive adoption in multiple industries. Yet, the shared and distributed nature of cloud environments presents distinctive security concerns, which render them uniquely susceptible to advanced cyber attacks. Of these, Distributed Denial-of-Service (DDoS) attacks, i.e., SYN flood attacks, are particularly ominous. These attacks inundate network resources by pummeling servers with a superfluous amount of connection requests, causing the service to be disrupted and operations brought to a standstill. Classic SYN flood detection techniques like rule-based and statistical methods frequently fail in the rapidly changing cloud environments. Some of their limitations are a high rate of false positives and low adaptability due to high vulnerability to unfamiliar or polymorphic types of attack patterns. The failure of these approaches to accurately differentiate between legitimate traffic spikes and SYN floods of malicious intent threatens the efficiency and reliability of cloud security infrastructures. To overcome these vital drawbacks, this paper introduces a new hybrid detection scheme. By combining the Event Correlation And Deep Learning Framework For Detecting SYN Flood Attack in cloud networks.

18.A GENERATIVE AI–DRIVEN DECISION SUPPORT FRAMEWORK FOR PRECISION AGRICULTURE USING MULTIMODAL SENSOR AND GENOMIC DATA

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Precision agriculture increasingly relies on heterogeneous data sources such as environmental sensors, soil parameters, and crop genomic profiles to optimize yield and resource utilization. However, existing approaches primarily focus on prediction accuracy while offering limited interpretability and decision-level guidance to farmers and agronomists. This paper proposes a Generative AI–driven decision support framework that integrates multimodal agricultural data to generate explainable, actionable, and context-aware crop management insights. The proposed system combines multimodal feature fusion using deep neural networks with a retrieval-augmented generative model to translate complex sensor and genomic patterns into natural-language agronomic recommendations. Environmental data (soil moisture, temperature, humidity), crop physiological indicators, and genomic stress markers are processed through dedicated encoders and fused into a unified latent representation. A fine- tuned large language model generates adaptive recommendations related to irrigation scheduling, nutrient management, and stress mitigation. Extensive experiments are conducted on real and simulated agricultural datasets to evaluate prediction accuracy, recommendation relevance, and robustness under varying environmental conditions. Results demonstrate that the proposed framework outperforms conventional machine learning and rule- based systems in both predictive performance and decision interpretability. The study highlights the potential of Generative AI to bridge the gap between complex agricultural data and practical decision-making, paving the way for intelligent, explainable, and scalable precision agriculture systems.

19. CI/CD PIPELINE FOR MICROSERVICES ON AWS

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In modern software development, Continuous Inte- gration and Continuous Deployment (CI/CD) are indispensable [2]–[4], [13] and the use of microservices increments even more their adoption [6], [7]. Automating the build, test, and deploy processes leads to faster, more reliable, and scalable software delivery [2], [3], [8]. This paper introduces a framework for im- plementing a CI/CD pipeline on Amazon Web Services (AWS) [1], [9] that automates the deployment of microservices. The proposed architecture takes advantage of AWS CodePipeline, CodeBuild, Elastic Container Registry (ECR), and Elastic Container Service (ECS) with Fargate, together with CloudWatch [1], [18] for mon- itoring, which allows for the integration of code, containerization, and deployment to be done in a streamlined manner [14], [16]. The pipeline reduces deployment time and at the same time improves the overall system's productivity by eliminating manual intervention. The deployment experiment of two microservices has shown that not only does it scale better, but also that it is faster and the management of operations is simpler [9], [15]. The results indicate that the CI/CD framework improves the software development lifecycle by providing continuous automation, better observability, and reliable cloud-native deployments [8], [13].

20. ASKBOT: AN AI-DRIVEN CHAT ASSISTANT FOR COLLEGE FAQ AUTOMATION

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In educational institutions, students frequently seek information related to admissions, courses, examinations, schedules, and campus facilities. Handling such repetitive queries manually places a significant burden on administrative staff and often results in delayed responses. To address this challenge, this paper presents AskBot, an AI-driven chat assistant designed to automate college frequently asked questions (FAQ) services. The proposed system utilizes natural language processing techniques to understand user queries and provide accurate, instant responses based on a structured knowledge base. AskBot is designed as a user-friendly web-based application that enables students to interact with the system in real time using natural language. The architecture includes query preprocessing, intent recognition, response retrieval, and continuous knowledge base updating. Experimental evaluation demonstrates that the system effectively reduces response time and improves accessibility to institutional information while minimizing human intervention. By automating routine inquiries, AskBot contributes to efficient information management and supports sustainable digital transformation in academic environments.Keywords AI Chatbot, Natural Language Processing, College Automation, FAQ System, Intelligent Assistant

21. MINIATURIZED DUAL-BAND SIW MICROSTRIP PATCH ANTENNA WITH ENHANCED EFFICIENCY FOR IOT DEVICES

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The research project titled "Miniaturized Dual-Band SIW Microstrip Patch Antenna with Enhanced Efficiency for IoT Devices" is concerned with the design and development of a dual-band efficient and compact antenna operating at 2.4 GHz & 5.8 GHz ISM frequencies. By adopting the SIW technology and HMSIW/QMSIW Miniaturization method, the designed antenna successfully overcomes the limitations like size, bandwidth, and efficiency of conventional microstrip line- based antennas. The designed work is carried out on the FR4 substrate material, and after that, it is analyzed by using the ANSYS HFSS simulation software to obtain optimal impedance matching, radiation efficiency, and stable radiation patterns for both frequency components. The designed antenna is quite compact, dual-band, and efficient, thus making it a superior choice for IoT devices, wireless LAN applications, and wireless sensor networks.

22. "SMART HELMET FOR SAFETY AND MONITORING OF COAL MINERS"

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Underground Mining is inherently dangerous. Workers face serious risks spanning from toxic gases and poor air quality to unexpected medical emergencies. The issue is that in deep , isolated tunnels, the standard communication tools often fail to work, making it difficult to spot hazards in real-time. To fix this gap, a smart helmet that uses Long Range (LoRa) technology is required. It is integrated with sensors that track temperature, humidity, oxygen levels and other dangerous gases. LoRa technology has been chosen because it stays connected even in deep mining zones where other signals fail. Data is sent by the system to a central dashboard that displays live conditions and automatically alerts supervisors if a miner falls or breathes in toxic air. The goal is to improve safety, cut down on accidents, and make operations run smoother in these hazardous environments.

23. CROSS PLATFORM HEALTHCARE MONITORING SYSTEM

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In an era where digital health is rapidly transform- ing global healthcare, this project presents a Cross-Platform Healthcare Monitoring System designed to bridge the accessi- bility gap and empower both patients and healthcare providers. Developed using Flutter, this mobile first application integrates

advanced technologies—Internet of Things (IoT) for real-time patient monitoring, Artificial Intelligence (AI) for early disease prediction, and cloud infrastructure for secure data storage and access. The system enables continuous tracking of vital signs such as heart rate, oxygen saturation, and blood pressure via wearable devices, with data being analyzed intelligently to predict potential health risks. By offering features like teleconsultations, appoint- ment scheduling, and health education modules, it also promotes proactive patient engagement and awareness. Unlike traditional systems, the cross-platform nature ensures uniform performance across Android and iOS, making healthcare more inclusive and scalable. The integration of AI allows for smart diagnostics and alerts, while cloud-based health records ensure seamless access and management by authorized personnel. Overall, this project aims to deliver a holistic, intelligent, and accessible healthcare experience that aligns with modern public health goals and next- generation care delivery models.

24. SMART CRIME INVESTIGATION MANAGEMENT SYSTEM

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The increasing volume of criminal cases and digitally generated evidence has exposed limitations in conventional investigation workflows, which rely heavily on manual documentation, fragmented data handling, and physical evidence storage. These practices often lead to delayed investigations, information loss, and difficulties in verifying evidentiary integrity. This paper proposes a Smart Crime

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Investigation Management System that provides a unified digital framework for case tracking, evidence management, and intelligent investigative analysis. The system incorporates role-based access control and an automated chain-of-custody mechanism to ensure secure handling and traceability of both digital and physical evidence. Artificial intelligence–based analytical modules support incident timeline reconstruction and assist investigators in identifying inconsistencies, missing links, and relational patterns among suspects, events, and evidentiary artifacts. To further enhance data integrity and tamper resistance, blockchain-enabled logging is employed for immutable record maintenance. The proposed framework demonstrates the potential to improve investigative efficiency, reduce reliance on manual processes, and support timely decision-making, thereby offering a scalable foundation for next-generation digital crime investigation systems.

25. STREAMLINED SOFTWARE DEPLOYMENT SYSTEM WITH INTEGRATED CONTINUOUS TESTING PIPELINES

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This research describes an automated solution for software deployment and the integration of a testing pipeline within a continuity framework throughout the software engineering process. The increasing complexity of software systems, coupled with the aggressive timeline pressure, has resulted in systems adopting CI/CD – Continuous Integration and Continuous Deployment - practices. In this project , we present design, architecture and implementation of a CI/CD system with closely coupled deployment automation and rigorous testing aspects. Application of current DevOps practices and cloud-native tools such as Docker, Kubernetes, and Jenkins, the proposed system minimizes manual control, enhances

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documentation, and ensures quality through continuous verification. In addition, the solution is based on accepted worldwide software engineering principles and is a feasible and resilient infrastructure model for business software solutions. The system was implemented using a running prototype to ensure the system and noted improved testing coverage, failure recovery, and deployment.

26. BAMBOO INTEGRATED ROBOTIC ARM FOR ECO-ENGINEERING

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The demand for sustainable engineering has led to the emergence of challenges in the development of ecologically sustainable materials for robotic systems. This paper investigates the possibility of using sustainable material called bamboo for the development of robotic arm material. A type of globally available bamboo is chosen for the purpose of the study, and its various properties, such as density, moisture content, dimensional stability, water absorption, compressive strength, tensile strength, shearing strength, and bending strength, are assessed. The paper also investigates the possibility of using this material for the development of robotic arms with the aid of metal, 3D printing, and joint functions with the usage of metal, 3D printing, or servo motors, hinges, and actuators. After the comprehensive study, the paper proposes the development of a model for the robotic arm using the material. A series of tests are carried out on the robotic arm to determine its performance. The results are compared with the performance of the available materials for the robotic arm, leading to the determination of the sustainability of the material.

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27. A REVIEW ON DETECTING THE FRAUDS IN CREDITCARD TRANSACTIONS

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This project tells us how it works with various strategies similar to logistic regression, decision trees, random forests, neural networks to generate a smart system which can be analysed and stop credit card fraud in real time. Techniques like SMOTE and cost-sensitive learning are adopted to handle the extremely unbalanced dataset. Precision, recall, F1-score, and ROC-AUC is accessed to assess the system. It achieves high accuracy while lowering false positives, which makes it useful for safe financial transactions.

28. NATURE BASED SUSTAINABLE REMEDIATION OF HEAVY METALS (NI, CU, CD, ZN AND PB) BY PHYTOREMEDIATION MECHANISM OF PLANTS

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The main cause of soil contamination comes from wastes produced by mining, chemical, metal processing, and other related sectors. Essential and non-essential heavy metals are an inherent part of the environment. A rise in geologic and anthropogenic activities has led to an increase in soils that are polluted with heavy metals. The majority of environmental pollutants include Ni, Cu, Cd, Zn and Pb, especially in regions with significant anthropogenic pressure. Owing to the detrimental impacts on food security, economic advantage, and crop growth as a result of phytotoxicity, as well as the environment health of soil micro-organisms, heavy metals aggregation is great consideration in agricultural productivity and production due to affected soil. Phytoremediation is very good technique to mitigate heavy metals contamination in the soil. In this article, we critically evaluated how these heavy metals affect plants and their reproduction, development and growth processes due to the biological and geological fixation of heavy metals due to water, and soil pollution. The analysis revealed that the presence of heavy metals has a role on both growth and photosynthetic pigments. Hyper accumulator plants species (Sansevieria trifasciata, Zea mays, Asparagus racemosus and Asparagus racemosus). used in the phytoremediation process, which is a systematic way to have remedy on soil or land that has been contaminated with heavy metals, to remove the harmful effect of the heavy metal that is transported on basis of accumulation in the land soil. This appraisal underscores the significance of phytoremediation as a viable strategy for sustainable environmental management and restoration of polluted sites.

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29. TRANSPARENT GOVERNANCE THROUGH EXPLAINABLE AUTOML:A SELF-OPTIMIZING MODEL ENGINE

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The very rapid growth of Artificial Intelligence (AI) in governance and decision making has never been seen before in the past. However, the aftereffects of poor transparency, and no accountability are the main reasons why people do not trust the system of decision making through the algorithms. This paper discusses the Transparent Governance using Explainable AutoML, a self- optimizing model engine that automates the entire machine learning pipeline while also ensuring interpretability. To ensure that clarity and equity are policy-driven, the framework combines various Explainable AI (XAI) methods such as SHAP, LIME, and counterfactual analysis with Automated Machine Learning (AutoML) for model optimization. From the very first stage of data preparation to the last one of decision making, the whole system has the ability to provide explanations at every step thereby supporting policy decisions that are based on evidence and are auditable. The experiments conducted with synthetic governance datasets have proven that the proposed solution significantly improves the interpretability, trust, and usability of the decision-makers while at the same time reaching an accuracy that is competitive.

30. ENHANCED IMAGE STEGANALYSIS VIA HYBRID DEEP LEARNING WITH ATTENTION AND NEAR-LOSSLESS RECONSTRUCTION

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Image steganalysis plays a crucial role in digital security by identifying hidden information within images without compromis- ing visual quality. Traditional statistical methods often struggle against modern content-adaptive embedding techniques. This paper introduces a hybrid deep learning framework that integrates convolutional neural networks (CNNs) with recurrent neural networks (RNNs) and an atten- tion mechanism for optimal and interpretable image steganalysis. The CNN component captures fine spatial artifacts, while the RNN compo- nent identifies contextual dependencies. An attention mechanism em- phasizes embedding-sensitive regions, and a near-lossless decoder recon- structs an approximation of the original image with minimal perceptual error. Experimental results on the BOSSBase v1.01 dataset demonstrate high detection performance and reconstruction quality, suggesting a bal- anced approach to accuracy, interpretability, and reversibility in security- sensitive applications.

31. ML BASED INTELLIGENT LEGAL RESEARCH AND SUMMARIZATION TOOL FOR COMMERCIAL COURTS

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In recent years, the judicial system has experienced a rapid increase in the volume and complexity of legal cases, particularly in commercial courts that handle disputes related to business transactions, corporate governance, contracts, and financial agreements. Legal professionals are required to examine large collections of judgments, statutes, legal provisions, and prior case precedents to ensure accurate and fair decision-making. However, traditional legal research practices rely heavily on manual document review and keyword-based searches, making the process time-consuming, inefficient, and prone to human oversight. This paper presents an ML Based Intelligent Legal Research and Summarization Tool specifically designed to support judges, lawyers, and legal researchers in commercial courts. The proposed system utilizes machine learning and natural language processing techniques to automatically retrieve legally relevant documents based on user queries and generate concise summaries of lengthy legal texts. The system performs document preprocessing, semantic similarity analysis, and extractive text summarization to ensure accuracy and interpretability. By automating legal research and summarization, the proposed tool significantly reduces research time, improves judicial efficiency, and assists legal professionals in making informed decisions.

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32. SERVERLESS REAL TIME DATA PROCESSING AND VISUALIZATION PLATFORM

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The rapid growth of Internet of Things (IoT) applications has resulted in continuous streams of real-time data that require efficient processing, storage, and visualization. Conventional server-based systems often introduce scalability limitations, higher maintenance costs, and operational complexity. This paper presents a serverless real-time data processing and visualization platform built using AWS S3 and Python-based data ingestion and visualization techniques. Sensor or simulated data are collected, timestamped, and stored in cloud-based object storage without the need for dedicated servers. A Python-based visualization layer enables near real-time monitoring and analysis of the stored data. The proposed system demonstrates a lightweight, scalable, and cost-effective architecture suitable for multiple real-world applications such as environmental monitoring, smart infrastructure, and industrial data logging.

33. ENHANCING DOCUMENT AUTHENTICITY: A COMPREHENSIVE REVIEW OF ADVANCED FORGERY DETECTION METHODS

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The increasing digitalization of important docu- ments, such as IDs and official documents, has substantially increased the threat of advanced digital forgery, which makes it a challenge to have robust procedures in searching and identifying these forgeries. The present research work offers a thorough analysis of advanced document and image forgeries methodologies, including traditional image forensics methods, such as Error Level Analysis, and current Deep Learning paradigms. The present analysis includes both supervised and unsupervised approaches, such as Convolutional Autoencoder-Support Vector Machine (approach, which achieves a accuracy of 92.78 in ink analysis with Hyperspectral Imaging (HSI) and other hybrid models such as the Convolutional-Transformer architecture (EdgeDoc). Although these DL-based approaches have proved to be effective in some applications, our research shows that there are research gaps which need but left blank in order to proceed. Such blanks include lack of robustness to adversary attacks (a problem alleviated by Latent Manifold Adversarial Training) and a need for Explainable AI (XAI) to provide a reliable forensic results (as evidenced by systems such as TextSleuth). In conclusion, we stress the importance of standardizing datasets and coming up with new ways to make document authentication systems that are truly strong, reliable, and scalable.

34. INDRADRIVE - AUTONOMOUS DRIVER ASSISTANCE SYSTEM DESIGNED FOR INDIAN HIGHWAYS

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IndraDrive revolutionizes Advanced Driver Assistance Systems (ADAS) for Indian highways by addressing the critical shortcomings of global models in unstructured, heterogeneous traffic environments featuring erratic maneuvers, faded lane markings, mixed road users (vehicles, two-wheelers, pedestrians, animals), frequent occlusions, and rapid rural- urban transitions. This project introduces a comprehensive, from-scratch solution: a bespoke large-scale dataset curated from calibrated multi-camera real-world captures across diverse Indian roadways (highways, urban streets, rural paths) under varied lighting/weather conditions, seamlessly augmented by CARLA-SUMO simulations to replicate rare safety-critical scenarios like sudden pedestrian crossings, dense overtakes, monsoonal fog, and animal incursions that are impractical or unsafe to record in reality. Unlike imported pre-trained networks (e.g., YOLOv8) or limited Indian datasets (DriveIndia, IDD, ORDER, iRASTE) deficient in long-tail rarity, annotation granularity, and scenario breadth, IndraDrive employs meticulous hybrid annotation pipelines—delivering bounding boxes, segmentation masks, lane edges, traffic signs, behavioural intents, and occlusion flags—verified via semi-automated tools and rigorous human audits for label consistency and class balance. Developed using state-of-the-art deep learning frameworks with supervised training from scratch, the system draws architectural blueprints (multi-scale feature extractors, FLAMNet-inspired attention-fusion modules, U-Net/transformer hybrids, PolyLoss for ambiguous segmentation) but tunes all weights exclusively on domain-native data to overcome domain-shift failures prevalent in transferred models. Key innovations include GPS-calibrated simulation blending via Haversine-like geospatial validation, automated rare-event augmentation per WHO-equivalent safety guidelines (e.g., 90-day rarity thresholds for hazardous classes), and multilingual dashboard support for Indian contexts (English, Hindi, regional variants). Empirical validation demonstrates superior performance: 25-35% gains in mAP/F1/recall for long-tail events over baselines, API inference under 150ms on edge hardware (Jetson Nano, Raspberry Pi), 97% annotation accuracy within 500km simulated scenarios, and qualitative overlays confirming robustness in occluded/faded conditions. IndraDrives mission to fill ADAS gaps in Indian roads, yielding streamlined real-time perception, predictive hazard alerts, and deployable modules for resource-constrained vehicles. The multilingual, proximity-based emergency finder (ranking blood banks by group/location/distance) parallels IndraDrive&s real- time risk mapping, enhancing accessibility in linguistically diverse regions while prioritizing safety, explainability, and indigenous scalability over off-the-shelf imports.

35. ENHANCED REAL-TIME OBJECT DETECTION USING AN IMPROVED SINGLE SHOT MULTI BOX DETECTOR ROSHINI BHIMANA STUDENT

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Real-time object detection is a necessary task in applications like autonomous vehicles, intelligent traffic system, smart traffic monitoring, and smart surveillance. The Single Shot Multi-Box Detector (SSD) has gained popularity as a fast method for object detection; however, it has proven difficult to simultaneously improve detection accuracy while maintaining real-time detection speeds. An enhanced version of the SSD detection framework for real-time detection of vehicles has been proposed. The framework features two different types of convolutional neural networks, namely depthwise separable convolutional neural networks and spatially separable convo- lutional neural networks, as a means to reduce computational complexity while maintaining effective representation of features. Additionally, a strategy to refine the generation of default boxes and to implement multi-scale feature fusion was used to increase localization accuracy and to reduce false-positive detections. Significant improvements to mean average precision and Intersectionover Union were achieved without violating real- time frames per second performance.

36. REAL-TIME VEHICLE NUMBER PLATE RECOGNITION IN LOW-LIGHT CONDITIONS USING YOLO AND HYBRID OCR

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Automatic Number Plate Recognition (ANPR) has emerged to play a central role in intelligent transportation, automation of tolls and monitoring of roadways. Nevertheless, plate detection at night-time is still a challenge as there is glare, noise, motion blur, and low-image contrast. In this paper, it has been proposed to deploy a real-time ANPR system in low-light settings with the aid of preprocessing to enhance the image quality, a YOLO- based detector, hybrid OCR fusion, and multi-frame identity tracking. Early nighttime CCTV tests show better consistency of recognition and at the same time are computationally light.

37. CAT FRAMEWORK: AN INTELLIGENT CYBERSECURITY AWARENESS AND TRAINING MODEL FOR THE DIGITAL ERA TO SPREAD AWARENESS ABOUT CYBERCRIMES AND CYBERSECURITY

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The advancement and proliferation of digital plat- forms in educational, corporate, and social settings have led to a substantial increase in cybersecurity threats. Even with cam- paigns aimed at awareness, training programs related to cyber security still miss the mark when it comes to impact, flexibility, and enthusiasm, which is the core problem this project aims to solve with the help of an AI-enhanced Cybersecurity Awareness and Training (CAT) Framework that employs gamification and evaluation techniques and real-time analysis tools. The initial phase of the project focuses on the comparative evaluation of awareness and training platforms to uncover potential gaps, which show a lack of dynamic content presentation, advanced learner tailoring, and even the most basic application of AI and machine learning to training. By applying research-backed agile methodologies, the project identifies the need for an adaptive framework capable of tailoring sophisticated cyber security train- ing to the user's demonstrated knowledge levels and behaviors. The primary goal revolves around building an AI-driven training platform, interactive active learning strategies, and designing experiments aimed at evaluating training sessions' effectiveness versus traditional and AI enhanced training techniques. Com- bining analytics from surveys and gamified learning modules, the tools applied in this project include Python, TensorFlow, and React. The anticipated results consist of raised.

38. A 3D-PRINTED MICROFLUIDIC- INTEGRATED SMART INJECTION SYSTEM FOR PRECISION AND CONTROLLED DRUG DELIVERY

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In the current healthcare environment, it is one of the most important demands that need to be addressed is the regulation as well as the administration of the drug in an accurate manner. The traditional method of injection is by the use of a manual injection technique that involves the use of considerable human factors and may result in drug error, non-real-time monitoring, as well as less supervision. For addressing the current limitations in the process, this paper focuses on the design as well as the implementation of the IoT-based smart syringe injection system by the use of the Blynk IoT tool. The tools that have been used for the implementation of the system include the microcontroller control unit, the DC control motor, as well as the syringe mechanism by the use of the mechanical motor. The control mechanism has been implemented by the use of the threshold function in order to allow the operation of the motor in a safe as well as uncontrollable state. The Blynk tool shows the status of the injection process as well as the current level of the drug by the representation of the dose value in the state of fulfilment and emptying. Hence, the proposed solution has a cost-effective design, simplicity, and scalability; therefore, it has the potential to be implemented in the context of smart healthcare, drug-assisted delivery systems, and remote medical monitoring systems. The addition of the microfluidic-

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assisted mixing module enables the system for dual drug infusion before the injection process, making it more flexible.

39. ENHANCED SOCIAL MEDIA VIRAL CONTENT PREDICTION SYSTEMUSING ENSEMBLE LEARNING

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This research establishes an advanced system for predicting viral content on social media using ensemble machine learning models. The system processes comprehensive datasets examining engagement metrics, user profiles, and content meta-data to forecast virality probability with 89.1 percent accuracy. Feature extraction techniques identify significant predictive vari-ables including engagement velocity, creator authority metrics, and content quality indices, while ensemble algorithms combin-ing Random Forest, Gradient Boosting, and XGBoost provide robust predictions. The infrastructure incorporates visualization dashboards displaying viral patterns. Implementation addresses technical challenges including data consistency and processing scalability. The system demonstrates practical applications in content strategy optimization and audience engagement enhance-ment, advancing computational social media analytics through ethical, explainable frameworks.

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40. SENTIMENT ANALYSIS AND PERSONALIZED AD RECOMMENDATION SYSTEM FOR SOCIAL MEDIA DATA USING MACHINE LEARNING AND NATURAL LANGUAGE PROCESSING

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There is a ton of user generated content on social media platforms and so analyzing and understanding this content would give some insight to measure user sentiment and preferences. This thesis is proposing a framework for sentiment analysis of social media data using natural language processing (NLP) techniques and for the targeted advertisement by using user sentiment. Additionally, we develop a sentiment classification model based on machine learning, using logistic regression, we test it and visualize trends of sentiment over time. The system shows how sentiment analysis and ad recommendation can be merged to produce an increase in users engagement.

41. BLACKBOARD BASED REASONING FRAMEWORK FOR EXPLAINABLE TABLE TENNIS ANALYSIS

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Reasoning models presently rely a lot on LLMs and LLM agents taking various roles.This has its advantages, but it requires a large number of tokens and computation. There are also other non- LLM based ways that provide intelligence such as various ML models that are specialized. Working with multiple specialized models together is a better way to obtain reasoning. This architecture facilitates flexible integration of diverse analysis components and minimizes redundant computation. A shared context layer aggregates module outputs for centralized LLM based querying and downstream applications such as visualization, summarization, and performance reporting. We demonstrate the applicability of the system in the domain of sports video analysis, using table tennis match footage as a case study. The proposed design generalizes well to other domains that require fine-grained and interpretable video understanding.

42. AN INTELLIGENT DASHBOARD FOR OBJECT-ORIENTED DESIGN QUALITY ANALYSIS AND AI-POWERED SUGGESTIONS

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Object-oriented design plays a critical role in determining the long-term quality, maintainability, and reliability of software systems. Despite its importance, early-stage and academic software projects frequently suffer from poor adherence to fundamental object-oriented principles such as low coupling, high cohesion, and appropriate class responsibilities. Over time, these problems can lead to messy and tangled code that is hard to change, making it more likely for bugs to appear Currently available static

analysis tools can compute basic structural metrics or identify simple code smells, but they do not analyze design quality on a class level. Moreover, they rarely provide feedback or recommendations based on object-oriented standards. Such a limitation reduces the static analysis tools' utility in assisting the developers in improving their design choices.In response to this problem, object- oriented metrics are applied to design a structured evaluation of class and interface design quality. In this case, the evaluation and grading of the quality of design of Java classes is done using the methods: WMC, Response for a Class (RFC), Coupling Between Object Classes (CBO), Lack of Cohesion in Methods (LCOM), and Depth of Inheritance Tree (DIT). These metrics are taken from reliable research in software metrics and fault reaction models.The outcomes are presented within an interactive visualization dashboard, which assigns qualitative gradings to each class as well as diagnosing possible design defects. Also, a heuristic or AI-based mechanism makes class structure-specific suggestions, like enhancing class cohesion or reducing class granularity to improve the software's structural quality. Unlike other solutions, the proposed model has better interpretability, design-level feedback, actionable feedback, and design-level feedback, which makes the software system easier to maintain and more robust.

43. IOT-DRIVEN ACOUSTIC DETECTION SYSTEM FOR EARLY IDENTIFICATION OF RED PALM WEEVIL INFESTATION IN COCONUT TREES

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Coconut plantations face severe damage from the destructive Red Palm Weevil (Rhynchophorus ferrugineus), which causes internal trunk damage that often remains undetected until advanced stages. Traditional detection methods such as visual inspection and pheromone trapping are labor-intensive and unsuitable for large-scale monitoring. This paper presents an IoT-based acoustic detection system for early identification of Red Palm Weevil infestation in coconut trees using deep learning. Acoustic

sensors mounted on tree trunks capture vibration signals from larval feeding, which are analyzed using a DenseNet-121 model trained on labeled audio spectrograms. Upon detection, alerts are sent to users via a mobile platform. Experimental results demonstrate that the system is non-invasive, scalable, and achieves high detection accuracy, supporting sustainable pest management in smart agriculture.

44. EMOTIONAL INTELLIGENCE, JOB SATISFACTION AND WORK ENGAGEMENT AS PREDICTORS OF TEACHING EFFECTIVENESS IN HIGHER EDUCATION

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Purpose: This study aims to explore the role of emotional intelligence (EI), job satisfaction (JS), and work engagement (WE) as predictors of teaching effectiveness (TE) among faculty in higher education institutions and develop an integrated understanding that may inform faculty performance and institutional practice improvements. Design/Method/Approach: This research uses a quantitative approach through a structured questionnaire to collect primary data from 380 faculty members in colleges and universities, using stratified random sampling. SEM is conducted using SmartPLS with reliability tests, factor loadings, Fornell–Larcker, HTMT, cross-loadings, VIF, and path coefficients at 95% significance. Findings: The study found that EI, JS, and WE each have a significantly positive effect on TE. Faculty with higher EI, JS and WE display significantly better TE in higher education institutions. Conclusion: The research found evidence that EI, JS, and WE improve TE. At a minimum, these three factors worked together to illustrate that when faculty possess greater EI, JS, and WE, their TE increases. Thus, there is a definite need for the strengthening of these factors in higher education settings. Originality/Value: This study provides new evidence with an original contribution by looking at EI, JS, and WE to predict TE in higher education. Furthermore, it extends existing research with an integrated model of EI, JS, and WE to inform institutional practices aimed at enhancing teaching at a faculty level.

45. A 3D-PRINTED, INTEGRATED INDUSTRIAL-GRADE MICROFLUIDIC DEVICE FOR CONTINUOUS REAL-TIME WATER QUALITY ASSESSMENT

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Increasing worries are also being raised on the degradation of water quality caused by industrial effluent, run-off and urbanization which are debilitating to human health and ecology. The conventional laboratory-based water testing is a timely, economical and inapt procedure that cannot be used in constant monitoring. Thus, creating a real-time water quality monitoring system, which will allow analyzing water samples fast, correctly, and in continuous, with the help of a microfluidic-based system, is the main objective of the project. The suggested system uses a microfluidic reaction cell that is 3D printed and operated under the laminar flow conditions using a standard reagent and water samples to allow controlled chemical reactivity. Micro peristaltic pumps are employed to inject sample and reagent with high precision by injection on two inlets to the mixer and promote sufficient mixing in the microchannel with passive mixers. The colorimetric process that takes place in the microfluidic device is imaged with an RGB camera and analyzed with an ESP32 microcontroller to estimate the parameters. The system under definition is capable of real-time monitoring of the key water quality parameter including pH, nitrate, nitrite, iron level, and hardness. Moreover, the system also has IoT-based cloud connectivity to allow remote visualization, data logging, and receive immediate alerts upon identifying unsafe water conditions, which is why it can be used in smart city, industrial, and rural water monitoring projects.

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46. ADVANCEMENTS IN LOSSY AND LOSSLESS SOURCE CODING FOR FUTURE MILLIMETER-WAVE AND TERAHERTZ COMMUNICATION SYSTEMS

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As wireless communication technology advances with the appetite for higher data rates and bandwidth efficiencies, so is the obsession with millimeter-wave (mmWave) and terahertz (THz) frequencies. There is enormous value associated with extremely high- frequency bands in this decade that begs for serious considerations in today's ready-to- launch ultra-fast and high-capacity wireless networks. These bands are indisputable for future communication technologies such as that of 5G networks and even more advanced ones. Still, certain drawbacks are faced owing to the characteristics of these frequency ranges such as high path loss, short-range propagation, and high atmospheric absorption that need to be surmounted in harnessing the potential of the bands fully. This paper provides a detailed analytical review of source coding methods, both lossy and lossless, which are designed and improved for application in the mmWave and THz com- munication systems. Coding, or how source information is transformed into a coded representation for transmission, occupies a very important part of the transmission process, which is designed to eliminate redundancy and encode the data to be transmitted in a more efficient way. However, some of these baseline coding techniques could potentially perform poorly under the very conditions and environments created by mmWave and THz communications. This research combines both mathematical and experimental methods performance evaluation of coding schemes. Different types of coding schemes are compared in terms of their effectiveness with respect to compression efficiency, error rates, delay, and complexity. In this picture there are some benefits and disadvantages of each

47. SMART MOVEABLE DIVIDER ON EMERGENCY VEHICLE LEND OUT USING IOT

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In cities where the traffic movement depends on time and place, the conventional and unchangeable road divides are not efficient in using the existing road spaces. The examples include situations where many industrial and commercial areas tend to be overly congested in the same direction during the rush hours, as a result. The proposed system will help resolve this inefficiency, as automated and smart road divider will dynamically change the lane distribution based on the real-time traffic intensity. The system allows controlled usage of lanes through automation, hence decreasing congestion, saving traveling time, and fuel consumption. The design will reduce the reliance on a manual traffic control, as well as, promote smarter, more adaptable traffic management strategy based on the application of the Internet of Things applied to monitor low, medium, and high-density traffic flow. It is developed to use IoT and embedded hardware that allows communication and control without any difficulties. The main parts are an Arduino board, RF transmitter and receiver, push button and wiring kit which will help to accomplish automated movement of the divider and priority of the emergency vehicles. When an emergency vehicle is coming, a push button mechanism sends a signal whereby a divider generally moves automatically and creates clear passage. All the functioning is controlled with the help of an IoT server and guarantees effective coordination and transfer of data. Such an alliance of automation and IoT technology optimizes traffic flow in the cities, minimized human input, and helped in safer and more efficient transportation management.

48. DESIGN AND OPTIMIZATION OF HEAT INTEGRATION SYSTEM FOR ENERGY-EFFICIENT BIODIESEL PRODUCTION

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Biodiesel production is inherently an energy- intensive operation because it involves multiple stages of heating and cooling in both reaction and separation units. When the heat generated within the process is not effectively recovered and reused, it results in higher operating costs and negatively impacts the overall sustainability of the plant. In this work, the design and optimization of a heat integration system have been carried out for a biodiesel production facility with an annual capacity of 6,600 tons. Substantial amounts of recoverable waste heat were identified, mainly originating from the high-temperature bottoms of distillation columns and the heat released during exothermic transesterification reactions. Based on this analysis, a systematic Heat Exchanger Network (HEN) was designed using detailed heat-duty calculations, Log Mean Temperature Difference (LMTD) analysis, heat exchanger sizing, pressure-drop estimation, and appropriate material selection. The optimized heat integration scheme successfully reduced the specific energy consumption from 4612.16 kJ/kg to 4358.9 kJ/kg and resulted in an overall energy saving of 70.35 kW. This improvement translated into annual operating cost savings of approximately ₹49.77 lakhs, along with a significant enhancement in overall system efficiency by 33.02%. The findings clearly indicate that a well- structured heat integration approach can greatly improve both the economic viability and environmental performance of biodiesel production plants.

49. ENHANCING DIABETIC RETINOPATHY MULTI-CLASS CLASSIFICATION ROBUSTNESS THROUGH BOTTLENECK ATTENTION AND CROSS-DATASET LEARNING

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Diabetic retinopathy (DR) is a leading cause of preventable blindness worldwide, indicating an increasing need for reliable and scalable automated screening solutions. Deep learning methods have demonstrated encouraging results in retinal image analysis, but their ability to generalize over diverse datasets is still a significant challenge. This study proposes an attention-based deep learning architecture for automated DR classification by integrating the Bottleneck Attention Module (BAM) with a ResNet50 backbone. Two publicly available fundus image datasets, APTOS 2019 and EyePACS have been used to assess the proposed model, to examine both single-dataset performance and cross-dataset generalization. Experimental results demonstrate that the integration of BAM strengthens lesion-focused feature learning, leading to improved classification performance, particularly on the APTOS dataset. To further evaluate the robustness of the model, cross-dataset validation is conducted in two scenarios: (i) training on APTOS followed by fine- tuning and testing on EyePACS, and (ii) training on

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EyePACS followed by fine-tuning and testing on APTOS. Among the scenarios under consideration, the model performed relatively better when it's trained on EyePACS and then refined on APTOS, indicating that training on a dataset with higher clinical diversity enables the learning of more robust and transferable feature representations. Overall, the findings demonstrate the importance of attention-based learning and cross-dataset validation and emphasizes the need of domain- aware training strategies for the development of reliable and clinically applicable DR screening systems.

50. HYBRID DEEP LEARNING MODEL FOR CLASSIFICATION OF THORAX DISEASES

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Accurate classification of thoracic diseases from chest X-ray (CXR) images is essential for effective clinical diagnosis and decision-making. This study proposes a hybrid deep learning–based framework for thorax disease classifica- tion that integrates the complementary strengths of ResNet- 50 and EfficientNet-B4 architectures. EfficientNet-B4 employs a compound scaling strategy to efficiently capture fine-grained visual features, while ResNet-50 utilizes deep residual learning to extract high-level semantic representations and ensure sta- ble training of deep networks. By fusing features from both models, the proposed approach learns rich, diverse, and reliable representations of thoracic pathologies. To enhance robustness and generalization, extensive image preprocessing and data augmentation techniques are applied, reducing overfitting and improving model performance on unseen data. The proposed hybrid model is evaluated on a large-scale, annotated chest X- ray dataset and compared against individual baseline models. Experimental results demonstrate that the hybrid

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framework consistently outperforms the standalone architectures in terms of accuracy, sensitivity, and specificity. These findings indicate that combining multiple convolutional neural network architectures within a unified framework significantly improves medical image classification performance. The proposed method shows strong potential

51. SERVERLESS DATA LAKE FOR REAL-TIME FINANCIAL ANALYTICS

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This research paper introduces a modern, serverless data lake system built to help financial companies handle fast-moving transaction data with ease. Using Amazon Web Services (AWS) tools, the system stores data in Amazon S3, processes it instantly with AWS Lambda, organizes it with AWS Glue, lets users run quick searches with Amazon Athena, and predicts trends using Amazon SageMaker. It tackles common issues like systems that can't grow easily, high costs, and slow traditional setups, all while meeting global financial standards (like ISO 20022). By blending real-time data analysis and machine learning, it automatically spots unusual activity (like fraud) and forecasts market shifts, fixing problems like slow insights and manual work. The system uses a layered data lake (raw, cleaned, and polished zones) to manage different types of financial data, tested with sample datasets to confirm it can scale and perform well. This affordable, flexible platform boosts decision-making and helps meet regulations, setting financial companies up to succeed in a data-driven world.

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52.SPATIAL AND CHANNEL ATTENTION MECHANISM WITH CONVOLUTION NEURAL NETWORK TO DETECT STUTTERING DISFLUENCIES IN SYNTHETIC, ANNOTATED SPEECH SIGNALS USING DATA IMBALANCE AND DATA AUGMENTATION TECHNIQUES

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Stuttering is a speech disorder, which involving disruptions such as sound repetitions, prolongations, and blockages, which is significantly affect an individual's social interaction and emotional wellbeing. Early detection of stuttering disfluency is essential for effective treatment and intervention. This study mainly focuses on the use of machine learning techniques for stuttering classification using the three different datasets, which is having data imbalance problem. To address this data imbalance issue, the Synthetic Minority Oversampling Technique (SMOTE) was employed. To improve the classification accuracy, an attention mechanism, which integrates spatial and channel attention mechanisms was proposed to improve the accuracy of the feature extraction and prediction. We used, 40 Mel-Frequency Cepstral Coefficient (MFCC), and it also has individual classifiers to distinguishing between different stutter class. The result of the study indicates that, the proposed hybrid model given promising results that will be helpful in the early detection of the development stuttering and its assistive technologies for stuttering intervention.

53. IOT-BASED LANDSLIDE PREDICTION AND REAL-TIME ALERT SYSTEM USING ESP-32, LORA AND GSM

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In hilly areas like Munnar, Kerala, where heavy rainfall, unstable terrain, and human activity greatly increase risk, landslides are a serious natural hazard. Traditional landslip warning systems frequently malfunction during severe weather because they mainly rely on cloud servers and constant internet connectivity. An autonomous Internet of Things landslip prediction and alert system based on the ESP32 microcontroller is proposed in this work. The system combines a number of environmental sensors to track temperature, humidity, vibration, ground inclination, rainfall intensity, and soil moisture. To calculate a Landslip Risk Index (LRI), a lightweight Edge AI model analyses the sensor data locally. While GSM technology is used for public alerts via SMS, automated voice calls, and local sirens, LoRa is used for long-distance communication. Even in the event of a network outage, the system continues to function because it is not dependent on the internet. The suggested solution is dependable, affordable, and appropriate for implementation in remote and disaster-prone areas, as evidenced by experimental testing that reveals an accuracy of roughly 88–90% in identifying high-risk conditions.

54. ARTIFICIAL FORGETTING IN NEURAL NETWORKS: CONTROLLED KNOWLEDGE REMOVAL FOR PRIVACY-AWARE AND COMPLIANT MACHINE LEARNING MODELS

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Machine unlearning, also referred to as controlled knowledge removal, has emerged as a foundational requirement in artificial intelligence due to increasing data privacy mandates such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). Unlike traditional retraining, which requires full dataset access and considerable computational cost, artificial forgetting aims to modify a trained model to selectively eliminate the influence of specific training data or learned knowledge while preserving performance on retained tasks. This paper proposes a principled framework for controlled knowledge removal in neural networks, integrating theoretical foundations, algorithmic strategies, and evaluation metrics that balance privacy guarantees with utility retention. We systematically analyze existing unlearning techniques, spanning exact and approximate mechanisms, federated and distributed unlearning, and privacy/security implications. Furthermore, we introduce novel metrics for quantifying forget quality and propose a scalable algorithmic pipeline that achieves provable unlearning guarantees. The effectiveness of our approach is empirically validated across diverse neural architectures and data settings, demonstrating strong compliance with forgetting objectives and minimal degradation in generalization. Our results establish a new direction for privacy-aware neural network design and lay the groundwork for robust, compliant deployment of AI systems in real-world environments.

55. GENERATED EXPRESSION AND PRIVATE KEY BASED ENCRYPTION ALGORITHM FOR SECURE PASSWORD PROTECTION

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This work introduces a new alternative approach to using passwords as an authentication mechanism to protect against database breaches for modern authentication systems. The alternative mechanism uses dynamically generated math expressions, based on an operator and a huge private numeric key, in order to implement a one-way password conversion system. Unlike traditional hashing algorithms, which generate identical outputs (deterministically), the alternative mechanism will use an example of changing the user-specific logic that determines how the operator will be processed. As such, it produces completely different cipher texts for the same password for each user, which reduces the likelihood of being subject to hash collisions and/or pre-computing attacks. Furthermore, this system employs strict data minimization concepts in that it will only store the generated cipher text and associated operator expression in the database, while the plaintext password and private key will be stored in a secure outside environment. The private numeric key will only be used during the transformation and verification processes. The ability to dynamically generate user logic expressions produces very diverse transformations and helps to verify that the users authentications are correct using the generated cipher text while still operating in a deterministic authentication method

56. DENSENET VISION SYSTEM FOR CROP PROTECTION ASSESSMENT

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Crop protection plays a vital role in ensuring agricultural sustainability and stable food production by safeguarding crops from biotic stresses that adversely affect plant health and yield. Among these stresses, pest infestations cause substantial economic losses when not identified at an early stage. Traditional crop protection practices rely on manual field monitoring and expert assessment, which are often inefficient, costly, and impractical for large-scale or resource-constrained farming environments. To address these challenges, this study presents a DenseNet-based vision system for intelligent crop protection assessment using leaf image analysis. The proposed framework employs a DenseNet approach to automatically recognize pest-induced symptoms on crop leaves and classify pest categories with high accuracy. The DenseNet architecture enhances feature propagation and reuse, enabling robust learning of complex visual patterns under diverse field conditions.

57. DESIGN AND EVALUATION OF A NATURAL SUNSCREEN USING BANANA PEEL AND MICROBIAL COMPONENTS.

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The increase in global warming and rising exposure to ultraviolet (UV) rays highlight the need for clean, chemical-free, and environmentally friendly sunscreens. This study presents the design and evaluation of a natural sunscreen developed using agricultural waste and microbial components, offering a sustainable and affordable alternative to conventional chemical formulations. Antioxidants from banana peels, enzymatic components from Escherichia coli K12, and cellulose from Pseudomonas aeruginosa were used together to create a physical barrier, along with a self-repairing mechanism, against UV rays. The sunscreen was developed as a stable gel-based formulation. The final product demonstrated effective UV protection with an SPF value of 10.1, highlighting the potential of waste-derived, bio-based sunscreen formulations as suitable sun protectants.

58. AI-DRIVEN ACCIDENT DETECTION AND EMERGENCY RESPONSE SYSTEM FOR REDUCING TRAFFIC FATALITIES

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Road traffic accidents in India represent a signifi- cant public health and safety issue, resulting in approximately 150,000 fatalities each year. A major factor contributing to these fatalities is the delay in emergency response, along with manual and frequently unreliable accident reporting systems. This paper presents a comprehensive AI based framework for accident detection and emergency response aimed at minimizing response times and enhancing coordination among emergency services, vehicle owners, and healthcare providers. The framework utilizes advanced computer vision methods, sensor-derived data from IoT devices, and Automatic Number Plate Recognition (ANPR) to detect accidents, retrieve vehicle information, and automatically issue alerts. The system offers real-time situational awareness via a centralized monitoring dashboard by integrating GPS, hospital databases, and government records. Proactive measures for road safety. This system aims to mitigate fatalities, optimize emergency resource allocation, and enhance road safety across both urban and rural contexts in India.

59. SECURE LIGHT: ADAPTIVE HEADLIGHTS FOR SAFER NIGHT DRIVING

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This solution falls under the domain of Transporta- tion Safety and Automotive Technology. It specifically addresses safety concerns related to vehicle lighting systems and proposes a technological solution to mitigate glare and reduce accident risks on roads, thereby enhancing overall road safety for both drivers and pedestrians. Glare from oncoming traffic headlights can cause traffic accidents, especially at night. According to NCBI, high-intensity headlights can dazzle and temporarily blind drivers, which can lead to accidents. In the US, 12–15 To address the issue of high-intensity LED lights from oncom- ing vehicles causing hazards on the road, a solution has been developed to detect approaching vehicles and adjust the light distribution to enhance road safety. To implement this solution, sensors are used to detect the presence of oncoming vehicles. In this context, infrared (IR) sensors, and light-dependent resistors (LDR) are suitable for detecting vehicles at a distance. LDR sensors, on the other hand, detect variations in light intensity from approaching headlights, enabling real-time glare reduction mechanisms. The importance of technological advancements in enhancing road safety is evident, with the newly implemented project demonstrating superior performance compared to the older version in mitigating glare and reducing accident risks.

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60. CROSS-PLATFORM DISASTER SYSTEM WITH AI-POWERED RISK ANALYSIS AND REAL-TIME EMERGENCY COMMUNICATION

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This research develops Disasters, bothnatural and man-made, pose significant threats to human lives and infrastructure. Effective disaster management requires real-time communication, accurate risk assessment, and adaptive response mechanisms. This research proposes a cross-platform disaster management system that leverages artificial intelligence (AI) to enhance disaster prediction, risk analysis, and emergency communication. The system integrates real-time weather data, AI-driven risk modeling, and offline capabilities to ensure continuous operation even in low-connectivity areas. By utilizing AI for predictive analytics and decision-making, the system aims to minimize disaster impacts and improve response efficiency. This research also explores the challenges of integrating AI with disaster management, the role of cross-platform applications in emergency response, and methods to enhance offline functionality for uninterrupted disaster management.

61. A LIGHTWEIGHT MULTIMODAL CNN FRAMEWORK FOR CROP DISEASE DIAGNOSIS AND MULTILINGUAL ADVISORY SYSTEM

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Monitoring and managing plant diseases is essential for maintaining agricultural productivity and long-term food sustainability. While image-based deep learning models have demonstrated strong performance in plant disease recognition, their dependence on visual data alone restricts practical use in real-world farming scenarios, particularly for farmers with limited literacy or poor image acquisition conditions. To address these limitations, this work presents a multimodal crop disease diagnosis system that combines a computationally efficient Convolutional Neural Network (CNN) with a natural language processing component, enabling interaction through images, text, and voice inputs. The CNN is trained using the PlantVillage dataset, which includes 38 disease categories across 14 crop species, and attains a classification accuracy of 99.1% with a macro-averaged F1-score of 0.98. In addition, a large language model–driven advisory module is integrated to deliver multilingual disease explanations and treatment guidance. Experimental evaluation confirms that the proposed system maintains robust generalization across multiple crop types while requiring minimal computational resources, making it suitable for real-time deployment on mobile platforms. By supporting natural user interaction and providing actionable disease management insights, the framework improves both accessibility and practical usability for farmers.

62. CROSS-PLATFORM SMART AGRICULTURE MONITORING SYSTEM

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This article presents the design and implementation of a Cross-Platform Smart Agriculture Monitoring System for converting traditional farming methods to smart farming through the use of IoT, cloud computing, and real-time analysis. The system makes it simple to monitor agricultural conditions such as soil moisture, temperature, humidity, and crop health using mobile and web platforms. Built with cross-platform development tools like Flutter and powered by cloud platforms like Firebase and AWS IoT Core, the solution makes it easy and scalable for farmers in terms of geography. The system supports SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production) with improved yield prediction, use of resources, and data-driven agriculture. The proposed model is data privacy and interoperability standard conformant at the international level and offers a robust, intelligent, and friendly agricultural system. Compared to conventional support systems for farming, the model is

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designed with simplicity and low power consumption for use in resource- constrained rural areas. Cross-platform compatibility enables Android and web users alike to gain real-time insights with low latency, facilitating farmers to make data-informed decisions. With analytics and alerting functionality, the system delivers tailored recommendations, enhancing precision agriculture and its reach and impact even to small and marginal farmers.

63. AI-BASED SATELLITE HEALTH PROGNOSTICS USING TEMPORAL CONVOLUTIONAL NETWORKS

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The telemetry data generated by modern satellite missions is growing at an exponential rate, but the way we operate health monitoring is overwhelmingly reactive in nature. Repetitive limit checking and threshold detection systems fail to register subtle degradation trends until a catastrophic fault occurs. This results in a sub-optimal mission life and loss of scientific data. To remedy this, we propose a prescriptive health prognostics solution leveraging AI-based Temporal Convolutional Networks (TCN) to predict the upcoming state of essential satellite subsystems. The architecture of the system was validated upon public telemetry from the ESA OPS-SAT mission. The final validation was performed upon proprietary operational data from the U R Rao Satellite Centre, Indian Space Research Organisation, which we shall not disclose. Raw telemetry is processed by way of an anonymization mechanism that normalizes sequences using a sliding window technique of sensitive mission parameters. The TCN model's causal and dilated convolutions successfully capture the long-range temporal dependencies that cannot be captured by Recurrent Neural Networks (RNNs). Experimental results show that the proposed system achieves a prediction accuracy of 96.4% in forecasting battery voltage and thermal trends compared to baseline statistical methods. Incorporating this model into an operator's dashboard in a ground station enables advisory lead time for preventive maintenance thus furthering the goals of sustainability and resilience in space infrastructure.

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64. END-TO-END DEVOPS WORKFLOW WITH SERVERLESS ARCHITECTURE

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The increasing prevalence of serverless architectures has reshaped modern DevOps workflows by providing the ability to have scalable, cheap, and fully automated cloud deployments. That said, optimizing serverless applications for dynamic workloads can be complex, particularly when balancing performance, security, and cost. This research paper applies an end-to-end DevOps workflow for serverless applications. In particular, we utilized AWS Lambda and Azure Functions to increase automation, scalability, and cost management. The proposed solution follows structured five-phase design: (1) develop serverless function prototypes, (2) automate CI/CD pipelines to enable a frictionless deployment process, (3) attach monitoring and logging using AWS CloudWatch and Azure Monitor, (4) develop cost optimization strategies, and (5) conduct scalability validation in the presence of dynamic workloads. The key challenges encountered were dynamic workload optimization, cost management best practices, and security. The results showed a streamlined DevOps workflow that improved serverless application performance while achieving reduced operational costs. The research applies ISO/IEC 17788 cloud computing standards to provide for a solid architecture for deploying sec ure, scalable, and efficient serverless solutions in production. The findings improve the practice of serverless DevOps more broadly, through actionable recommendations for enterprise organizations migrating to cloud-native architectures.

65. XMACNET: AN EXPLAINABLE LIGHTWEIGHT ATTENTION BASED CNN WITH MULTI-MODAL FUSION FOR CHILI DISEASE CLASSIFICATION

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Plant disease classification via imaging is a critical task in precision agriculture. We propose XMACNet, a novel light-weight Convolutional Neural Network (CNN) that integrates self-attention and multi-modal fusion of visible imagery and vegetation indices for chili disease detection. XMACNet uses an EfficientNetV2S backbone enhanced by a self-attention module and a fusion branch that processes both RGB images and computed vegetation index maps (NDVI, NPCI, MCARI). We curated

a new dataset of 12,000 chili leaf images across six classes (five disease types plus healthy), augmented synthetically via StyleGAN to mitigate data scarcity. Trained on this dataset, XMACNet achieves high accuracy, F1-score, and AUC, outperforming baseline models such as ResNet-50, MobileNetV2, and a Swin Transformer variant. Crucially, XMACNet is explainable: we use Grad-CAM++ 5 and SHAP to visualize and quantify the model's focus on disease features. The model's compact size and fast inference make it suitable for edge deployment in real-world farming scenarios.

66. ACCIDENT DETECTION AND ALERT SYSTEM

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The Road Accident Detection Alert System is de- signed to identify road accidents in real-time using computer vision techniques. It analyzes visual inputs to detect collisions and triggers an immediate audio alert to notify nearby individuals. The system captures a screenshot of the accident scene along with the date and time for proper documentation. It also facilitates quick emergency response by allowing authorized personnel to call an ambulance through integrated communication services. The system aims to reduce emergency response time and im- prove road safety. Technologies like OpenCV, Twilio, and sound libraries are used to implement key features effectively. By leveraging machine learning and image processing, the system can identify accidents under various conditions, enhancing its reliability. This system not only improves real-time monitoring but also provides critical data for traffic management and accident prevention in the future. With continued advancements, the system can be integrated with smart traffic infrastructure to further optimize road safety measures.

67. INTELLIGENT ROBOTIC SPIDER HAZARDOUS AREA EXPLORATION

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The project is a smart multi – legged robot spider that would inspect and survey the unsafe areas covering those places that are not safe or unreachable by people. The robot moves like a spider with servo drives and has many built-in sensors to allow it to walk steadily and see what is in its environment in real-time. Its main sensing parts include: MQ-2 gas detector, ultrasonic distance sensor, temperature monitoring and wireless video stream. These allow the robot to continue checking for toxic gases, obstacles in the vicinity and weather inside the area. An Arduino-based board is used to control the robot, and hence develop coordinated walking patterns to enable the robot navigate through rough and cluttered ground. All data gathered and live video are sent wirelessly to an operator so that decisions can be made safely from far away. The system is a combination of embedded control, data from numerous sensors, power management and wireless link to provide a reliable and efficient tool for industrial inspection, underground surveys, and emergency responses. The robotic spider solves these problems by having numerous legs for movement, immediate detection of hazards and wireless transmission of information from a small embedded system. Its design ensures that things such as gas leaks, temperature changes and obstacles are found and reported to the operator quickly.

68. ANALYSIS OF EARLY PREDICTION OF WINE QUALITY BASED ON DEEP LEARNING AND MACHINE LEARNING METHODS AND TECHNIQUES

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Using machine learning to predict wine characteristics is now a big deal because wineries need a fast, objective way to evaluate different wine attributes. Various ML approaches, ranging from classical techniques such as SVM, RF, and KNN to deep learning methods like 1D-CNNs and transformer-based models, have been developed. These studies aim to improve several aspects, including prediction accuracy, handling class imbalance in datasets, and integrating viticulture and spectral imaging data, as well as hybrid models. This paper summarises 30 recent articles in the field of wine quality prediction that analyse the aims, methods, datasets, evaluation metrics, and limitations of these studies, along with suggestions for advancing and developing more robust, accurate, and generalizable predictive models.

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69. RISK-AWARE GRAPH NEURAL POLICIES FOR DYNAMIC ELECTRIC-VEHICLE ROUTING VIA SAFE MULTI-AGENT REINFORCEMENT LEARNING

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Dynamic electric-vehicle routing (DEVR) requires solving complex combinatorial problems under battery safety constraints and uncertain demand. Conventional heuristics typically determine routes first and incorporate safety considerations afterward, limiting real-time adaptability and failing to model charging queues, nonlinear charging behavior, and state-of-charge (SOC) restrictions. This study presents RaGNS-MARL, an end-to-end Risk-Aware Graph Neural Policy for Safe Multi-Agent Reinforcement Learning, designed to address these limitations. In this framework, each electric vehicle operates as an autonomous agent on a spatio-temporal road–charger–customer graph, sharing a graph neural network (GNN) encoder and being trained within a constrained Markov decision process (CMDP) to minimize total operational cost while satisfying probabilistic energy depletion constraints. Safety is ensured through a Lagrangian penalty mechanism for constraint violations and an on-policy safety projection layer, which maps infeasible charger–energy decisions to the closest feasible alternatives. Additionally, surrogate models are developed to capture (a) queueing delays at charging stations and (b) nonlinear constant- current/constant-voltage (CC–CV) charging times, enabling accurate prediction of dwell durations. Across dynamic Solomon-style benchmark scenarios extended with stochastic arrivals and charger queues, RaGNS-MARL achieves a 7–15% reduction in total operating cost and a 60–90% reduction in depletion risk compared with strong heuristic baselines, while consistently meeting strict service-time requirements.

70. SMART GSM-FREE FIRE ALERT AND MONITORING SYSTEM

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Fire incidents and gas releases remain a serious menace in the residential, industrial, and institutional environments. Traditional fire alerts are very much dependent on GSM modules to communicate but this aspect makes it expensive, consumes more electricity and provides unreliable alerts in regions with low network coverage. The paper will describe a Smart GSM-Free Fire Alert and Monitoring System, which uses an ESP32 microcontroller with built-in Wi-Fi technology to offer real-time, Internet-based alerts. The system is comprised of MQ-2 smoke sensors, MQ-6 LPG gas sensors, flame sensor and DHT11 temperature- humidity sensor which allows 24/7 monitoring of the environment. A dashboard, which is linked to the cloud enables displaying sensor data in real-time, and a threshold-based analysis transmits instant notification and local alarms. An RF communication and an Arduino Nano make up a secondary receiver module, which provides backup monitoring capabilities. The suggested design will ensure low cost, improved responsiveness, energy saving, and reliable delivery of alerts without the need of SIM based GSM networks. The results of the experiments prove the stable functioning, quick identification of hazards, and the applicability to smart safety systems.

71. AI-POWERED AUTONOMOUS ASSISTIVE ROBOT WITH ARM SUPPORT

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The present paper describes an independent assistive robot that is designed to identify, find, and pick up objects and apply lightweight embedded artificial intelligence. It is an effective computer-vision and machine-learning program that takes place on a Raspberry Pi 3 Model B+ and is a live perception. The robotic arm used is a 3-DOF, which is used in pick-and-place tasks, and the 4WD mobile base is used to navigate flat indoor environments. Its architecture supports the continuous visual feedback with the use of a WebCam and uses the ultrasonic ranging to provide safe execution of paths and exclusion of obstacles. The design eliminates external computing units, complex programming environment or proprietary control systems. Experimental validation supports credible execution of tasks, good response performance and reliable hardware-software coordination of human-assistive systems, warehouse automation, and material handling.

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72. A HYBRID SOFTWARE AND REAL-TIME SENSOR-BASED LIVER DISEASE DETECTION SYSTEM USING MACHINE LEARNING

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Liver disease is a major health issue in many countries. Finding the disease early is important for effective treatment. Traditional diagnosis often requires several medical tests and repeated hospital visits, which can delay early detection. This paper introduces a web-based liver disease detection system that uses machine learning to predict health risk at an early stage. The system uses a Random Forest classifier trained with key medical parameters such as bilirubin levels, liver enzyme values, and protein measurements. The application is developed using the Python Flask framework and provides secure user access, fast prediction results, and graphical analysis. Experimental evaluation shows that the proposed system produces accurate and reliable predictions. The system can be used as a useful screening tool for both users and healthcare professionals to monitor liver health early. The system helps users understand their health condition through clear and easy-to-read results. It reduces the need for frequent hospital visits by providing an initial health check online. Since the system is web-based, users can access it from any location. Secure data storage is used to protect personal medical information. Overall, the system supports early awareness and better management of liver health.

73. NOVEL REDUCED-SWITCH NINE-LEVEL INVERTER WITH OPTIMIZED LOW-FREQUENCY MODULATION: HARDWARE IMPLEMENTATION AND PERFORMANCE VALIDATION

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Multilevel inverters are increasingly popular due to their ability to generate high-quality output voltages with reduced harmonic distortion. Their performance can be further enhanced by employing a low-

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switching-frequency modulation scheme, which allows precise control over output voltage amplitude and harmonics. However, determining the optimum switching angles to minimize total harmonic distortion typically requires complex algorithms and numerous iterations. This work presents a novel approach for calculating optimum switching angles at low switching frequencies to achieve minimal total harmonic distortion in the output voltage. The proposed calculation technique uses only a single control parameter, enabling the optimum switching angles to be computed with fewer iterations. The effectiveness of the calculated switching angles in reducing harmonic distortion is validated through MATLAB/Simulink simulations and experimental results obtained from a small-scale lab prototype of a symmetric five-level inverter. To demonstrate generality, the proposed switching-angle calculation technique is tested across various inverter levels to minimize total harmonic distortion. Extensive comparisons with other popular low- frequency strategies (Equal Phase, Feed Forward, and Half-Height methods) verify the superiority of the proposed technique. It produces lower harmonic distortion and a higher fundamental voltage than those methods.

74. EMBEDDED SYSTEM BASED COMPREHENSIVE SMART DRIVING SUPPORT SYSTEM WITH INTEGRATED SIGN BOARD GUIDANCE FOR FOLLOWING VEHICLE

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The sharp rise in traffic accidents occurs because drivers face three main challenges. Conventional driver assistance systems don’t give surrounding vehicles real- time instruction; instead, they concentrate mostly on the safety of individual automobiles. The study develops a smart driving support and warning system through embedded systems which combines sensor-based hardware with software-based visual processing. The system uses three sensors which include the MPU6050 MEMS sensor and RCWL- 0516 radar module and ultrasonic sensor to track vehicle movement and track object proximity while the laptop-connected webcam conducts software-based monitoring and decision-making. The ESP8266 Wi-Fi module enables wireless communication which allows following vehicles to view live warning information on a DMD display board. The buzzer provides immediate audio warnings to drivers during emergency situations. The proposed solution uses real-time visual and audio alerts to enhance situational awareness while reducing rear-end crashes and improving overall road safety. By offering continuous situational updates, hazard warnings, and visual guidance to trailing vehicles, the proposed system minimizes human error, enhances driver cooperation, and decreases the likelihood of

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collisions in dense traffic or poor visibility conditions. The solution provides a cost-effective, scalable, and intelligent assistance platform suitable for modern transportation, smart mobility systems, and next-generation automotive safety applications. This sign board uses LED/LCD/DMD display technology to show dynamic text, arrows, warning icons, or speed recommendations to the following vehicle in real time.

75. GUARDNET: AI-DRIVEN INTRUSION DETECTION WITH HYBRID PYTHON-C++ BACKEND

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In modern network infrastructures that are beginning to evolve to high-speed smart environments, traditional signature-based Intrusion Detection Systems (IDS) exhibit a striking vulnerability to detect zero-day exploits and variations in time. In order to overcome this weakness, we introduce a very high-performance hybrid NIDS named GuardNet which separates the process of raw packet-reading and deep- learning analysis. The system consists of a C++ Data Acquisition Plane which makes use of the Npcap library to perform line-rate sniffing, avoiding operating-system stack overhead and allowing real-time provision of packet length, service ports and similar features. The transmission of these features is done through a secure RESTful bridge to a Python based Intelligence Plane which uses a multi-tier AI engine. To filter benign traffic, GuardNet uses an unsupervised K -Means clustering module as a statistical gating unit, and a Stacked Long Shortterm Memory (LSTM) network is used to analyze the complex temporal patterns of attacks. Live Wi-Fi traffic empirical assessment based on 97.66% classification accuracy and 100.00% precision are fully able to remove false positives. In addition, the system comes with an autonomous mitigation layer, called Sentinel that imposes real time IP blocking in high confidence predictions. GuardNet is a flexible, transparent structure that balances the trade-off between computational complexity and real time responsiveness in the context of the current cybersecurity defense.

76. HYBRID AUTOMATIC SPEECH RECOGNITION UTILIZING CROSS-ENCODER EMBEDDING FUSION

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Automatic speech recognition (ASR) systems based on transformers have significantly increased the accuracy of the transcription in a variety of linguistic and acoustic environments. However, open-source applications like Whisper [1] degrade in performance when faced with spontaneous speech, noisy speech, or speech domain. In its turn, proprietary services, such as Deepgram [14][15], provide accurate timestamps and confidence scores, which can be attributed to their more robust acoustic modeling systems. This paper presents a hybrid ASR system, known as CEEF (Cross-Encoder Embedding Fusion), a system combining the linguistic generalization properties of Whisper and the acoustic strength of Deepgram. CEEF has two main modules, including (1) a confidence-weighted logits steering mechanism that controls the token probabilities during decoding; and (2) a temporally biased cross-encoder fusion module that aligns Whisper-encoded representations with Deepgram embeddings using Gaussian at- tention. Experimental analyses reveal that CEEF has lower word error rates, greater stability of decoding, and less latency than Whisper alone, without sacrificing computational tractability by using Low-Rank Adaptation (LoRA) [4]. The results suggest that hybrid ASR designs have the potential to outperform monolithic and ensemble designs, and can additionally encourage scalable, interpretable, and model-agnostic speech processing.

77. AUTOMATIC TWO WHEELER BRAKING SYSTEM IN HILLS

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This project addresses a critical safety concern for two-wheeler riders navigating hilly terrain, the dangerous and unstable condition of rollback on steepinclines. Conventional manual braking systems, which require precise coordination of both front and rear brakes, often prove inadequate in these high-stress situations. The project aims to develop and implement a practical, automated braking solution

that enhances rider safety and convenience by preventing the vehicle from rolling backward when starting from a stop on an uphill slope.The proposed system utilizes an intelligent design, a microcontroller, and an automated mechanical braking mechanism. The systems operation is primarily based on the data received from a sensor, which functions as atriple-axis accelerometer. The sensor continuously measures the vehicles angle of inclination. This data is transmitted to a microcontroller, which serves as the central processing unit. By analyzing the X and Y acceleration readings, the microcontroller can determine if the vehicle is stopped on an uphill slope. When this condition is met, and the rider attempts to start the vehicle, the microcontroller triggers an automated braking process.This eliminates the need for the rider to simultaneously manage the clutch, accelerator, and manual brakes, a task that can be particularly difficult and prone to error on asteep incline. This system directly contributes to the United Nations Sustainable Development Goal 3 (SDG 3): Good Health and Well-being, specifically Target 3.6, which mandates halving the number of global deaths and injuries from road traffic accidents by 2030. Furthermore, this technological advancement supports SDG 9: Industry,Innovation, and Infrastructure, by fostering resilient transport infrastructure and promoting inclusive and sustainable industrialization (Target 9.1). By introducing innovative, reliable safety technology tailored to regional geographic needs, this project facilitates safer, more efficient, and sustainable mobility solutions. The expected outcome is a robust, cost-effective safety mechanism thatpreserves human life and health while advancing sustainable transport systems in vulnerable topographies.

78. EDURANKER: A MACHINE LEARNING-BASED STUDENT RANKING AND ACADEMIC ANALYTICS FRAMEWORK

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EduRanker is an intelligent, data-driven academic analytics frame work designed to automate student ranking and performance prediction using machine learning techniques. Traditional academic evaluation systems primarily rely on examination scores and manual computation, often lacking transparency, scalability, and predictive capability. The proposed system integrates multi-parameter evaluation metrics including academic scores, attendance, participation records, and behavioral indicators to generate fair and holistic rankings. The system is implemented using Python-based backend frame works such as Flask/FastAPI, with data preprocessing and modelling performed using Pandas, NumPy, and Scikit-learn. Visualization modules are built using Matplotlib and modern web technologies(HTML, CSS, JavaScript) to provide interactive dashboards. Predictivemodels such as Random Forest, Logistic Regression, and GradientBoosting are employed to identify at-risk students and forecast academic outcomes. EduRanker promotes transparency, fairness, and proactive academic intervention by enabling real-time analytics and role-based access control. Experimental validation using benchmark educational datasets demonstrates improved ranking accuracy and predictive reliability. Theframework provides a scalable, secure, and adaptable solution for modern educational institutions.

79. SCALABLE SERVERLESS WORKFLOW FRAMEWORK FOR E-COMMERCE

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Fast and fast-paced is online shopping, and we want businesses to be able to navigate this ever-changing landscape without getting stuck in systems that feel like a swamp. These server-based solutions do not typically hold up well to sudden increases in site traffic causing slowdown (or outright failure) at the very time your customers are depending on speed and reli- ability.This article brings a serverless solution offering utilizing AWS services, such as AWS Lambda, DynamoDB, EventBridge (or Event Bus), and Step Functions to optimize the e-commerce process. With such a cloud-based process, companies are able to take and fulfill orders, do inventory control, accept payments, and maintain a relationship with customers — all with no need to store a server.What's so potent about this system?

Flexibility and scalability. Be it a giant holiday sale or an unanticipated spike in demand, this platform scales on its own to accommodate the ebbs and flows of traffic. Which is to say, even as demand peaks, transactions will be smoother and shoppers won't hit a wall — at least not that wall.And with event-driven microservices and automation tools, it's also a lot faster and more reliable. This further removes any delays or bottlenecks that customers might experience – they can now continue shopping, feeling reassured that the value was applied. And, by simplifying and improving fault tolerance and reliability of the system, business can do what running and scale-appropriate infrastructure, and businesses don't have to worry about what that appropriate infrastructure is—they can get back to we're the best at, all while not having to drain financial resources to make it all work.

80. DYNAMIC LOAD MANAGEMENT IN SMART GRIDS USING EDGE INTELLIGENCE

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The overloads are increasing, and new distribution networks are becoming congested because of fast load variations, inadequate real-time visibility, and delayed functions (especially the control functions), leading to reduced grid reliability. We managed to suggest a decentralized smart energy grid infrastructure in this paper, which incorporates IoT-based sensors and deep learning deployed at the edge for predictive load control. The ES bu intelligent meters identify electrical variables (voltage, current, frequency, power factor, and total load) repeatedly, and this data is transferred to an MQTT Raspberry Pi edge node. The short-term load forecasting is achieved with a lightweight three-layer LSTM model trained using TensorFlow Lite, which allows a tiered decision maker to decide in real

time, without the cloud. Evaluation of that with actual utility data and profiles grown through MATLAB demonstrates the high predictive performance with an R2 value of 95.32%, a mean absolute error of 1.094 kW, and a mean absolute percentage error of 3.66% is achieved. The anticipated load is overridden to operation states of Normal, Warning, and Critical, with running automatic loads and priority-based shedding, provided the allowable load is met by a specially defined allowable load. The suggested architecture is unique, and it combines edge intelligence, real-time control logic, and cloud-based visualization in one system to reduce response time and increase grid resiliency. The findings indicate that anticipatory load control can be scaled down to a cost-effective scale of deployment at the smart grid level.

81. SMART FLOOD DETECTION AND EARLY WARNING SYSTEM FOR PREVENTION

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Floods are among the most damaging natural disasters, leading to loss of life, property damage, and disruption of daily activities. To reduce these impacts, this project presents a Smart Flood Detection and Early Warning System with Prevention capabilities. The system continuously monitors water level,

water flow, temperature, and humidity using an ultrasonic sensor, flow sensor, and DHT11 sensor. These sensor readings are processed by a microcontroller and compared with predefined threshold values. When flood- risk conditions are detected, the system immediately activates a buzzer, displays warning messages on an OLED screen, and automatically turns ON a motor pump through a relay module to remove excess water. In addition, real-time alerts and sensor data are sent to users through Blynk IoT and a Telegram Bot, enabling remote monitoring and quick response. The prototype demonstrates accurate sensing, fast alert generation, and reliable flood prevention. Due to its low cost, scalability, and ease of installation, the proposed system is suitable for residential areas, agricultural lands, drainage systems, and remote flood-prone locations.

82. DESIGN OF HIGH-PERFORMANCE DSP MULTIPLIER USING STACKER BASED BINARY COMPRESSION TECHNIQUE

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Digital Signal Processing (DSP) systems highly rely on multipliers with fast arithmetic operation. In this project, a high-performance DSP multiplier is designed using a stacker- based binary compression technique. The proposed method minimizes delay by efficiently reducing partial products. The stacker method groups bits vertically and compresses them using simple hardware blocks. This reduces the number of addition levels and makes the overall design faster. The architecture also maintains low power consumption while increasing speed, making it suitable for both small and large DSP systems. The code for the multiplier is written in Verilog HDL.It isimplemented on a Xilinx Spartan-3E FPGA using the Xilinx ISE tool. The experimental results demonstrate improvements in operational speed, area and power consumption when compared to traditional multipliers. This design is suitable for DSP applications that are well suited for high-throughput and low-power applications.

83. SMART CONSTRUCTION SAFETY MANAGEMENT SYSTEM USING YOLOV8 FOR REAL-TIME PPE COMPLIANCE MONITORING

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Construction sites are very dangerous places where accidents happen frequently. A major cause of such accidents is the incorrect use of personal protective equipment (PPE). Manual traditional monitoring is very slow and inconsistent and it cannot give a feedback in real-time. In this paper, an AI-based Construction Safety Management System that uses a low-cost ESP32-CAM module for live video streaming combined with a YOLOv8 deep learning model for real-time PPE detection is pre- sented.The ESP32-CAM sends the MJPEG frames over the Wi-Fi network, and these frames are then analyzed inference server to locate helmets, vests, and masks with high precision. To train the YOLOv8 model, a hybrid dataset of 23,000 annotated images was used, and extensive augmentation was applied to make the model robust against low-resolution and variable lighting conditions. it can achieve up to 45 FPS with a mean Average Precision of 91%.The web-based dashboard shows the real-time detections, violation logs, worker statistics, and a chatbot guided by OSHA that gives safety recommendations and helps in compliance. By combining computer vision, IoT, and safety analytics, it is possible to have a system that is automated, accurate, and cost-effective in monitoring PPE compliance in construction environments. The present work is a demonstration of a full and feasible end-to- end scenario with the integration of ESP32-CAM IoT sensing and state-of-the-art YOLOv8 detection to site safety enhancement and violation risk reduction significantly.

84. DEVELOPMENT OF AGNO 3 NANOPARTICLES MEDIATED WOUND HEALING GEL FROM MADAGASCAR PERIWINKLE

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Creating products for wound care that can fight off bad bacteria is very important to prevent infections and help wounds heal faster. This study is about making a kind of wound healing gel that uses tiny silver particles. We made these tiny particles using the flowers of the Madagascar periwinkle plant. The special thing about this plant is that it helps turn a type of silver into these particles. We checked that this really happened by using a tool that can see how much light these particles absorb and it showed us a peak at 374 nm.We then put these silver particles into a gel that we made with safe ingredients like polyvinyl alcohol, glycerin, coconut oil and some other helpful things. This gel is good for putting on wounds because it is gentle and does not hurt the skin. We tested this gel to see how well it works against bacteria that can infect wounds. What we found out is that this gel is very good, at fighting off these bacteria.So our study shows that we can make a wound healing gel using these silver particles and a plant-based method. This is a way to make products that can help people heal from wounds.

85. SMART ENERGY METER WITH ENHANCED IOT NOTIFICATION SYSTEM

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The recommended framework has multiple options for its expansion. The research team will use actual vaccination operational data from rural medical facilities to test their system. The system will enable real-time monitoring together with instant decision-making through the combination of live data from GPS-equipped vehicles and Internet of Things temperature monitoring devices. The demand forecasting system requires seasonal models together with uncertainty-based models to improve its ability to manage sudden changes in vaccination requirements. The routing system currently supports multiple vehicles together with different traffic conditions. The next step requires the team to implement policy restrictions which will include both priority groups and emergency vaccination programs. The proposed framework will gain better scalability and improved performance through these enhancements which will help in conducting large-scale rural vaccination programs. The proposed system also automates the creation of monthly bills and provides dynamic visual graphs of usage trends/patterns to allow users to make informed decisions. The proposal is aligned with several Sustainable Development Goals (SDGs), through promoting the use of energy in a responsible manner and supporting SDG 7 (Affordable and Clean Energy) and SDG 12 (Responsible Consumption and Production); as well as through the use of IoT technologies and intelligent monitoring techniques, support for SDG 9 (Industry, Innovation and Infrastructure). The measurements taken within this proposal will improve the efficiency of all residential and workplaces using this technology and therefore, will provide measurable benefits to all end-users.

86. FORMULATION AND ANTIFUNGAL ASSESSMENT OF ALLIUM FISTULOSUM EXTRACT AGAINST ORAL CANDIDIASIS

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Oral candidiasis is a common opportunistic infection caused by Candida albicans. There has been growing interest in alternative medicine due to limitations associated with conventional antifungal medication. Allium fistulosum has been identified as a source of bioactive compounds such as sulfur compounds, which exhibit antimicrobial properties. However, there has been less emphasis on using such plants as A. fistulosum as alternatives or complementary medicine. This study aimed to develop a herbal medicine using A. fistulosum to investigate its effect on Candida.Leaves of A. fistulosum were extracted using solvent extraction, and the resulting extract was incorporated into an oral preparation. This preparation was characterized for physicochemical attributes such as pH, homogeneity, and stability. Antifungal activity was also determined using Disk diffusion and minimum inhibition concentration methods for Candida albicans, with a commercial antifungal drug acting as a positive control. All analyses were done in triplicate. The developed Allium fistulosum formulation exhibited concentration- dependent antifungal activity, resulting in a significant inhibitory zone against Candida albicans.The developed formulation exhibited satisfactory stability and antifungal properties. The result indicated that Allium fistulosum might be a potential plant ingredient in developing antifungal agents for the treatment of oral candidiasis.

87.BLOCKCHAIN BASED MULTI FACTOR AUTHENTICATION FOR EHR USING DOCKER

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In modern healthcare, Electronic Health Records (EHRs) play a vital role in storing and managing patient information." However, they face serious risks due to increasing cyberattacks aimed at stealing sensitive medical data. Unauthorized access can compromise patient privacy and trust. This project proposes a Blockchain-Based Secure EHR Framework integrating Blockchain technology, Multi-Factor Authentication (MFA), and Docker containerization to enhance data privacy, integrity, and scalability. Blockchain ensures decentralized and tamper-proof data storage which is done with the use of Metamask as it acts as a wallet and authorises blockchain transactions, while MFA provides strong user authentication through multiple verification factors. Further Docker enables modular and scalable deployment across healthcare infrastructures for consistent performance. Additionally, encryption algorithms and smart contracts automate data access control and ensure compliance with HIPAA and GDPR regulations.

88. DESIGN OF ENERGY EFFICIENT BINARY INTERFACED STOCHASTIC MULTIPLER

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Stochastic computing provides a different way of performing calculations by expressing numbers as probability- based bitstreams, which allows arithmetic operations to be carried out using very simple hardware components. While this technique is attractive for its low power usage and reduced circuit complexity, traditional stochastic multipliers usually face challenges such as slow processing speed and reduced accuracy, mainly caused by long bitstream requirements and the overhead of random number generation. To address these limitations, this work introduces optimized encoding patterns along with enhanced serial and parallel stochastic multiplier designs. The proposed architectures improve

numerical accuracy while simultaneously lowering hardware area, power consumption, and processing delay. The serial architecture improves performance through a compact, step- by-step processing structure, while the parallel architecture completes the multiplication operation within one clock period .Experimental validation using image multiplication confirms that the proposed method produces better output quality and consistent performance without adding extra hardware overhead.

89. HYBRID DEEP LEARNING WITH EXPLAINABLE AI FOR MULTI-CLASS IMAGE FORGERY AND AUTHENTICITY ANALYSIS

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The rapid development of Artificial Intelligence (AI) and deep learning technologies enables the development of realistic digital images using tools such as DALL·E, Midjourney, Stable Diffusion, and image editing software. This makes it very difficult to assess the authenticity of the images. Therefore, there are serious issues of concern regarding the problem of misinformation, digital forgery, and media manipulation. Deep learning models, particularly Convolutional Neural Networks (CNNs), are primarily based on spatial information and are unable to generalize the features of various AI-manipulated images from different sources. Additionally, the models are not clear about the decisions that are made during the process. The aim of the research is to develop a hybrid deep learning model for the classification of the authenticity of images, particularly for distinguishing between real images, AI-manipulated images, and digitally edited images. The proposed model integrates Convolutional Neural Networks (CNNs) for local texture and edge information, Vision Transformer (ViT) for global contextual dependencies, and Fast Fourier Transform (FFT) for frequency information, which is generally introduced during AI-based image synthesis and manipulation. The incorporation of spatial, contextual, and frequency domain features helps to improve the accuracy, robustness, and generalization capabilities of the classification system for various forms of image manipulation. To improve the interpretability of the classification results, Explainable Artificial Intelligence (XAI) techniques based on Grad-CAM Ms. S. Shanmugapriya Department of Artificial Intelligence and Data Science Nandha Engineering College (Autonomous), Erode, Tamil Nadu, India sathyaaishu103@gmail.com Yathigaa. T. S Department of Artificial Intelligence and Data Science Nandha Engineering College (Autonomous), Erode, Tamil Nadu, India yathigaa.t.s@gmail.com have been employed to generate visualizations of the regions that impact the classification results. Additionally, a web interface has been made available to make the system useful for real-time image analysis. The experimental results have shown the accuracy and interpretability of the classification results for image manipulation detection by the proposed system..

90. DEEP LEARNING–BASED RAILWAY TRACK DETECTION USING SEGNET WITH A RESNET-101 ENCODER

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Railway track checking was done with the help of manual way of checking where it takes lot of time for checking and by manual process leads to human errors. In terms of developing safety as well as efficiency we have developed the automatic track identification mechanism which depends over deep learning mechanisms. Photos from the railway track were taken at equal intervals of time and detect the track position like cracks, damages in tracks, water stagnant in track. Our proposed work designed the framework with the help of SegNet with the help of ResNet-101 encoder technique for identifying as well as defining track locations. Existing works depends over ResNet-50 along FCN-16 got an accuracy of 98.75%. by using of indepth of network mechanism as well as more defined way of proposing our mechanism gained the more accuracy as well as security in terms of multiple scenarios. This proposed work is developed in giving time to time updates in multiple seasonal conditions. Our work is designed to give information for the train drivers or else railway authorities which makes addition to most safety.

91. INTEGRATED MONITORING OF EARLY HYDRATION AND STRUCTURAL REHABILITATION IN RDF ASH-MODIFIED CONCRETE USING EMBEDDED PIEZOELECTRIC SENSORS

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This study tackles the dual challenge of evaluating early-age hydration behavior and long-term structural integrity in sustainable concretes containing refuse-derived fuel (RDF) ash. The significance lies in ensuring performance verification of eco-friendly binders while enabling real-time structural monitoring through embedded sensing technologies—critical for advancing smart and low-carbon infrastructure. An integrated electromechanical impedance (EMI)-based monitoring framework using embedded piezoelectric (PZT) sensors was employed. Cube specimens were cast with ordinary Portland cement (control mix, CM) and 30% RDF ash replacement (RDF mix, RM) and monitored from 0–8 hours to assess hydration. Reinforced concrete (RC) beams were subjected to three sequential damage stages and retrofitted in three steps. EMI signatures (conductance and resonance frequency) were collected and interpreted using Root Mean Square Deviation (RMSD) analysis. CM reached 14.35% RMSD and RM 12.71% within 8 hours, with resonance shifting from 234.6 to 248.3 kHz in CM. During beam damage, conductance dropped from 0.0135 S to 0.0089 S, and RMSD rose from 10.53% to 23.01%. Retrofitting restored conductance to 0.0145 S and raised RMSD to 30.86%, reflecting mechanical enhancement. RDF concrete demonstrated compatible hydration kinetics and strong sensor integration. EMI sensing accurately captured both degradation and recovery phases, confirming its viability as a dual-state monitoring tool. This work uniquely integrates hydration and structural monitoring in a single system. It extends previous EMI studies by validating smart sensors in RDF-based concretes, offering scalable applications in sustainable, intelligent construction. The methodology supports life-cycle performance evaluation, contributing to circular economy goals in the construction sector.

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92. ZERO TRUST SECURITY FRAMEWORK WITH MACHINE LEARNING-DRIVEN NETWORK INTRUSION DETECTION

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Due to the rise in advanced cyber-attacks, traditional perimeter-based security systems are not enough to protect current networks. Hence, the Zero Trust Security Model has become an appropriate solution to continuously verify the identity of users, devices, and networks without having any implicit trust in them. This paper demonstrates how to create a smart Zero Trust Security Dashboard that combines

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Machine Learning (ML)-based threat detection with real-time network traffic analysis and monitoring. The UNSW-NB15 dataset is used to train multiple ML algorithms such as Random Forest, Support Vector Machines (SVM), Logistic Regression, Decision Tree, Multi-Layer Perceptron (MLP), and Isolation Forest for both supervised and anomaly-based intrusion detection. Data preprocessing methods include feature encoding, normalization, and stratified data splitting to ensure robust and accurate training for each model. The model with the best performance, assessed using accuracy and F1-score, will have its weights saved for deployment. An interactive dashboard based on the Streamlit framework is created to simulate and visualize network traffic in real time, along with security-related metrics, including attack detection and alert generation. It provides a way to monitor activity in real time, examine individual sessions, aggregate the analysis of multiple weeks of activity, and assess the overall security posture of the network using Zero Trust principles such as continuous verification of trustworthiness, least-privilege access, and automated response to threats. Results show that an ML-based approach integrated with Zero Trust architecture greatly improves the accuracy of threat detection, enhances situational awareness, and improves decision-making for defending against threats. Therefore, the system is capable of being used in enterprise-level, real-world networking environments.

93. TERMINAL-BASED COGNITIVE ARCHITECTURE FOR AUTOMATED SOFTWARE ENGINEERING GITPILOT CLI

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The Gitpilot CLI is an AI assistant that works directly inside the terminal to help developers work faster and more efficiently. It connects Google's Gemini AI models with the command-line environment, allowing developers to interact with AI without leaving their workflow. The tool is built using

TypeScript and runs on Node.js. It follows an agent-based design using React, which means it can perform multi- step tasks instead of just answering questions. Rather than behaving like a chatbot, it acts more like a smart assistant that can plan and complete actions step-by-step. One of its most useful features is its understanding of the current project. Gitpilot can read local project files such as GITPILOT.md and analyze folder structures, so any generated or modified code follows the project's coding standards. This makes its suggestions more accurate and relevant. The CLI can also interact with the file system and run shell commands securely. Because of this, it can debug programs, refactor code, and automate repetitive tasks directly inside the terminal. By reducing the need to switch between tools, Gitpilot helps developers save time and speeds up the overall software development process.

94. RECRUITER-SIDE AI INTERVIEW CHEATING DETECTION SYSTEM

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Remote interviews introduce challenges in maintaining interview integrity while preserving candidate privacy. Current methods of monitoring the interview may be invasive, offline, or only based on single-modality analysis, which may lead to unstable results. This paper proposes a recruiter-side real-time interview integrity monitoring system based on multimodal audio and video behavioral analysis. The proposed audio analysis pipeline includes speech-to-text transcription, silence ratio calculation, and linguistic AI probability estimation with time smoothing and clamping, whereas the video analysis pipeline includes face presence detection, gaze deviation detection, and head movement detection with the inclusion of persistence logic. The modality results are combined using a late fusion mechanism to produce an interpretable risk score. The experiment results showed 82.95% classification accuracy using the proposed model with stable temporal behavior scoring, which shows the feasibility of the proposed privacy-aware interview integrity monitoring system.

95. AN EFFICIENT AI-BASED APPROACH FOR INSTANT PEST DETECTION IN AGRICULTURE

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Pest infestations have a major impact on agricultural productivity. This, therefore, requires an efficient and reliable detection system. This paper presents a real-time system that uses CycleGAN for image enhancement and MobileNetV3 for accurate pest detection. The performance of the model is tested on 24,881 leaf images belonging to 22 classes. The results show that MobileNetV3 achieves 84% classification accuracy, which is quite impressive, especially since it has low computational requirements, which is important for efficient performance, especially for agricultural purposes. In addition to pest detection, it assesses the level of infestation by checking the level of confidence and provides suggestions for treatment through a web interface, which is important for effective decision-making.

96. EXPERIMENTAL INVESTIGATION ON THE PARTIAL REPLACEMENT OF CEMENT WITH POZZOCRETE IN CONCRETE.

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The demand for concrete is steadily increasing to meet the growing need for infrastructure development. The production of Ordinary Portland Cement (OPC) consumes significant natural resources and energy while releasing a large amount of carbon dioxide into the atmosphere. Therefore, exploring alternative materials to make concrete more environmentally sustainable is crucial. Research on Pozzocrete has

consistently shown that its use in concrete significantly enhances its strength. This helps mitigate shrinkage issues commonly observed in concrete, while also filling voids and improving workability. Due to its finer particle size, which is greater than that of cement, Pozzocrete provides a larger specific surface area, resulting in concrete or mortar with an improved appearance. This study investigates the structural behavior of Pozzocrete and examines the optimal percentage of cement replacement to achieve both improved economy and enhanced strength of structural members. In this project, cement is partially replaced with Pozzocrete at levels of 10%, 20%, 30%, 40%, and 50%. Compressive strength, split tensile strength, and water absorption tests are conducted on the 7th and 28th days. The results show that replacing 20%, 30%, and 40% of cement with Pozzocrete improves strength compared to conventional concrete, with 30% replacement achieving the highest strength.

97. HIGH-BANDWIDTH MMWAVE MICROSTRIP ANTENNA ON SILICON CARBIDE

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This paper presents the design and performance of a millimeter- wave microstrip antenna built on a silicon carbide (SiC) substrate. With the goal of Better bandwidth, higher radiation efficiency and solid en- vironmental stability. Copper-FR4 antennas lose efficiency because of dielectric losses, soak up moisture and degrade due to thermal insta- bility. To address these challenges, a SiC-based microstrip antenna is analytically modeled and evaluated using MATLAB Antenna Toolbox. Simulations show that this design works well at both 3.5 GHz and 28 GHz. It delivers broader impedance bandwidth, steady gain, and better radiation efficiency. By using metamaterial inspired field confinement, we pushed performance beyond what you get from typical copper FR4 antennas. This improvement makes the antenna a strong fit for next- generation millimeter-wave communication systems.

98. WEATHER-BASED CROP RECOMMENDATION SYSTEM USING IOT AND MACHINE LEARNING

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Sustainable agriculture needs clear knowledge of soil nutrients, environmental conditions, and crop suitability. Farmers still use age-old traditional methods of manual inspection and guesswork. This may lead to inappropriate selection of crops, reducing productivity and causing wastage of resources. This paper proposes an IoT- empowered agriculture advisory system, namely AgriSmart. It integrates soil pH sensing, analysis of soil NPK, and live weather data for personalized crop recommendations. The entire system is interfaced on an ESP8266 microcontroller that gathers sensor data and uploads it to the cloud platform. A recommendation engine evaluates the soil conditions and environmental parameters. A web and mobile-based interface supports multilingualism and provides crop suggestions with nutrient details and growing tips in a very lucid manner to the farmers. The tests conducted have revealed the accurate detection of nutrient levels, reliable IoT communication, and relevance of crop suggestions. AgriSmart thus presents a useful solution for precision farming and rural agricultural development.

99. INTEGRATED PLATFORM FOR CROWDSOURCED OCEAN HAZARD REPORTING AND SOCIAL MEDIA ANALYTICS

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Ocean hazards consist of ways to build an ocean for fishing and disasters in the ocean, which threaten the lives of fishermen living in and around the ocean. Ocean hazards include the risk of being attacked by creatures that live in the ocean, causing destruction for work, accidents while working, etc., The majority (or at least most) of the currently existing ocean hazard monitoring methods do not exist where they do not provide up to date, locally relevant information. By using a combination of crowdsourced reports from the people who live on the ocean or who are at the ocean (crowdsourced) and by using social media analytics to detect and categorize the hazards in the ocean, we can significantly improve our detection of these hazards and give better warnings to the public. The two components create better accuracy, coverage, and confidence in the ocean hazard information that we collect. The geospatial dashboard offers visual access to real-time alerts; locations of hazards; and the severity and trending of hazards over time. This combination of using human reports and automated reports from social media will provide for early warning of hazards in the ocean. This approach allows communities to actively participate in monitoring our environment while leveraging artificial intelligence (AI) technologies for environmental monitoring.

100. AI CITY BRAIN: MULTI-AGENT GENERATIVE AI FOR FREE SMART CITY SIMULATION AND AUTONOMOUS URBAN MANAGEMENT

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Smart cities need ongoing, precise, and smart decision- making across various areas like traffic management, emergency response, pollution control, energy use, and public services. Traditional smart city systems rely heavily on large infrastructures, physical sensors, and manual supervision. This reliance can make deployment expensive, maintenance demanding, and scaling challenging in developing areas. This paper introduces AI City Brain, a fully autonomous, multi-agent control framework that operates solely on a digital twin simulation of a city without needing any hardware. The system includes various specialized AI agents—Traffic Agent, Emergency Response Agent, Environment Agent, Energy Agent, Public Services Agent, Citizen Well-Being Agent—and a Central Governor Agent that oversees decisions in all areas. Each agent has autonomy, memory, goal-driven

behavior, and negotiation skills, allowing the city to self-manage and self-optimize in changing conditions. The digital twin environment replicates real-time city data, such as vehicle flow, accidents, pollution trends, energy needs, population movements, weather changes, and public service workloads. This simulation takes the place of physical sensors and serves as a controlled setting for testing urban policies, stress situations, and emergencies. The agents continuously monitor the simulated environment, predict future problems using learning and rule- based models, create action plans, negotiate with other agents when conflicts arise, and implement optimized control strategies. A centralized reasoning module maintains global consistency by resolving agent conflicts with priority-based logic, teamwork strategies, and multi-objective optimization. Testing shows that the system greatly enhances city efficiency across several measures. It reduces traffic congestion through adaptive signal timing and dynamic rerouting. Emergency response times decrease due to smart ambulance dispatch and path clearance. Energy use is optimized via context-aware lighting control and load forecasting. Pollution levels stabilize through environmentally friendly routing and traffic density management. Public service tasks, like garbage collection scheduling and road maintenance planning, benefit from predictive demand analysis. The digital twin also offers a visual dashboard for monitoring city- wide operations, making it useful for academic research, urban planning, and simulation training. In summary, AI City Brain presents a scalable, low-cost, -free method for autonomous smart city management using agentbased artificial intelligence. The framework supports complex coordination, real-time decision-making, and adaptable optimization, making it a strong foundation for future AI-driven urban governance and simulation platforms.

101. SENSE MART: AI POWERED STORE

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This paper introduces the design and implementation of an AI powered kiosk system that helps in real time inventory management and monitoring, voice assisted product search without depending upon computer vision techniques. This system uses a strain gauge sensor with hx711 amplifier to continuosly measure the product weight and estimate how much stock is left. The system also has a cloud based Firebase backend which gets the sensor data from an embedded controller thus achieving real time synchronization of inventory information across kiosk screen and admin dashboard. A voice-to-text interface allows customer to search the products they need hands free thus improving the user experience. The results demonstrate that the proposed system provides accurate stock estimation and improved operational efficiency, making it a cost- effective and scalable solution for smart retail environments.

102. REAL-TIME SAFETY ALERT SYSTEM USING ML-BASED VIDEO SURVEILLANCE

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The rapid expansion of surveillance infrastructure in public and private environments has created a strong demand for intelligent systems capable of detecting security threats in real time. This paper proposes a Real-Time Safety Alert System using Machine Learning–based Video Surveillance that automatically identifies potential threats and generates immediate alerts. The system processes live video streams frame by frame and applies deep learning techniques to detect weapons, violent activities, and camera tampering events. A YOLO-based object detection model is used for real-time weapon detection, while Convolutional Neural Network (CNN)–based methods analyze abnormal visual patterns and obstruction scenarios. When a threat is detected, the system triggers instant alerts along with captured visual evidence, enabling rapid response and preventive action. The proposed architecture is modular, scalable, and suitable for real-world deployment. Experimental observations indicate improved detection accuracy and reduced response time compared to traditional surveillance systems. The results demonstrate that integrating machine learning with video analytics can transform conventional surveillance into a proactive and intelligent safety solution

103. IMAGE STEGANOGRAPHY WITH DUAL-LAYER INTEGRITY VERIFICATION USING AES-GCM AND HMAC-SHA3-512

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Modern image steganography techniques have shown a high level of data secrecy yet they are vulnerable to tampering attacks, bit-level attacks and other image processing attacks. The existing solutions typically only depend on encryption that does not secure against the manipulation of the embedded message without being detected after the compression, filtering, or intentional alteration of the cover image. This paper responds to this critical integrity concern by introducing an Adaptive Image Steganography Framework and Dual-layer Integrity verification. The two levels of cryptographic protection are introduced in the proposed system prior to the process of embedding. The initial layer utilizes AES- GCM which offers authenticated encryption of the messages with separable initialisation vectors (IVs) and counter-mode qualities to assure confidentiality and integrity. The second layer has a HMAC-SHA3-512 integrity module that utilizes the Keccak sponge function resulting to a 512-bit message authentication code which is safe against collision attacks, forgery attacks and length-extension attacks. The message is then adaptively stashed in the cover image in the form of the doubly protected message, using the DWT-SVD image steganographic transform, and enhances the noise and compression resistance. Examples of experimental findings indicate that the proposed system is highly perceptually transparent with PSNR values consistently in the range of 40 dB and the dual-layer verification system is 100 percent accurate in detecting any form of tampering. The results of the experiment confirm the hypothesis that the suggested architecture significantly enhances the security of the covert communication and can be used in the military, forensic, and high-security applications of digital transmission.

104. MALICIOUS URL DETECTION SYSTEM USING MACHINE LEARNING AND BERT

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The services based on the Internet have been increasing at a high rate thereby exposing individuals to internet threats such as phishing, spoof sites and fraudulent web URL. The practice of achieving obfuscation and creating new malicious URLs by the attackers on an on- demand basis makes the traditional blacklist- based methods of detection useless. These conventional systems cannot provide real time security, capability of identifying an attack on the zero-day attacks thereby creating greater security risks to the users and organizations. This project proposes AI based Malicious URL Detection System to overcome these limitations since it will be a machine learning algorithm and semantic analysis classifier of URLs. This system takes BERT (Bidirectional Encoder Representations: Transformers) to retrieve contextual images and structural images of URLs and subsequently Isolation Forest, which is an unsupervised learning algorithm, to detect abnormalities and suspicious behaviour. This way it is possible to identify those URLs that were deemed as malicious before without blacklists. It is a web- based application that is a proposal of a system that uses a backend to process the scan and saves the scan history and scan results in the MongoDB. The end-user interface has the capability to post URLs, receive real-time feedback and threat scores and history of detection. This system recognizes URLs as being safe or suspicious and malicious using learned behavioral patterns. Being experimentally confirmed, the system is rather precise and possesses low latency in detecting phishing and malicious URLs. The application of machine learning with a user-friendly interface will ensure the scalability, reliability, and usability can apply to the implementation of the solution to real-world cybersecurity.

105. MACHINE LEARNING-BASED ENERGY MANAGEMENT STRATEGY FOR GRID-CONNECTED MICRO GRIDS

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The increasing penetration of renewable energy sources introduces significant uncertainty in micro grid operation, requiring intelligent energy management for reliable and stable performance. This paper presents a machine learning–driven energy management framework for a grid-connected hybrid micro grid integrating solar photovoltaic, wind generation, and battery energy storage. An LSTM-based forecasting model is employed to predict solar power variations, enabling proactive scheduling of distributed resources. A reinforcement learning controller is developed to optimally coordinate power exchange among renewable sources, energy storage, and the utility grid while maintaining DC-link voltage stability under dynamic load conditions. The proposed strategy enhances energy balancing, reduces grid dependency, and improves system adaptability during renewable intermittency and demand fluctuations. Simulation- based analysis demonstrates effective DC-link regulation, accurate renewable prediction, adaptive ESS charging– discharging behavior, and optimized grid power utilization. The results confirm that the proposed intelligent control framework significantly improves operational efficiency and reliability of hybrid micro grid systems.

106. AGRO-ECOLOGY BASED CROP RECOMMENDATION SYSTEMFOR FARMER

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Agriculture remains a primary source of livelihood for a significant portion of the global population; however, farmers frequently encounter difficulties in selecting suitable crops due to climate variability, inadequate soil knowledge, and limited access to expert advisory systems. Incorrect crop selection often results in low yield, economic losses, and inefficient utilization of natural resources. To overcome these challenges, this paper proposes an AI-Based Crop Recommendation System that assists farmers in identifying the most suitable crop for cultivation based on soil and environmental conditions. The system employs machine learning techniques to analyze critical parameters such as soil nutrients (Nitrogen, Phosphorus, and Potassium), soil pH, temperature, humidity, and rainfall. Historical agricultural datasets are used to train the model, enabling it to learn patterns between environmental factors and crop suitability. Upon receiving real- time soil and climatic inputs from farmers, the trained model predicts the optimal crop for cultivation. The proposed system aims to enhance agricultural productivity, support data-driven decision-making, and promote sustainable farming In recent years, the integration of artificial intelligence in agriculture has gained significant attention due to its potential to improve decision- making and resource management. Traditional farming practices largely depend on experience and manual analysis, which may not accurately reflect rapidly changing environmental conditions. The proposed AI-based crop recommendation system bridges this gap by providing a data-driven approach that minimizes human error and uncertainty. By leveraging machine learning models trained on diverse agricultural datasets, the system delivers accurate and reliable crop recommendations tailored to specific soil and climatic conditions. This approach not only assists farmers in maximizing crop yield and profitability but also contributes to sustainable agriculture by reducing improper fertilizer usage and optimizing land utilization.

107. UNIFIED DEEPFAKE DETECTION IN MULTIMEDIA CONTENT

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Deepfake technology allows the creation of highly realistic manipulated multimedia content. This raises serious concerns about digital trust and cybersecurity. This paper intro- duces a unified deepfake detection system that combines audio and video analysis in a user-friendly application. The proposed framework uses XceptionNet and Vision Transformer for video analysis, and a Convolutional Neural Network with Audio Spec- trogram Transformer for audio analysis. Each modality under- goes fusion, and then they are combined through multimodal fusion to produce a single authenticity score. The system operates via a web-based frontend, which enables dynamic model selection and real-time inference. Experimental evaluation shows better robustness and practical use for multimedia authentication.

108. AN EVIDENTIAL HYBRID DUAL-STREAM FRAMEWORK FOR DIABETIC RETINOPATHY GRADING USING FUNDUS IMAGES

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Accurate automated grading of diabetic retinopathy (DR) from retinal fundus images is a clinically critical yet challenging task due to high inter-class similarity, subtle lesion characteristics, and variations in imaging conditions. In this work, we propose an evidential hybrid dual-stream deep learn- ing framework that integrates convolutional and transformer- based representations to jointly model local pathological patterns and global retinal structural context. The proposed architec- ture consists of a ConvNeXt-based local branch and a Swin Transformer-based global branch operating in parallel. Instead of conventional probability averaging or feature concatenation, the outputs of both branches are fused using a Dempster–Shafer– inspired evidential fusion strategy, enabling principled modeling of prediction conflict and epistemic uncertainty. The network is trained using an evidential deep learning objective formulated under a Dirichlet distribution, encouraging reliable uncertainty estimation and conservative confidence behaviour. In addition, post-hoc visual explainability using Grad-CAM and uncertainty- guided referral analysis are employed to assess clinical reliability. The proposed

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framework is designed to improve robustness, interpretability, and safety for real-world diabetic retinopathy screening systems.

109. HEALTH RISK PROFILING DASHBOARDS FOR PREVENTIVE CARE AND EARLY DISEASE DETECTION

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The Health Risk Profiling Dashboard for Preventive Care is an intelligence platform designed to assist in the early detection of chronic conditions such as diabetes, high blood pressure, and heart disease. With AutoGluons AutoML framework, the system automatically trains and optimizes machine learning models that predict disease risk based on critical health variables like age, BMI, blood pressure, glucose, and cholesterol levels. Through an interactive Gradio dashboard that shows the predictions, users can instantly view risk probabilities and preventive recommendations after entering their health information. By combining automation, predictive analytics, and visualization, the platform enables continuous health monitoring, early diagnosis, and data- driven healthcare decisions. Ultimately, this improves quality of life and encourages preventative care.

110. GESTROBOT: SMART GESTURE-CONTROLLED OMNIDIRECTIONAL ROBOT WITH OBSTACLE DETECTION AND DYNAMIC PATH PLANNING

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In this paper, a gesture-controlled sys- tem for op- erating a robot has been designed and validated through the development and implementation of a hand-gesture- controlled omnidirectional robot car. The designed system uses a YOLOv11 model developed through a CNN approach and is fully functional and self-sufficient for recognizing and detecting hand gestures and classifying them with high efficiency and accuracy in real- time using a web camera. The system utilizes these recognized gestures for precise command generation for operating and controlling the robot for direction and pause. The real-time visual images are displayed using an ESP32-CAM device embedded within the robot, which transmits real-time images for remote operation observation. For communication and synchronization of the hand gesture recognition system and robot operation and actuation systems in real-time, with low latency, and fast efficiency and speed, a cloud-based communication system is employed, using a Firebase Realtime Database system. To ensure safety during operation, an ultrasonic sensor is also employed for obstacle detection, thus ensuring path planning and self-guided avoidance. The proposed system is designed for ensuring stability even when there are environmental changes. It is also efficient in operation, as proved during testing. The system can be employed for remote surveillance, robot operation, human-robot interaction, and even for operation in dangerous zones without using wearable technologies or other external devices.

111. SKIN LESION CLASSIFICATION WITH EXPLAINABLE AI

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Skin cancer, especially melanoma, has a high death rate when not detected early, it presents a serious concern to public health. The apparent similarity between benign and malignant skin lesions frequently leads to diagnostic errors, making accurate classification a difficult process. For precise and comprehensible skin lesion categorization, this study suggests an Explainable Artificial Intelligence (XAI) framework that combines the advantages of Vision Transformer (ViT) and Graph Neural Network (GNN) architectures. Grad-CAM++ is used to produce visual explanations that highlight clinically significant regions impacting the model&s predictions in order to improve model transparency. Standard dermoscopic datasets, specifically HAM10000 and ISIC 2017, are used to assess the suggested system for both training and validation.Experimental results demonstrate that the ViT–GNN hybrid model achieves a classification accuracy of 96% while producing fine- grained heatmaps that closely correspond with dermatological interpretations. By improving diagnostic consistency and interpretability, the proposed framework offers a clinically viable decision-support system for the early detection of melanoma.

112. A COGNITIVE-AWARE MULTIMODAL SCENE INTERPRETATION AND SEMANTIC NARRATION FRAMEWORK FOR ASSISTIVE VISUAL PERCEPTION

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The vision impaired people tend to have challenges working in the dynamic real-world situations as they are not given tools with which to interpret the scenes. This paper will present a Human Scene Understanding Mechanism-Based Image Captioning System; which translates the visual scenes into meaningful voice description. The model is used to combine both object detection based on YOLO with a semantic reasoning component written in MATLAB to extract information about objects, spatial configurations, and human and object interactions. The identified objects undergo a contextual inference layer to produce fluent natural language captions of actions, positions as well as environmental context. These captions are then converted into real time audio output, and so, the user is able to sense the environment with the help of speech. This is a low latency based, high detection accuracy and strong performance platform in a diverse range of indoor and outdoor environments. Scene interpretation and successful generalization is proven by experimental assessment. The methodology proposed is a better way to ameliorate assistive technology with respect to enhancing the level of mobility, situational awareness, and autonomy among the visually impaired.

113. HARNESSING MULTISENSOR NON-MOTOR BIOMARKERS VIA MACHINE LEARNING FOR EARLY DETECTION AND PROGRESSION MODELING IN PARKINSON'S DISEASE

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Parkinsons disease is a progressive neurodegenerative disorder characterized by the loss of dopaminergic neurons in the substantia nigra leading to debilitating motor symptoms including tremors, bradykinesia, rigidity, and postural instability. On a global scale, PD affects millions and creates significant public health, social, and economic burdens. Early diagnosis remains one of the most important challenges since classical motor symptoms usually appear only after substantial neuronal loss has occurred, thus reducing the therapeutic window. These include non-motor symptoms such as olfactory dysfunction, gustatory deficits, and sudomotor abnormalities that typically precede motor manifestations for several years and, therefore, are promising prodromal biomarkers. Despite their potential for early detection and personalized disease management, these non-motor biomarkers are underutilized both in clinical practice and in computational modeling, which predominantly focuses on motor assessments. Recent developments in AI, ML, and DL provide unparalleled opportunities for the analysis of complex multimodal data, integrating non-motor biomarkers for improved early diagnosis, disease subtyping, and prediction of disease course. This review systematically synthesizes evidence from 2014 through to 2025 on sensing modalities, techniques for biomarker acquisition, machine learning strategies, and fusion approaches applied toward non- motor features in PD.

114. IOT-BASED SMART AQUACULTURE SYSTEM USING SOLAR POWER

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DESPITE INDIA BEING ONE OF THE TOP PRODUCERS OF AQUATIC PRODUCTS, THERE IS STILL A HIGH DEMAND FOR SUSTAINABLE AND REAL-TIME MONITORING SOLUTIONS. AQUACULTURE IS A VITAL SECTOR IN INDIA THAT SIGNIFICANTLY CONTRIBUTES TO THE ECONOMY AND NUTRITIONAL SECURITY. HOWEVER, MANY FISH FARMERS FACE DIFFICULTIES IN ACCURATELY AND AFFORDABLY MONITORING WATER QUALITY, WHICH DIRECTLY AFFECTS FISH HEALTH AND PRODUCTIVITY. IN ORDER TO IMPROVE WATER QUALITY MANAGEMENT, THIS PROJECT PROPOSES A SOLAR-POWERED IOT-BASED SMART AQUACULTURE SYSTEM THAT INTEGRATES MONITORING, AUTOMATION, AND BASIC FILTRATION. THE SYSTEM USES BOTH ESP32 AND ARDUINO UNO MICROCONTROLLERS TO INCREASE FUNCTIONALITY AND RELIABILITY. THE ARDUINO UNO SERVES AS THE PRIMARY CONTROLLER FOR GATHERING DATA FROM SENSORS LIKE THE NPK SENSOR, WHICH MONITORS ESSENTIAL NUTRIENT LEVELS (NITROGEN, PHOSPHORUS, AND POTASSIUM), AND A TEMPERATURE SENSOR TO TRACK WATER TEMPERATURE. THE ESP32 MODULE IS RESPONSIBLE FOR WIRELESS DATA TRANSMISSION AND SENDS REAL- TIME WATER. IN ADDITION TO MONITORING, A SIMPLE BIOLOGICAL FILTERING UNIT IS INCLUDED, WHICH CIRCULATES WATER THROUGH BIO- RINGS AND FILTER PAPER MEDIA. THE BIO-RINGS PROVIDE SURFACE AREA FOR BENEFICIAL MICROORGANISMS, WHILE THE FILTER PAPER REMOVES SUSPENDED IMPURITIES. THE SYSTEM INCLUDES AN AUTOMATIC FISH FEEDING MECHANISM CONTROLLED BY AN ARDUINO, WHICH ROTATES THE FEED CONTAINER AT PREDEFINED INTERVALS TO ENSURE TIMELY AND CONSISTENT FEEDING. A 16X2 LCD DISPLAY IS INTEGRATED TO DISPLAY REAL-TIME PARAMETERS SUCH AS TEMPERATURE AND NPK VALUE. THE FEEDING SCHEDULE IS ADJUSTABLE VIA THE CLOUD INTERFACE, ALLOWING FOR FLEXIBILITY AND AUTOMATION. USING SOLAR ENERGY AS THE PRIMARY POWER SOURCE ENSURES SUSTAINABILITY, LOWERS OPERATIONAL COSTS, AND ALLOWS FOR CONTINUOUS OPERATION IN RURAL OR LOW-POWER ENVIRONMENTS. THE DUAL-CONTROLLER ARCHITECTURE IMPROVES SENSOR MANAGEMENT, FEEDING CONTROL, FILTER SUPPORT, AND COMMUNICATION, MAKING THE SYSTEM SUITABLE FOR SMALL-SCALE AQUACULTURE APPLICATIONS. KEYWORDS

115.STOCK PRICE PREDICTION USING LONG SHORT-TERM MEMORY WITH INTEGRATED FINANCIAL ANALYSIS

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Stock price prediction is a difficult task due to probable to vary rapidly, non-linear as well as time dependencies in financial markets. Traditional machine learning techniques and traditional statistical models are more likely to have problems with capturing the sequential dependencies in stock market time series data in the long run. This paper seeks to propose a deep in order to overcome these challenges. Long Short- Term Memory (LSTM) networks Learning-based framework with sentiment analysis and Hidden Markov Model based market regime de- tection for enhanced stock price prediction. In addition to stock price prediction, the technical analysis is also incorporated in the proposed framework, finance risk analysis measures like Beta and Capital Assets Pricing Model (CAPM), making informed investment decisions. The historical stock price Before training the model, data obtained on Yahoo Finance are pre-processed by applying the normalization and difference techniques. The results demonstrate that the suggested approach can offer correct short- term stock price forecasts and has smaller prediction errors. other analytical modules are allowed to be integrated to increase the capability of the model to interpret and make decisions.

116. MITIGATION OF DDOS ATTACK IN CLOUD COMPUTING

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Cloud computing involves the management and provision of resources, software, applications, and information as services over the Internet. Numerous organizations are adopting cloud services because of economic and technological changes in the field. The important aspects that need to be considered when using the cloud are availability, confidentiality, accessibility, and integrity. The severity of the

consequences of any attack on the cloud could lead to downtime, which, in turn, could cause financial and reputational losses. An important security issue that targets cloud computing is denial-of-service (DoS) attacks. Distributed denial-of-service (DDoS) attacks are an improved version of DoS attacks that have heavily targeted cloud infrastructures in recent years. This paper discusses the cloud computing infrastructure and the DDoS attack scenario and its effect on cloud computing, along with the performance analysis of the existing single-server architecture against the N_S model with proven results.

117. ECHODRIFT: THE BUTTERFLY EFFECT

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Accurate prediction of extreme atmospheric events remains a fundamental challenge due to the nonlinear and chaotic nature of weather systems, where small perturbations in initial conditions can amplify into large-scale unpredictability, commonly referred to as the Butterfly Effect. Traditional deterministic forecasting approaches struggle to maintain reliability over extended horizons under such conditions. To address this challenge, this work proposes ECHODRIFT, a PROACTIVE physics-informed artificial intelligence framework that integrates chaos theory–based Lorenz modeling with advanced machine learning techniques for early disaster risk assessment. The framework employs the classical three-dimensional Lorenz equations to represent atmospheric convection and sensitivity, alongside an extended five-dimensional Lorenz system to capture higher-order interactions and multiscale feedback mechanisms. Chaos-derived indicators are fused with meteorological data and processed using Long Short- Term Memory (LSTM) networks for temporal learning, Convolutional Neural Networks (CNNs) for spatial feature extraction, Transformer models for long-range dependency modeling, and Bayesian inference for uncertainty quantification. An ensemble decision layer integrates physical chaos metrics with probabilistic model outputs to produce interpretable, confidence-aware risk predictions. As a supporting capability, the system incorporates a centralized weather data integration layer, aggregating multi-state datasets into a unified platform for consistent model training and forecast dissemination. Experimental evaluation demonstrates improved robustness, reduced false alarms, and

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enhanced early warning capability compared to conventional deterministic and single-model approaches, validating the effectiveness of combining chaotic dynamics with data-driven intelligence.

118. AGROVET ASSISTANT: A GENERATIVE AI BOT FOR IDENTIFYING AGRICULTURAL AND LIVESTOCK DISEASES

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Agriculture and livestock farming, in many countries, are an important means of economic stability and food security. However, farmers face challenges in the areas of determining the types of diseases that affect their crops and animals, the best fertilizers to be applied, the best crops to grow based on their soil type, and how to keep up with changing market trends. It is on this basis that traditional advisory services are mostly inaccessible, untimely, and less personalized, hence rendering them incapable of serving the farmers in the best way. The paper focuses on a generative AI-driven chatbot that is available to assist farmers, cattle owners, and anyone within the ag industry to obtain intelligent real-time assistance that is specific to the circumstance. The installation brings a group of modules together (crop disease identification, soil-crop matches, fertilizer suggestions, and livestock illness management) to ensure that all regions of the farm are advised appropriately. The best part is that it is a community based forum through which people chat and share stories and cracks solutions to the problems they are grappling with. And since the chatbot continues to draw data continuously, it could also provide you with real time market trends information. This will help farmers make better financial and planning decisions. The architecture combines natural language processing with generative AI to ensure smooth and user- friendly communication. The paper describes how generative AI can transform traditional agricultural advisory services to make dependable, scalable, and swift support available. This will be achieved by the proposed system through the provision of timely, relevant, and practical information to farmers, hence supporting digital agriculture.

119. SATRI: SATELLITE IMAGE SUPER-RESOLUTION AND CROP HEALTH MONITORING

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Satellite imagery is very critical in agricultural monitoring yet they are largely restricted by a small spatial resolution. Nonetheless, low spatial resolution is one of the issues with remote sensing that cause ambiguous information about vegetation due to which the paper suggests a two-step process fulfilling the role of image enhancement and vegetation health assessment using visible band images. The process improves the images on low-resolution satellite images with SwinIR-L model. This model uses a shifted window self-attention mechanism to integrate the local and the global information in such a way that it generates better high-resolution pictures. After that, it uses VARI vegetation health analysis on these sharpened images. Visible Atmospherically Resistant Index VARI is a vegetation index that does not need near-infrared bands and only requires visible bands. The resulting VARI values are then converted into maps indicating vegetation that classify the fields as healthy, stressed and deficient. The suggested procedure has been experimented and the findings indicate that pre-processing of images, before analysis of vegetation, enhances the clarity of the vegetation maps and crop health data becomes easier to read and thus will give accurate results through images.

120. PHYSIOWAVE: WIRELESS HAND RECOVERY-TECH USING HYBRID 1D CNN–BILSTM MODEL FOR INTELLIGENT PHYSIOTHERAPY MONITORING

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People who have had a stroke, neurological dis- orders, fractures, or surgery often experience difficulty using their hands, which significantly affects their daily life. Tradi- tional physiotherapy usually requires a therapist to monitor and guide the patient, making continuous rehabilitation difficult for many individuals. Recent research has explored wireless sensing technologies that enable remote monitoring

and assistance for rehabilitation exercises. In this paper, the authors discuss PHYS- IOWAVE, a wireless technology designed to support recovery from hand injuries. PHYSIOWAVE is a system that uses WiFi signals to track hand movements over time and employs advanced computational techniques to analyze the captured data and understand the performed activities. The system consists of two computing units that communicate wirelessly. One component collects motion-related information from the user's hand and transmits it to another unit where the data is processed and analyzed. Similar WiFi-based sensing approaches have been widely studied for activity monitoring and device-free sensing applications. The system uses a machine learning model capable of identifying patterns within the collected signal data. This model is composed of two components: one that analyzes the signal characteristics at a specific moment and another that examines temporal patterns by considering previous and subsequent signal states. Such temporal learning approaches are commonly used in WiFi-based human activity recognition systems to improve classification accuracy. Through experimental evaluation, the researchers demonstrated that the system performs effectively and can successfully recognize different physiotherapy exercises. This indicates that PHYSIOWAVE can be used to monitor reha- bilitation progress in both hospital and home environments. By leveraging WiFi sensing and intelligent data analysis techniques, the system offers a practical and scalable solution for remote physiotherapy monitoring.

121. A UNIFIED FRAMEWORK FOR SCALABLE AND SECURE MICROSERVICES DEPLOYMENT USING CI/CD, GITOPS, AND PREDICTIVE AUTOSCALING

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The paper brings together advanced scalable software suggestion systems with automated testing frameworks which integrate directly with continuous integration and delivery (CI/CD) pipelines. The system enables unimpeded regulations throughout development and staging and production environments. The application uses Jenkins together with Gitlab CI/CD and Docker and Kubernetes as well as Selen and Junit and Postman and Prometheus and Grafana and Sonarqube. The adopted methodology allows our organization to achieve higher software quality with fewer provisioning errors to meet faster release cycle requirements. Test results validate that organizationwide improvements in saving time and reducing maintenance outages can be achieved in select pipeline environments.

122. SMART HEALTHCARE REAL-TIME RISK PREDICTION FOR DIABETES

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Chronic health conditions such as diabetes, heart disease, and hypertension are rising in global prevalence, ne- cessitating new paradigms for early prediction and ongoing monitoring systems . This work introduces an intelligent health care prediction system that couples a mobile app as a primary data subscription with a cloud analytics pipeline based on machine learning The system obtains user health parameters via the mobile app and assesses the risk of disease using a Random Forest Classifier. The model processes features such as glucose level, heart rate, BMI, and lifestyle factors to generate personalized alerts and recommendations . The predicted out- come is returned to users via the mobile application and informs proactive health care decision-making. Results of an experimental evaluation clearly illustrate that the Random Forest Classifier achieves strong prediction accuracy and greater robustness than common baseline models . Along with the mobile app (for health parameters update) and cloud analytics, this architecture offers an efficient, low-cost, and scalable approach for real-time health risk assessment while supporting remote health care and prevention-based diagnosis .

123. CONVERSATIONAL AND IMAGE RECOGNITION CHATBOT

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This paper presents the design and implementation of a modular, multimodal AI chatbot capable of processing text, image, audio, and document (PDF) inputs within a unified conversational interface. To address the privacy and latency concerns associated with cloud-based AI, the system utilizes a fully local architecture leveraging open-source technologies, including Ollama for large language model (LLM) orchestration, LLaVA for visual question answering, and OpenAI's Whisper for robust speech-to-text transcription. The framework integrates Retrieval-Augmented Generation (RAG) using ChromaDB and LangChain to enable precise semantic search and fact-grounded responses from uploaded documents. Experimental evaluations on mid-range consumer hardware demonstrate near real-time performance, with average latencies ranging from 0.8 to 3.8 seconds for text queries and under 10 seconds for complex visual analysis. The results indicate that high-fidelity multimodal interaction is achievable on local infrastructure, providing a scalable and privacy-preserving alternative to proprietary, cloud-dependent AI systems.

124. AN ANONYMOUS AND PRIVACY-PRESERVING FEDERATED LEARNING FRAMEWORK USING RING SIGNATURES AND OBLIVIOUS TRANSFER

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Today, we all know that it is necessary to learn from isolated and privacy-sensitive datasets. This need has led to the adoption of multiple collaborative training techniques that work without centralized data aggregation. This requirement is very well addressed by Federated Learning, which allows several participants to retain the data locally while training the machine learning models together. However, the existing Federated Learning framework has multiple challenges. They are vulnerable to privacy risks such as identification of participant, drawing inference of sensitive attributes from the model parameters, etc. that occurs particularly in some hostile environment. In order to overcome these limitations, we need to enforce anonymous authentication and privacy-preserving framework with correct model updates. The scheme proposed in this paper presents a federated learning framework in which the server can authenticate the rightfulness of the received model updates without learning which client contributed, thus protecting the feature information. Machine learning techniques are increasingly being adopted in healthcare systems for improved efficiency and precision of clinical decision support systems, disease prediction, and diagnosis. The proposed framework is experimentally evaluated using a real-world healthcare dataset, demonstrating that strong privacy and anonymity can be achieved while maintaining competitive predictive performance. Although this research has been conducted in the context of healthcare systems, the proposed framework can be very well extended to other domains that involve sensitive and private data, such as financial institutions, fraud detection, defense and intelligence agencies, smart cities, and many more places.

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125. ECOBRIDGE: AN AGENTIC AI-DRIVEN SUSTAINABLE ITEM MATCHING SYSTEM USING GRADIENT BOOSTING OPTIMIZATION

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Sustainable consumption practices and localized resource sharing are essential in mitigating environmental degradation and carbon emissions. This paper introduces EcoBridge, an intelligent peer-to-peer item exchange system that combines smart matching using machine learning algorithms with an Agentic AI sustainability evaluation system. The system design combines a Gradient Boosting Regressor for successful swap prediction with a large language model (Mistral) for environmental sustainability assessment and feedback to users. The design framework formulates the swap matching problem as a supervised regression problem with features such as geographic distance, item condition, user reputation, relevance, and sustainability scores. Simulation experiments on a simulated dataset of 5,000 users and 12,000 items yield excellent predictive accuracy ($R^2 = 0.8597$). A 5-fold cross-validation test confirms robustness (mean $R^2 = 0.8514$, $\sigma = 0.0063$). Ablation studies and statistical significance tests ($t = 21.09$, p < 0.001) confirm the significance of sustainability intelligence features. The results indicate that the inclusion of sustainability intelligence features enhances swap matching accuracy and enhances estimated environmental impact savings (2.01 kg CO_2 per swap).

126.IOT-DRIVEN SMART HOME ENERGY MONITORING, FAULT DETECTION, AND LSTM-BASED ELECTRICITY BILL FORECASTING

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The increasing demand for residential electricity necessitates intelligent systems capable of monitoring, analyzing, and forecasting energy usage at a granular level. Conventional energy meters provide only aggregate consumption data, offering limited insight into appliance-level behavior, fault conditions, and future electricity costs. This paper presents an IoT-driven smart home energy management framework

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that integrates real-time appliance-level monitoring, rule-based fault detection, and LSTM-based short-term energy forecasting for electricity bill estimation. ESP32-based sensing units continuously measure electrical parameters of household appliances, and the collected data is transmitted to a cloud backend for storage and processing. A multi-stage preprocessing pipeline performs timestamp correc- tion, noise filtering, and hourly energy aggregation. An LSTM model trained on historical consumption data predicts next-hour household energy usage, which is subsequently mapped to time- of-day electricity tariffs to estimate expected monthly electricity costs. The system includes a web-based dashboard that visualizes real-time consumption, detected anomalies, optimization recom- mendations, and forecasted billing information. Experimental results demonstrate that the proposed LSTM model achieves effective short-term energy prediction with low error metrics, making the framework suitable for practical and cost-aware residential energy management.

127. KERALA EPIDEMIC FORECASTING FRAMEWORKS AND THEIR APPLICABILITY TO REGIONAL HEALTH SURVEILLANCE

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The Kerala Epidemic Forecasting System is a machine-learning-based framework designed to forecast disease outbreaks in the Kannur district by analyzing environmental and public-health indicators. It utilizes features such as temperature, humidity, rainfall, sani- tation quality, and population density to identify pat- terns related to the spread of dengue, malaria, cholera, and similar infectious diseases. Using algorithms like Random Forest, Logistic Regression, and XGBoost, the system learns from historical data to estimate future outbreak risks with improved accuracy. A Flask-based web interface enables users to input re- cent data and visualize predictions through interactive graphs and geospatial heatmaps. This aids government health departments and decision-makers in early inter- vention, resource allocation, and public-health planning. The system demonstrates the practical role of AI-driven analytics in strengthening com- munity health safety and reducing socio-economic losses from unmanaged out- breaks. Recent literature shows significant progress in out- break forecasting through advanced machine learning and epidemiological modeling. Existing studies fo- cus on (1) quality and availability of epidemiologi- cal–environmental data, (2) preprocessing techniques, (3) feature representation, (4) forecasting methods, (5) evaluation metrics, and (6) remaining challenges and future research scope. This survey highlights these de- velopments and offers a structured reference point for researchers working on predictive health surveillance systems.

128. A MULTIMODAL DEEP NEURAL SPATIO-TEMPORAL CNN-GRU FRAMEWORK FOR DYNAMIC SIGN LANGUAGE INTERPRETATION AND AUDIO GENERATION

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Sign language is the chief method of communication for both hearing and speech-impaired individuals. However, communication between signers and non-signers still poses one of the major problems in

society. This paper proposes a CNN–GRU based Sign Language to Text and Speech Conversion System that recognizes hand gestures automatically from video input and converts them into their corresponding text and synthesized speech. The proposed system uses CNNs to extract relevant spatial features from frames representing sign language and Gated Recurrent Units to model temporal dependencies for gesture sequences. The recognized signs are mapped to textual output, which further gets converted into speech with the help of a text-to-speech engine. Experimental results show that the proposed architecture has achieved success in extracting spatiotemporal patterns in sign gestures, which are quintessential for reliable translation in real- time. The system focuses on enhancing the accessibility of communication for deaf and hard-of-hearing individuals to be at par with mainstream society.

129. SMART HELMET-LITE: IOT BASED SAFETY HELMET FOR CONSTRUCTION SITE

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The construction site is one of the places that is most susceptible to accidents with falls from heights and dangerous gas leaks being amongst the most common sources of injury and mortality. For this purpose, such challenges, this work proposes an IoT-based Smart Safety Helmet and Monitoring System, for use in improving the safety and productivity of construction workers. The system allows various intelligent functions to be integrated into a single helmet, such as fall detection, safety compliance checks, gas leaks detection, and activity monitoring. An ADXL345 accelerometer maintains track of the worker's motion in order to relocate any sudden free falls, and when it detects these, it automatically triggers a motorized retractable safety rope system against impact injuries. A Smart Rope Locking Unit with a magnetic is fastened before work starts, and in case this does not happen, alert notifications are sent real-time for the supervisor's Android monitoring application for Ensure safety protocols and mitigate negligence. In addition, the motion information obtained from the accelerometer is processed for classification between idle, working, and climbing conditions through the use of an LSTM (Long Short-Term Memory) deep learning algorithm. The addition of the MQ6 gas sensor provides the workers with yet more safety since the sensor is able to detect LPG or Fuel gas leakage, which in turn sends immediate alerts to the supervisor in addition to an in-helmet buzzer for the worker. The whole safety system is able to improve safety within construction sites since it is able

to prevent accidents as well as identify potential dangers within the environment using AI-enabled analysis.

130. AI-POWERED SYSTEM FOR DETECTINGELDERLY FALLS AND HEALTH ANOMALIES IN SMART HOMES

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The growth of the elderly population is creating increased urgency for the safety of older adults in their homes through using smart home technology. As falls are still one of the leading causes of injury-related death among seniors, one of the most important issues is how quickly to identify a fall. Additionally, not being aware of health issues such as an irregular heartbeat, unusual motion patterns or unexpected inactivity could prevent a senior from receiving medical help in a timely manner. The “AI-Powered System for Detecting Elderly Falls and Health Anomalies in Smart Homes” project incorporates the Internet of Things (IoT), combining data capture through multiple wearable sensors, ambient IoT devices and camera-based pose estimation models with machine-learning algorithms, to enable real-time detection of falls and to provide real-time monitoring of key health indicators. The AI will automatically determine if an event is abnormal based on the input received through all integrated systems, including all key indicators. If an abnormal event is detected by the AI, it will alert a caregiver, family member or emergency services immediately through the cloud-based AI models. This system focuses on making homes safer for the elderly, therefore providing faster response time in emergency situations and offering continuous monitoring of their health without being intrusive; while the system provides an easy-to- use dashboard that displays all monitored parameters of the elderly and better data analysis. Thereby supporting independent living in a safer environment.

131. REMEDYROOT: LIGHTWEIGHT DEEP LEARNING FOR MEDICINAL PLANT IDENTIFICATION USING LEAF IMAGES

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Accurate identification of medicinal plants is essential for safe therapeutic use, preservation of traditional knowledge, and pharmaceutical research. However, visual similarity among species and variations in real-world imaging conditions pose significant challenges for reliable recognition. This paper presents RemedyRoot, a lightweight deep learning–based system for medicinal plant identification using leaf images. The proposed framework integrates MobileNetV2 with Squeeze-and-Excitation (SE) blocks to enhance channel-wise feature representation while maintaining low computational complexity. To improve robustness under practical conditions, a U^2-Net-based segmentation approach is employed to isolate leaf regions and suppress background interference. The model is trained and evaluated on a dataset consisting of 80 medicinal plant species and 9,256 leaf images captured under diverse environmental variations. Experimental results demonstrate high classification accuracy, efficient inference, and stable generalization compared to existing lightweight plant identification methods. Beyond visual recognition, the system incorporates a disease-based medicinal lookup module and supports controlled user-driven dataset expansion, enabling new medicinal plant species to be integrated as sufficient image evidence becomes available. The proposed web- based platform thereby functions as both an automated identification tool and a practical medicinal knowledge support system.

132. REAL-TIME AIR QUALITY MONITORING AND PREDICTION FOR INDUSTRIAL AND URBAN ENVIRONMENTS

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The fast pace of industrialization and urbanization has resulted in a substantial increase in air pollution levels, which pose serious threats to human health and environmental security. The major air pollutants—particulate matter (PM2.5 and PM10), PM, and toxic gases such as carbon monoxide (CO), nitrogen oxides (NOx), sulfur oxides (SOx), ozone (O3), and volatile organic compounds (VOCs), among others—demand immediate attention, as they are mainly emitted by industrial, transportation, and urban sources. However, the existing monitoring system is based on expensive ground stations, providing sparse spatial information and inadequate timeliness of data. This paper presents a scalable IoT-based air quality monitoring and prediction system that uses various low-cost environmental sensors, real-time data processing, and machine learning algorithms. In particular, it uses Long Short-Term Memory (LSTM) networks for temporal prediction of pollutant patterns and Random Forest and Boosting algorithms for multi-class classification and prediction problems. The proposed system includes validation and mitigation strategies to handle noise, loss, and overall system anomalies in sensors. The experimental results show the potential of the proposed system to be applied on a large scale and its effectiveness in mitigating health risks caused by air pollution by 20-30%.

133. AUTOMATED RAILWAY TRACK INSPECTION USING COMPUTER VISION AND DEEP LEARNING

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Railway transportation is one of the most widely used and reliable modes of transport across the world. The safety of railway operations mainly depends on the physical condition of the tracks. Over time, railway tracks may develop cracks, wear, misalignments, and other surface defects due to continuous heavy loading and environmental conditions. If such defects are not detected at an early stage, they may lead to serious accidents and service disruptions. Conventional inspection methods mainly rely on manual monitoring and periodic testing, which are time-consuming, labor-intensive, and prone to human error. To overcome these limitations, this paper presents an automated railway track defect detection system based on deep learning and computer vision techniques. The proposed system uses a YOLOv8-based object detection model to analyze track images captured using cameras and drone platforms. The model is trained with labeled railway defect images to accurately detect and localize defects in real time. Detected defects are highlighted using bounding boxes and are transmitted through an IoT-based communication framework along with location information. Experimental results show that the system achieves high detection accuracy while maintaining real-time performance on edge devices. The proposed approach reduces manual inspection effort, improves safety, and supports proactive maintenance planning for modern railway networks.

134. STEGO IMAGE DETECTION AND REGION MAPPING

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Steganography has emerged as an effective tool for secret communications, raising many challenges to modern digital forensic and cybersecurity practices. Traditional steganalyzers have faced challenges due to a single statistical feature-based approach to steganography detection, leading to very high false positive rates and lack of robustness against different embedding schemes. This paper proposes the implementation of a novel, multi-modal steganography detection framework using steganalyzers

dependent on statistical features, heuristic- based data extraction, and verdict confidence scoring. Here, the proposed approach will be a blend of different steganalyzers such as analysis of Least Significant Bit (LSB) distribution, Chi- square tests, Shannon entropy analysis, RS (Regular-Singular) analysis, histogram correlations, and multi-channel verification of data extraction. In addition to these steganalyzers, a confidence aggregation-based weighted approach has been proposed to integrate output details of different steganalyzers to obtain an overall suspicion value. Hence, in this work, the implementation and experimentation of the proposed scheme have been carried out on a set of images containing clean and stego images to prove the efficiency of the multi-layered multi-modal approach.

135. AUTOMATED BLUE GREEN DEPLOYMENT

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Automation is revolutionizing the way modern software systems are deployed. Blue-Green Deployment (BGD), when integrated with automation tools, enhances efficiency, reduces manual errors, and ensures faster release cycles with minimal downtime. This paper discusses how automation optimizes BGD by leveraging Infrastructure as Code (IaC), container orchestration platforms, and CI/CD pipelines. Practical insights from cloudnative ecosystems are shared, along with challenges, best practices, and future opportunities for AI-driven deployment automation. In addition to examining technical implementations, the paper highlights real- world scenarios where organizations have successfully applied automated Blue-Green strategies to improve deployment reliability and scalability. It also addresses common pitfalls, such as managing infrastructure complexity and ensuring seamless rollback capabilities. By combining practical experience with emerging trends, the paper aims to guide software teams in adopting more resilient, scalable, and intelligent deployment practices that keep pace with the

growing demands of modern applications. As businesses increasingly shift towards cloud-native architectures and microservices, the need for dependable and automated deployment strategies becomes even more critical. Blue-Green Deployment, when reinforced with automation, offers a practical approach to minimize service disruptions while accommodating continuous updates. The integration of tools such as IaC and container orchestration not only simplifies infrastructure management but also improves consistency across development, testing, and production environments. By leveraging CI/CD pipelines, teams can accelerate release cycles while maintaining high levels of quality and reliability. This paper provides actionable insights to help organizations navigate these technologies effectively and adapt to the fast- evolving software landscape

136. OPTIMIZED OCR SYSTEM FOR SANSKRIT MANUSCRIPTS WITH CROSS LINGUAL TRANSLATION USING GENERATIVE AI

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Sanskrit texts have a lot of cultural information, but it is difficult to digitize the texts because of the deterioration of the writing and the complex Devanagari scripts. The current project offers a better tool for OCR by using image preprocessing and generative AI to ensure accurate OCR. Techniques are also implemented to enhance images to make the historical texts more readable. The recognized Sanskrit text is corrected to avoid any recognition errors. The tool also offers the facility to translate the text into another language to make the tool more user-friendly. Once the translation of the text is complete, the tool offers the facility to read the text meaning by using the text-to-speech feature. A chatbot has also been integrated to make the user understand the digitized text.

137. SMART CRIB: AI-POWERED SMART BABY CRIB WITH ANDROID APP

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Ensuring the safety and comfort of infants is a top priority for parents, especially when they are not phys- ically near their child. To address this concern, this project presents an AI-powered Smart Baby Crib Monitoring System that continuously observes a baby's activities and responds automatically when needed. The system aims to reduce parental stress while enhancing infant safety through intelligent and automated features. A built-in microphone continuously listens to the baby's sounds. These audio signals are analyzed using a Convolutional Neural Network (CNN) to accurately detect crying. When crying is detected, the system automatically activates a motorized swinging mechanism and plays soothing sounds such as lullabies or a parent's recorded voice. This helps calm the baby without requiring immediate parental involvement.To further ensure safety, the system uses a gyroscope sensor to monitor the baby's movements and posture. If the baby attempts to stand up or climb out of the crib, an instant alert is sent to the parents through an Android mobile application, allowing them to take quick action.In addition, a wireless camera provides real-time video streaming, enabling parents to visually monitor their baby from anywhere. By integrating AI-based cry detection, motion sensing, and IoT connectivity, the proposed smart crib system offers a reliable, user-friendly solution that improves infant safety, automates comfort, and supports the needs of modern parenting.

138. EMPLOYEE ATTRITION USING HYBRID MACHINE LEARNING MODELS

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In today's world, Employee attrition is significantly affecting the organizational performance which results in decreasing stability of an organization. To prevent the employee shortage, proactive retention strategies implementation will be the best solution. This paper includes hybrid framework which consists of Autoencoder and Ensemble learning classifiers such as XGBoost and LightGBM. Information of the employees are collected from Human Resource Management Systems (HRMS) is sent for preprocessing, transformation of latent representations is done using Autoencoders and ensemble models are used for analyzing the prediction of employee shortage risk. Compared to traditional machine learning methods, the experimental results shows that the proposed approach improves the accuracy and the stability of the prediction. To support the effective human resource decision-making ,the system also provided interpretable insights.

139. LOW-COST AUTONOMOUS ROBOTIC SEEDER FOR PRECISION FARMING

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This project aims at designing a low-cost, light Autonomous Robotic Seeder suitable for easy implementation in precision farming. It consists of a solid and stable wheeled chassis; a robotic injector to precisely place the seeds at a targeted point; and a basic automation system. The project emphasizes the use of simple and inexpensive machinery that can easily be adopted and handled by farmers who

have a limited technical background. It will also be tested on different types of terrain for seamless functioning and can later be upgraded for IOT connectivity and integration of solar power.

140. DEEP LEARNING FRAMEWORK FOR PEST AND DISEASE DIAGNOSIS WITH PESTICIDE RECOMMENDATIONS

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This project presents a system of artificial intelligence-driven system of detecting the diseases and insect pests in the crops, which is built around the images, and an electrical signal to spray farmers with the relevant pesticides. Large scale crops that are often covered by the system have been focused on to target pests through the application of machine learning and computer vision to identify the symptoms based on leaf and plant images. Upon the detection of a pest or disease, the system recognizes it as a pesticide database in the form of a curated database and proposes suitable pesticide treatment depending on the kind of crop and pest. This is to reduce loss of crop, to eliminate excessive use of chemicals and allow the farmers to make correct and timely decision support on how to protect their crops which must be region specific.

141. SESAURA: A REAL-TIME ACOUSTIC ALERT SYSTEM FOR ASSISTING HEARING-IMPAIRED INDIVIDUALS

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People with hearing loss often struggle to recognize some important environmental sounds, which are crucial for safety and daily life awareness. This paper proposes the SesAura smart acoustic alert system, design to help them detect and interpret in real time the critical household sounds. The system is implemented on a Raspberry Pi-based edge platform and exploits machine learning techniques for efficient sound classification. SesAura currently detects a wide range of significant home sounds: doorknocks, baby cries, fire alarms, shattered glasses, and human screams. For instance, upon detecting any one of these sounds, the system can deliver alerts via multiple accessible channels that include vibration-enabled mobile notifications or visual LED indicators. A speech-to-text module can also convert detected speech into readable text, enhancing the understand- ing of spoken communication. The system is lightweight, has a privacy orientation, and is conceived for continuing home use with minimal dependence on cloud services. Experimental results under real-world conditions show robust performance with very low latency. SesAura demonstrates the potential of embedded acoustic intelligence to enhance safety, accessibility, and independent living for hearing-impaired individuals.

142. QUANTUM-ENHANCED PORTFOLIO OPTIMIZATION: A COMPREHENSIVE SURVEY OF HYBRID ALGORITHMS AND IMPLEMENTATION FRAMEWORK

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The financial services industry is currently facing a computational bottleneck. Traditional optimization problems, such as selecting the optimal mix of assets to maximize returns while minimizing risk, belong to the complexity class of NP- Hard problems when realistic constraints—such as cardinality, transaction costs, and discrete lots—are applied. As the number of assets increases, classical algorithms, including brute-force search and gradient-based methods, struggle to find global optima within reasonable timeframes. This paper presents a comprehensive survey of Quantum Computing applications in finance, specifically focusing on the transition from classical Mean-Variance Optimization to Quantum Approximate Opti- mization Algorithms (QAOA). Furthermore, we propose and implement a hybrid quantum-classical framework. This system utilizes the Variational Quantum Eigensolver (VQE) on a high- performance simulator to solve the portfolio problem formulated as a Quadratic Unconstrained Binary Optimization (QUBO) model. The work culminates in the development of an inter- active diagnostic tool that visualizes the real-time convergence of quantum states, bridging the gap between theoretical quantum advantage and practical financial engineering.

143. ANIMAL INTRUSION DETECTION SYSTEM WITH REAL -TIME VIDEO SURVEILLANCE (AI + COMPUTER VISION)

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The proposed system uses &Artificial Intelligence& technology, employing a &Deep Learning& model and a &Computer Vision& model to monitor and control &Animal Intrusion& in agricultural lands, residential areas, highways, and so on. This detection can be implemented using the &Real-Time Video Surveillance& method, such as CCTV or an IP Camera, to provide live video surveillance to end users.

It collects video datasets of various kinds of animals, such as &Dogs, Cows, Ox, Elephants, Jaguars, Wild Bears&, and so on. The collected data are pre-processed by resizing, augmenting, and labelling images to improve accuracy. It helps to analyse the animals during the day and night and in various weather conditions, such as rainy, snowy, fog. The proposed work uses &YOLO& for object detection purposes, and it will be well-trained for the animal detection scenario. Here, YOLO stands for &You Only Look Once&. When an animal is detected in the agricultural field or residential areas, it shares real-time alerts to the end user as well as to the intruded animal. A buzzer alarm is used for alerting both the end user and the animal, and the instant alert SMS can be shared to the smartphone of the end user.

144. YAALIR: A HYPERLOCAL TRAVEL PLANNER FOR PRESERVING AND PROMOTING TAMIL NADU HERITAGE

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When it comes to Tamil Nadu s cultural and architectural heritage, the region& s tourism is hindered by a disjointed digital landscape. One that, due to its inability to fathom & hyperlocal& experiences, throws up a myriad of logistical and financial problems for the tourists and rural artisans alike. The problem, not to be missed, is at the heart of a paper that proposed the intelligent, web-based 'Yaalir' system for a new wave in heritage tourism. This platform, bolstered by AWS EC2 and Cloudfront, and running with a proprietary recommendation engine that computes user specifications such as budget, time and interests to sort out intricate multi-station itineraries. The innovative &Community Module' takes the travel experience a step further, realising real-time data on local festivals and craft fairs, and sending tourists straight into the heart of intangible culture. The trials of Yaalir showed that it can cut costs while immersing visitors in the area&s cultural heritage. While it was once a focus on the Local Commercialisation of Travel Destinations, the primary focus now is on connecting with the Community and Responsible Economic Enhancement per the UN Sustainable Development Goals.

145. REAL-TIME AUTOMATED WEIGH BATCHING SYSTEM FO PLASTERING APPLICATIONS USING LOAD CELLS AND TEENSY 4.1

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At construction sites, the manual preparation of mortar for plastering applications leads to unequal qualities of surface finishes, adhesion, and durability since the proportions of ingredients differ. This paper describes a real-time automated material weigh-batching system for plastering operation designed using the Teensy 4.1 microcontroller and load-cell sensors. The system is designed for continuous measurement and control of the flow of cement and sand, via an embedded control algorithm, to dispense them in real-time. To control measurement precision and minimize drifts of the sensors, a multi-point calibration method was developed. The system demonstrates the integration of real- time weight measurement, automated control of cutoffs, and proportional control for the consistency of mortar formulation. Tests indicate the system provides lower manual measurement errors, greater accuracy of batching, and consistent proportion control. The system also provided less preparation time than traditional methods. The automated system provides greater mixture homogeneity than manual methods, enhances usability, and provides control of material waste. The automated system provides customized settings, the solution offers an alternative to advanced plastering quality, while providing an additional option to fully automated and semi-automated construction environments, offering further scalability potential.

146. WEB BASED INTERACTIVE QUIZ APPLICATION FOR ACADEMIC EVALUATION

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The rapid adoption of digital technologies in education has increased the need for efficient, interactive, and automated assessment systems. Traditional evaluation methods are often time-consuming, prone to manual errors, and lack instant feedback, which limits student engagement and learning effectiveness. This paper presents the design and development of a Web Based Interactive Quiz Application for Academic Evaluation that enables real-time quiz creation, participation, and automated result processing. The proposed system supports multiple quiz categories, including educational, parenting, mental, fun, and IQ-based assessments, to address diverse learning needs. Teachers can create and manage quizzes with predefined time limits, while students can join quiz rooms using unique access codes and participate in real-time evaluations. A buzzer-style response mechanism is incorporated to display the top three fastest correct responders, encouraging competitive and interactive learning. Experimental results demonstrate that the proposed system improves evaluation speed, accuracy, and

user engagement when compared to conventional manual and semi-automated assessment methods. The system offers a secure, scalable, and user-friendly platform suitable for modern academic environments. The application automates the evaluation process, providing instant results and feedback, thereby reducing manual effort and evaluation time. It supports secure user authentication, time-based assessments, and centralized storage of student performance data. The system improves transparency, accuracy, and accessibility in academic evaluation and promotes continuous learning through immediate feedback. Overall, the proposed application offers a scalable and user-friendly solution that enhances the effectiveness of academic assessment in educational institutions.

147. RESEARCH AND DEVELOPMENT DIGITAL TWIN FRAMEWORK FOR EEG-BASED DETECTION OF EPILEPSY AND ADHD USING DEEP LEARNING MODELS

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A Digital Twin–based neural disorder assessment system has been developed to analyze EEG signals using deep learning while simultaneously visualizing affected brain regions through an interactive 3D model. The framework targets two major neurological conditions—Epilepsy and Attention-Deficit Hyperactivity Disorder (ADHD)—and integrates an EEG preprocessing pipeline with LSTM-based epilepsy detection and CNN–LSTM–based ADHD classification. These predictive models are coupled with a digital twin that maps EEG abnormalities onto anatomically relevant cortical regions, supported by medical information panels describing symptoms, functional impacts, and treatment options. A web-based interface built using Dash and Plotly enables users to upload EEG segments and obtain real-time predictions along with personalized brain-region activation maps. This interpretability links abnormal EEG patterns to specific structures such as the prefrontal cortex, temporal lobe, hippocampus, and anterior cingulate cortex, offering deeper insight into each disorder's neural basis. By combining AI-driven signal analysis with an intuitive digital-twin visualization, the system improves accessibility, reduces dependence on specialized EEG facilities, and supports precision neurology. Overall, the framework lays the groundwork for future, scalable digital twin applications in healthcare.

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148. HCRL-UIE: HYBRID CNN AND REINFORCEMENT LEARNING BASED UNDERWATER IMAGE ENHANCEMENT

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Underwater images usually appear unclear due to the absorption and scattering of light in water. This leads to color imbalance, low contrast, and poor visibility. Because of these issues, it becomes difficult to observe underwater scenes accurately. This paper propose a method called Hybrid CNN–Reinforcement Learning Underwater Image Enhancement (HCRL-UIE). This method improves the quality of underwater images in two steps. First, a Convolutional Neural Network (CNN) enhances the input image. It improves the color balance and overall visibility of the image. After this step, a Reinforcement Learning (RL) model further improves the image. The RL agent applies a series of small enhancement actions. Checks the current image and select the best action to improve the image quality. This step-by-step process helps the system adjust to different underwater conditions. It also helps avoid over- enhancement. The proposed method is evaluated using some evaluation metrics such as PSNR, SSIM, UIQM, and UCIQE. The results show that the proposed method produces clearer and more natural underwater images than the original input image. The proposed framework can support various underwater applications such as marine exploration, underwater robotics, and environmental monitoring.

149. SPEECHMATE: AN AI-DRIVEN PLATFORM FOR INTEGRATED SPEECH THERAPY MANAGEMENT

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The effective provision of speech therapy is often hindered by systemic inefficiencies, including high patient-to- therapist ratios and significant administrative burdens on clinicians, which can compromise the quality and consistency of care. This paper presents SpeechMate, a novel, AI-powered platform designed to address these challenges by automating key management functions. The system integrates a rule-based AI engine with a modular software architecture built on technologies such as Next.js and MongoDB to streamline patient-therapist allocation, generate personalized therapy plans, and establish data-driven feedback loops. This paper details the system's design, architecture, and preliminary results. Initial observations from controlled testing confirm the successful integration of core modules, the efficiency of the AI matching logic, and positive early findings regarding system usability and performance. The findings indicate that SpeechMate offers a scalable and practical solution that not only addresses a critical need in healthcare management but also establishes a new model for continuous quality improvement through systematic data collection and analysis. The platform redefines the role of technology in therapy by acting as a force multiplier for clinicians, rather than a replacement.

150. HYBRID ZIGBEE–WI-FI AD-HOC NETWORK FOR REAL-TIME VICTIM LOCALIZATION AND RESCUE COORDINATION IN POST-DISASTER SCENARIOS

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Conventional communication infrastructure frequently fails entirely or partially in post-disaster environments, which severely impairs situational awareness, victim localization, and rescue coordination. This paper proposes a Hybrid ZigBee–Wi-Fi Ad-hoc Network for Real-Time Victim Localization and Rescue Coordination, which is intended to function independently in disaster scenarios without infrastructure. The proposed system leverages a multi-protocol wireless architecture integrating ZigBee, Wi-Fi, and GSM technologies to ensure reliable data transmission, scalability, and rapid alert dissemination. The transmitter node is built around an ESP32 microcontroller interfaced with a suite of environmental and motion sensors, including MQ2 gas, vibration, soil moisture, DHT11 temperature and humidity, PIR motion, and accelerometer sensors. Each sensor is configured with predefined threshold values to detect abnormal conditions such as gas leakage, seismic activity, temperature anomalies, moisture variation, and human presence, which are indicative of potential disaster events. Upon threshold violation, sensor data and alerts are transmitted via ZigBee to a centralized receiver node. The receiver provides real-time visualization on an OLED display and supports on-demand QR code generation, enabling access to a Wi-Fi–based web server for detailed sensor analytics and network status monitoring. Additionally, a GSM module ensures automatic SMS notifications with location-relevant information to rescue teams and nearby responders. The proposed hybrid ad-hoc framework demonstrates a cost-effective, resilient, and scalable solution for enhancing disaster response efficiency, situational awareness, and coordination in emergency scenarios. The hybrid nature of this architecture ensures continuous data transmission, even in areas where one of the networks becomes non-functional. This decentralized, ad- hoc design enhances the reliability and scalability of the system, enabling rapid deployment without the need for existing communication infrastructure.

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151. SMART PERSONAL FINANCE MANAGEMENT: DESIGN AND EVALUATION OF A CROSS-PLATFORM BUDGETING SYSTEM

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Due to the accessibility of technology in today&s digital age, more and more people need to find easy ways to keep track of their spending, create budgets, and accomplish their financial goals. This paper discusses the design and creation of a cross- platform personal finance tracking and budgeting application, which was created as a research prototype. This uses Flutter as front end, Firebase authentication (for user login and notification services), a Node.js backend (used to process business logic), and a MySQL database (used to store structured financial data). The system includes features such as secure user login and registration, transaction logging and history, expense categorization, budgeting, goal setting, and a financial coaching module that will help promote responsible financial behaviour. The system architecture and prototype implementation illustrate how the components of the solution interact to provide users with an intuitive experience. The proposed system demonstrates a scalable, secure, user-friendly solution that makes financial monitoring easier and provides users with increased awareness of their finances.

152. SEAF: A SMART FRAMEWORK FOR SOCIAL ENGINEERING ATTACKS

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Phishing and other social engineering attacks have evolved into a se- rious cybersecurity challenge as they exploit human behavior rather than weak- nesses in technical systems. Phishing techniques are rapidly evolving. This in- cludes tactics like URL obfuscation, domain manipulation, and large-scale auto- mated phishing campaigns. As a result, these techniques are not effective any- more. The consequence is that traditional detection methods that rely on rules or blacklists are becoming ineffective. Machine learning methods in use are poten- tially accurate classifiers, but while they perform well in isolation, they do not contribute to an overall understanding of the surrounding situation, the nature of the behavior, or actionable threat intelligence. In addition, the failure to integrate phishing detection with attack visualization and adversarial Tactics, Techniques, and Procedures (TTPs) limits their practical use in effective security operations. There is a need for phishing detection tools

that go beyond identifying bad URLs to also support a better understanding of attacks and their impact on operations. In this study, we analyze phishing detection from a technical and threat-mapping perspective using a combination of lexical as well as host-based URL features. We argue for contextualized and interpretable forms of security against phishing- based social engineering attacks.

153. STUDY BUDDY: AN AI-POWERED MULTIMODAL STUDY ASSISTANT FOR AUTOMATED GENERATION OF PERSONALIZED LEARNING MATERIALS

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Students today are dealing with too many disparate tools just to get ready for one exam—one for summarization, another for flashcards, and a third for practice quizzes. Each of these tools is only capable of dealing with one file type and utterly disregards multimedia content such as audio lectures and video slides. Study Buddy was created to solve this problem. The system takes PDF, DOCX, PPTX, audio, and video files, processes them with the Google Gemini API to create summarizations, flashcards, and practice quizzes, and also includes a chatbot that can answer questions directly related to the uploaded content. A goal-setting tool creates customized daily study plans, and YouTube API integration includes tutorial videos. The system was tested in a 4- week case study with 20 undergraduate students studying for their mid-semester exams in Computer Science and IoT. Students noted a 30-40% reduction in the time spent compiling material, and 72% found the summaries very useful.

154. AI-POWERED REAL-TIME SIGN LANGUAGE DETECTION AND TRANSLATOR USING DEEP LEARNING

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The given project will achieve the communication gap between signers and non-signers by developing a real-time translation system that utilizes the deep learning. Unlike the other solutions, the software is based on a traditional webcam, to decode a stationary or dynamic gesture of the hand in real- time to cast it to text or voice. On the background we are having a hybrid system so that the software can convert messages in time but we are not losing much on quality. Precisely, we are applying YOLO detection, CNN-BiLSTM and ModelNet classification. In this manner, it enables the software to be capable of functioning effectively on the edge devices making the solution to remain affordable and viable to be implemented in the medical, education industries or any other industries. The first tests prove the viability of the solution Crucially the findings prove that the AI can be applied to drive the issue of accessibility and deliver inclusive communication.

155. A HYBRID CNN-QUANTUM FRAMEWORK FOR AUTOMATED MALIGNANCY DETECTION IN LYMPH NODE HISTOPATHOLOGY PATCHES

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The efficacy of near-term quantum machine learning (QML) is often limited by two primary hurdles: the high cost of representing complex medical images in quantum states and the significant measurement overhead required for similarity- based inference. This paper introduces a hybrid medical-QML framework in which a convolutional backbone with a compact neck first compresses each 96 × 96 lymph-node patch into a low- dimensional feature vector, which is then amplitude-encoded and evaluated by a fixed interference circuit [4], [11]. We employ a fixed interference-based decision rule that relies on the sign of the real linear overlap rather than quadratic fidelity, significantly reducing the measurement shots needed for inference. The learning phase is executed entirely classically through centroid aggregation of training embeddings, which are then used to define static state-preparation unitaries. We evaluate the proposed Interference-Based Quantum Classifier (IQC) on the PatchCame-lyon dataset under realistic noise models. Our results demonstrate an accuracy of 88.07% on the validation subset, demonstrating that high-performance medical classification is achievable with measurement-efficient, NISQ-compatible quantum circuits.

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156. FINMATE: AN INTELLIGENT PERSONAL FINANCE MANAGEMENT PLATFORM USING NLP-BASED FINANCIAL ASSISTANCE AND SPENDING ANALYTICS

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In recent years, financial literacy and effective personal finance management have become critical challenges for students and young professionals who often lack in structured budgeting, taxation, and also financial decision- making. Existing personal finance applications entirely focus on expense tracking and offer limited support for financial education, personalized insights, and intelligent assistance. To overcome these limitations, this paper presents FinMate, an AI-driven personal finance support system designed for to assist users in managing their financial activities while simultaneously improving financial literacy. The proposed system comes with a conversational AI assistant capable of interpreting finance-related queries using natural language processing, a budget analytics module that analyzes spending patterns and generates visual insights, and an India-specific tax calculation engine that evaluates liabilities under different tax regimes. In Addition to this, the system includes a financial knowledge module and a real-time financial news integration layer to support continuous learning and informed decision- making. The architecture combines with AI-based conversational guidance with data analytics and rule-based financial computation to deliver an exceptionally interactive and educational financial management platform. Experimental evaluation of the prototype explains the system's ability to categorize the user expenses, provide contextual financial explanations, and generate actionable insights that could encourage better financial habits. By integrating intelligent assistance

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with practical financial tools, the Objective FinMate is to bridge the gap between financial management and ensured financial education, ultimately empowering the users to make informed and responsible financial decisions.

157. AN ENSEMBLE LEARNING FRAMEWORK FOR ENHANCED CERVICAL CANCER DETECTION USING PAP SMEAR IMAGES

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Cervical cancer remains a major cause of cancer- related mortality among women, where early and accurate screening is essential for improving clinical outcomes. This work presents an ensemble-based deep learning framework for automated multi-class cervical cancer classification using liquid-based Pap smear images. The proposed system integrates ResNet50, EfficientNet-B3, and Vision Transformer (ViT), along with a hybrid ResNet50–ViT feature fusion model to capture complementary local and global representations. A weighted soft- voting ensemble strategy is employed to enhance robustness and generalization. Experiments conducted on a clinically relevant dataset of 963 Pap smear images acquired at 40× magnification demonstrate that the ensemble model achieves an overall ac- curacy of 92.8%, outperforming individual architectures. Grad- CAM visualizations are incorporated to provide interpretable insights by highlighting diagnostically relevant cellular regions. The results indicate that the proposed framework offers an accurate and explainable decision-support solution for cervical cancer screening in clinical settings.

158. EVALMODEL: A HYBRID META-EVALUATOR FOR MACHINE LEARNING MODELS WITH LLM MENTOR

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The traditional machine learning evaluation pipeline provides measures of performance, fairness, and robustness as separate entities. This allows for compensatory masking, in which high performance in one area can cover up poor performance in another. In addressing this limitation, the paper proposes a new metric that measures model trust as a bounded combination of performance, dataset health, fairness, and robustness. It provides a score from 0 to 100. A Dataset Instability Index is used to measure the compounded structural data risk using additive and multiplicative combinations. A hybrid weighting mechanism is used that depends on the observed risk. A non-compensatory guard is used to ensure that failure in one area will not be offset by high performance in another. Experiments using the UCI Adult Income and COMPAS datasets and three classifier families using five-fold cross-validation show that strict evaluation in the presence of severe corruption results in trust degrading almost twice as fast, has a substantial fairness penalty in the case of real disparity, and has classifier-independent trust rankings that have statistical significance less than 0.01. A new module, the LLM-based mentor, is introduced that translates quantitative trust measures into easily understandable explanations and corrective actions.

159. DESIGN AND IMPLEMENTATION OF A LIGHTWEIGHT MINI-SOAR FRAMEWORK FOR AUTOMATED CYBER INCIDENT RESPONSE

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Security Operation Centers (SOCs) are under pressure from the increasing number of alerts and the growing sophistication of modern threats. Although Wazuh-based SIEMs are effective in supporting the detection and correlation of logs, the response is still mostly dependent on human analysts, resulting in the bottleneck that typically takes 10-15 minutes for each high-priority case. Security Orchestration, Automation, and Response (SOAR) solutions are touted as the answer to the problem; however, the cost of these solutions makes them inaccessible for many universities and small organizations. Mini-SOAR: An open-source SOAR engine that integrates directly into the Wazuh SIEM system has been created. The system automates the entire Incident Response process using a five-step pipeline: ingestion, JSON field extraction, decision- making using a composite risk score, automated remediation using Linux iptables rules, and case organization using OpenSearch. The system uses the risk score, combining Wazuh alert severity, external IP reputation from VirusTotal and AbuseIPDB, and attack tempo, for adaptive graduated response. The system was simulated using an isolated virtual network for an SSH brute force attack and reduced the Mean Time To Respond from 10-15 minutes to 1.8 seconds. The system was able to achieve 100% accuracy, 98.7% automation, and no false negatives using only 2 GB of RAM and one consumer CPU core. The playbooks are modular, allowing for straightforward extension for other attack scenarios, cloud environments, and multi-tenant SOC environments.

160. PERSONALIZED HEALTHCARE AI ADVISOR: AROGYAM.AI

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Arogyam.ai is a healthtech platform built to make healthcare support feel easier and more responsive. It brings patients and medical specialists together online in a safe, guided setting. This paper explains how Arogyam.ai works as a blend of human care and artificial intelligence. It also walks through the idea behind the product, the design choices, the main features, and where it may go next. The aim is simple: help people get the right care, fast. Patients can reach experts across many fields through chat or video. That includes neurology, cardiology, and orthopedics, as well as pulmonology,

gastroenterology, gynecology, and urology. Alongside consultations, the platform supports practical needs too-secure payments, digital prescriptions, and safe document sharing-so follow-up steps are clear and, most of the time, stress-free. These features make consultations better. Create a complete online healthcare system. The artificial intelligence helper gives patients answers, second opinions and good advice. It helps patients when they cannot see a doctor easily or when there are not doctors. The goal of Arogyam.ai is to use technology to make sure everyone gets good medical care. Arogyam.ai wants to change how healthcare works over the world.

161. HYBRID MACHINE LEARNING FOR INTELLIGENT THREAT DETECTION

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*

The increasing dependency of satellite and space- based communication on ground networks has brought new challenges to cybersecurity. Contrary to terrestrial communication systems, space communication systems experience limitations, e.g., high delays (latency) and long-range transmission or in terms of computing resources/hardware; these different constraints impact the susceptibility of a system to cyber- attacks or exploitation. This study suggests a hybrid Convolutional Neural Network-Long Short-Term Memory (CNN-LSTM) deep learning model for intelligent intrusion detection in space network environments. The components of CNN successfully model spatial dependency and feature correlation in the input, while the LSTM component models long-term sequential relationships, which aid in capturing multi-step attack characteristics. The model has been developed and trained using the synthetic space network dataset, which simulates satellite communication traffic, consisting of normal and malicious data patterns. The proposed CNN-LSTM reached an accuracy of 96.8% and an F1-score of .96, outperforming existing CNN-QRNN models with respect to precision and recall. The hybrid architecture is more robust in detecting sophisticated cyber threats, minimizing false-positives, and showing the ability to be deployed for near-real-time, mission-critical space communication systems. This research contributes to advancing operational security of a satellite network using data-driven, adaptive intrusion detection.

162. AD CLICK FRAUD DETECTION BASED ON PREDICTIVE MODELLING

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With the widespread use of internet-based services and data-driven marketing, digital advertising online has become a significant source of income for businesses as well as publishers and content providers. Campaign performance tracking, along with tracking pay-per-click (PPC) and cost-to-impression (CPI), are facilitated for advertisers through the use of various advertising models. In contrast, the swift expansion of online advertising ecosystems has also resulted in a marked increase in fraudulent click generation, where fraudulent actions are intentionally taken to increase advertising expenses, manipulate performance metrics, or consume rivals& advertising budget. The perpetrators& malicious deeds result in substantial financial losses for advertisers, weaken campaign analytics, and undermine confidence in digital advertising platforms. Automated bots, malware-infected devices, distributed botnets and organized click farms are all common methods used for adecline fraud. The use of static thresholds, IP filtering, and predefined heuristics has become increasingly ineffective in rule-based fraud detection systems as fraud techniques continue to evolve. Such methods are difficult to detect sophisticated fraud patterns and often have high false-positive rates. The paper proposes a framework for detecting unauthorized purchases using machine learning techniques through predictive modelling, in order to overcome these challenges. This approach is based on an analysis of user behavior, click patterns (such as time travel), temporal dynamics and device-specific characteristics to reliably distinguish between legitimate clicks and fraudulent ones. By utilizing advanced data preprocessing and feature engineering techniques, meaningful indicators can be extracted from clickstream data of significant scale. They evaluate several supervised machine learning models, and use an ensemble approach to improve detection accuracy, robustness, complexity, precision in general (and the reduction of false positives). According to experimental evidence, the proposed system outperforms traditional detection techniques and supports real-time decision making in modern online advertising networks.

163. DISTRIBUTED PATTERN EMERGENCE DETECTION IN HUMAN-CENTRIC HEALTH DATA STREAMS

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Early diagnosis of infectious disease outbreaks is critical for efficient public health response and resource planning. This paper introduces Outbreak track, a predictive analytics platform driven by AI that uses anonymized medical data to track infectious diseases in several locations. Through region-based identification, the system maintains institutional anonymity while combining recurring disease reports from several institutions into a single dataset. The Auto-Regressive Integrated Moving Average (ARIMA) model is used to estimate regional disease trends, and Z-score-based anomaly detection, which measures differences between expected and observed case counts, is used to identify anomalous growth patterns. An interactive dashboard visualizes regional trends and overall disease escalation in real time, allowing for early detection of impending epidemics. The presented framework is appropriate for real-time public health surveillance and decision assistance because it places an emphasis on interpretability, low computing complexity, and deployability.

164. SOLGEN: AN AUTOMATIC CLEANING ROBOT FOR SOLAR PANELS

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Solar photovoltaic systems generally experience degradation due to continuous environmental contaminants and dust accumulation on the surface of solar panels. Conventional cleaning mainly depand on manual labor, which is inefficient, time-consuming and unsafe for large scale or sloppy installations. This work presents SOLGEN, an autonomous solar panel cleaning bot designed to improve energy efficiency through automated maintenance. The system is built by ESP-32 based control unit and integrates edge detection sensors, motor-driven movement, also with rotating brush mechanism and if wet cleaning motor for water is also given for effective cleaning of solar panels. Wireless communication through the Blynk app allows us for real time monitoring and control through mobile device or web. The robot is capable of navigating across the solar panel surface automatically while preventing accident falls using continuous sensor detection. Experimental evaluation demonstrates a stable operation with reduced human effort and effective removal of dust. The proposed design is lightweight, cost-effective, suitable for residential as well as commercial installations. Future improvements involves the integration of YOLO model or Convolutional Neural Networks (CNN) for intelligent dirt detection and fully autonomous condition based cleaning.

165. KNITINSPECT: REAL-TIME KNITTING ANOMALY DETECTION POWERED BY COMPUTER VISION

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Circular knitting machines operating at approx. 30 RPM generate fabric at speeds that outpace human visual perception. A single broken needle can damage 5 to 10 meters of fabric in under sixty seconds, creating a need for automated, low-latency intervention. In this Phase I study, we engineered KnitInspect, a computer vision prototype designed to detect texture anomalies without relying on labeled defect data. We utilized a sliding-window architecture that processes fabric texture via a pre-trained ResNet-18 feature extractor. To avoid the logistical bottleneck of collecting thousands of ”defect” images for supervised training, we implemented an unsupervised Isolation Forest. This approach models the statistical distribution of ”valid” fabric and flags outliers using a dynamic 3-sigma threshold. Testing was conducted on a live industrial setup using a Full HD (1920×1080) GigE camera at 45 FPS. Preliminary validation on a manually collected dataset yielded a detection accuracy of roughly 60% for structural defects. However, latency analysis revealed a critical hardware limitation: processing time on the edge GPU (RTX 3050 Ti) averages 55ms per frame. This exceeds the 22ms actuation window required to halt the machine, establishing the primary optimization metric for Phase II.

166. ADAPTIVE CYBER RISK ASSESSMENT FOR INDUSTRIAL IOT USING DYNAMIC RISK SCORING

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The Industrial Internet of Things technology is being used more and more in automation systems. This has made it easier to connect things monitor them from away and make them work better.. There are some big problems with using Industrial Internet of Things technology. When you combine cyber things it can be very dangerous. The old ways of checking for risks do not work well. They cannot keep up with how fast thingsre changing in industry. So we are suggesting a way to check for cyber risks, in Industrial Internet of Things systems. This new way uses a framework that can change and adapt. We use a monitoring unit that is based on Arduino. This unit has sensors that can feel temperature, vibration and voltage. These sensors help us keep an eye on things. We calculate risk scores based on how much thingsre deviating from what is normal how severe the problem is and what our thresholds are. We do all of this on a platform that gets data in real time from the Industrial Internet of Things. If the risk score gets too high we get an alert. We take steps to prevent bad things from happening. This new way of doing things helps us stop cyber threats before they happen in automation. It also helps us understand what is going on better and makes our systems stronger. The Industrial Internet of Things technology is used to make this happen.

167. CROWDSEC SENTINEL: A COLLABORATIVE REAL-TIME THREAT INTELLIGENCE AND VISUALIZATION PLATFORM

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Cybersecurity threats continue to grow in frequency, complexity, and spread. This makes collaboration and flexible defense strategies more important than ever. This paper intro- duces CrowdSec Sentinel, a community-focused threat intelli- gence and real-time visualization platform built on the open- source CrowdSec framework. The system improves CrowdSec's detection and mitigation abilities by adding a FastAPI-based backend for processing and enriching alerts, a Supabase database for dependable cloud storage, and a React-based frontend that provides an interactive and user-friendly experience. A real-time Leaflet-powered global threat map shows live attack sources and trends, helping security teams understand the situation quickly. To boost operational efficiency, the platform combines alerting and notification systems, ensuring fast responses to critical incidents. It also includes a collaborative rule-sharing module that allows users to publish, share, and adopt detection rules from the broader community. By using lightweight, modular, and open-source technologies, CrowdSec Sentinel is affordable, scalable, and flexible, making it suitable for both individuals and businesses. The system shows that it is possible to combine crowdsourced intelligence with real-time data visualization to cut down incident response times, encourage collective defense, and enhance resilience against changing cyber threats. Additionally, its modular structure allows for future enhancements like AI- driven anomaly detection, predictive analytics, and integration with existing SIEM/SOAR platforms, showcasing its potential as a modern collaborative cybersecurity solution.

168. A COMPARATIVE ANALYSIS OF MACHINE LEARNING AND ENSEMBLE MODELS FOR PHISHING DETECTION USING DIVERSE DATASETS

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Phishing attacks are getting more commonly, and that has everyone a bit on edge about keeping things more secure online. Most research studies show better classification results after scientists improve their models through accessing multiple datasets and testing various algorithms under different operational conditions. The research leaves a gap because real world phishing data can shift all the time and researchers need this ability to verify findings across different data environments. The research team conducted their experiments using various data configurations to accomplish their objectives. The researchers worked on both balanced and imbalanced datasets because these two types of datasets represent the actual conditions which occur during phishing attacks. The researchers established several split ratios which ranged between 90 to 10 and 80 to 20 and continued downwards until reaching 60 to 40, in order to test their hypothesis about split ratios. The research shows that studying thirteen recently discussed algorithms through ten specific evaluation methods produces better results for understanding their behavior. The results show t each method produces different outcomes which depend on the operational environment because the results show which methods work effectively and which methods fail. Some algorithms operate effectively in one situation while they completely fail in the next situation which creates a surprising outcome. The research shows that past studies did not cover this variation which leads researchers to build more reliable models for environments with unpredictable data. The information does not connect to each other in a smooth way. Some results still seem unclear, like they need more digging to make sense.

169. A COMPACT PLANAR MONOPOLE ANTENNA AT 2.4 GHZ FOR MULTI-STANDARD COMMUNICATION

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This paper presents the design and rigorous dual-tool validation of a compact rectangular planar monopole antenna operating at 2.400 GHz on an FR4 substrate (ε_r= 4.4, tanδ = 0.02) with a 50-Ω microstrip feed. The antenna is intended for simultaneous multi-standard operation across the entire 2.4 GHz ISM band. Independent simulations are performed using ANSYS HFSS and MATLAB Antenna Toolbox, and results are compared across all key performance metrics. At precisely 2.400 GHz, the antenna achieves a peak realized gain of 3.64 dBi, a VSWR of 1.81, and a minimum return loss of −10.80 dB. In accordance with quarter-wave monopole theory, it displays a figure-of-eight E-plane pattern and nearly omnidirectional radiation in the H-plane. The 83.5 MHz ISM spectrum (2.400–2.4835 GHz) is completely covered by the −10 dB impedance bandwidth of about 100 MHz. Excellent agreement between FEM and MoM findings is confirmed by a thorough cross- validation; deviations for all scalar parameters are less than 0.11%, indicating great numerical robustness regardless of solver type. Because it supports IEEE 802.11b/g/n, IEEE 802.15.1/802.15.4 Bluetooth Low Energy, and IEEE 802.15.4 all at once, the antenna is appropriate for wearable technology, smart home hubs, IoT nodes, and small multi-protocol wireless systems.

170. PREDICTIVE ANALYSIS OF EMPLOYEE ATTRITION USING MACHINE LEARNING

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Employee attrition is a major challenge for organizations, as frequent employee turnover increases costs and affects productivity. Predicting employee attrition in advance can help organizations take early preventive actions. This project proposes a machine learning–based approach to predict employee attrition using historical employee data. After preprocessing the data, machine learning models such as Logistic Regression, Decision Tree, and Random Forest are applied to classify whether an employee is likely to leave or stay. The results show that machine learning techniques can effectively support employee attrition prediction and assist human resource teams in making data- driven decisions. In the future, the system can be improved using advanced models and real-time data.

171. SIGN LANGUAGE TRANSLATOR FOR HEARING IMPAIRED USING MACHINE LEARNING

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Sign language is a significant means through which the Deaf and the hard-of-hearing individuals communicate. It is an elaborate visual language that employs the use of the hands, facial expression, and the body movements. Nevertheless, communication issues between signers and non-signers remain, and therefore it is all the more crucial to have automatic Sign Language Recognition (SLR) systems that would assist. Word- level SLR remains highly challenging due to the constantly changing gestures, signers vary, and annotated datasets are not common and it requires robust and discriminative feature extraction.WLASL100 is a word-level standard of ASL recognition that is composed of 100 signs of vocabulary signed by diverse signers that we are also evaluating a CNN + LSTM- based recognition pipeline on. Our model has the highest accuracy of around 75% of Top-1, which is better than the original frozen CNN models.Precision, recall and F1 score of the system are also 78, 74, and 76 respectively. Such findings can be compared to previous sequence-modelling approaches of WLASL100, which demonstrates the effectiveness of the combination of spatial CNN features and temporal LSTM processing. The key findings of this paper are: (1) CNN + LSTM to recognise sign language (SLR) at the word level, (2) extensive assessment and benchmarking of the WLASL100 dataset, and (3) a detailed discussion of the findings including challenges and possible future improvements.

172. SIMULATION-BASED LEO MICROSATELLITE DEFENCE SYSTEM USING SIMU-CIC, VTS, PYTHON, AND CELESTIA

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The use of Low Earth Orbits micro satellites has been gaining significance in defence systems due to their reduced latency, high revisit, and economical deployability. The manuscript introduces an LEO micro satellite-based defence system, designed and developed using Python-based SIMU-CIC, VTS, and Celestia software. To emphasize various functions of the LEO micro satellite-based defence system, this manuscript introduces essential functions in ground observation, guaranteed/multi-target detection, communication between satellites and ground observations, as well as scenarios of electronic counter-measures using an integrated software solution. The LEO micro satellite-based defence system, developed using an orbital simulation, footprint, and rule-based observation functions, analyzes observation and revisit patterns of micro satellites according to practical Defence Mission requirements. The communication performance is analyzed by simulating configurations with multiple ground observation stations according to line-of-sight observations, while analysis of space-based jamming operations among enemy satellites is carried out in terms of counter space capability. The results derived using this manuscript clearly illustrate that the orbital, observation, communication, and possible jamming operations of LEO micro satellites are successfully incorporated into this software solution, hence establishing an innovative aspect of software simulation towards successful LEO micro satellite Defence Mission validation.

173. BIDIRECTIONAL INVESTOR - STARTUP MATCHMAKING PLATFORM WITH RETRIEVAL-AUGMENTED GENERATION AND EXPLAINABLE RATIONALES

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The application of artificial intelligence can aid in matching investors with startups and make funding process more equitable and more accessible. The old approaches are weak since they depend on networking and individual opinion. Good startups are missed due to lack of awareness and in terms of hidden biases. The present paper presents a Bidirectional Investor-Startup Matchmaking Platform on the basis of Retrieval-Augmented Generation (RAG) and explainable reasoning, which aims to make the bidirectional investor- startup matchmaking more precise and transparent. The platform not only recalls the information of startups and investors in question, but also creates the matching and explains the reasons behind each suggestion to both investors and startups to decide more appropriately. Alongside the matchmaking functionality, the platform offers interactive dashboards and communication features such as a message and negotiation portal that simplifies the connectivity and negotiation of both the sides. In general, this will reduce the significant issues of the current funding environment like prejudice, scaling, recognition and most crucially, data gaps, therefore resulting in a fairer and more productive investment environment.

174. DESIGN AND IMPLEMENTATION OF RF MIXER FOR FR1 AND CRN APPLICATIONS

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The integration of 5G and Cognitive Radio Networks (CRN) opens up recent research to address its impact in the spectrum utilization and the demand. In this article, Radio Frequency (RF) mixer is designed, implemented and tested for sub 6 GHz frequencies and for ISM bandwidth between 2.4 GHz to 5 GHz which is suitable for CRN. This ISM band is a n unlicensed band and preferred by secondary users of CRN. The RF mixer employs a 3dB branch line coupler and SMS7630 single-balanced mixer

diode. The above mentioned frequency ranges have wide range of applications such as RFID, WSN and even more. This design is implemented in the receiver side to down convert the RF to usable Intermediate Frequency (IF) range using 3dB branch line coupler to facilitate power splitting whereas SMS7630 mixer enables down-conversion of the RF signal to a lower IF for subsequent signal processing. In this proposed design, RF chosen as 5G FR1 4GHz and a local oscillator is designed to provide 3.6 GHz and finally down converted into IF of 400 MHz in its output.

175. A COMPREHENSIVE SURVEY OF FLEXIBLE DCT HARDWARE ARCHITECTURES FOR HEVC: FPGA VS. ASIC IMPLEMENTATIONS

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This survey provides an exhaustive examination of flexible Discrete Cosine Transform (DCT) hardware architectures developed for the High Efficiency Video Coding (HEVC) standard. As video resolutions escalate to 8K and beyond, the computational demands on transform modules increase exponentially, necessitating sophisticated hardware implementations that balance flexibility, throughput, and power efficiency. This paper systematically reviews architectural innovations spanning the past decade, categorizing approaches based on their flexibility mechanisms, arithmetic implementations, and target platforms. We analyze the evolution from early multiplier- based designs to contemporary multiplier less architectures employing Multiple Constant Multiplication (MCM) units, tracing the trajectory of performance improvements from 1.4 Gbps to nearly 5 Gbps throughput. The survey reveals fundamental trade-offs between FPGA and ASIC implementations, with FPGA designs achieving 85-90% of ASIC throughput while consuming 30-50× more power. Emerging trends indicate convergence toward configurable architectures supporting multiple video standards through dynamic reconfiguration and approximate computing techniques. This comprehensive analysis serves as both a reference for researchers and a roadmap for future developments in video compression hardware.

176. SMART RAILWAY GATE STATUS AND TRAIN DISTANCE ALERT SYSTEM FOR RURAL SAFETY

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Many railway crossings in rural areas frequently lack sufficient information systems, which causes delays, confusion, and accidents. With the goal of providing villagers with real-time updates, this project introduces an IoT-driven railway gate status and train proximity alert system. The system consists of three parts: a Train Unit with a GPS-enabled ESP32 to track the train&s real-time position; a Village Display Unit with an ESP32 to display gate status, train distance, and estimated arrival time;

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and a Gate Unit with an ESP32 and a trigger switch to determine whether the gate is open or closed along with a GPS to locate the gate. A cloud backend receives data from the Gate and Train Units and uses it to calculate the train&s distance to the gate. The Village Display Unit receives the processed data and uses it to inform residents& decisions, such as choosing different routes in an emergency or crossing before the train arrives. This system aims to increase safety, reduce wait times, and improve transportation efficiency in rural areas by integrating real-time GPS tracking, cloud processing, and public display notifications.

177. SMARTSPEND: AN AI-DRIVEN EXPENSE TRACKING AND FINANCIAL ANALYTICS SYSTEM

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Personal finance management has become a crit- ical challenge in the digital era due to the rapid increase in digital transactions and complex spending behaviors. With the widespread adoption of online banking, digital wallets, credit cards, and mobile payment systems, individuals perform numerous financial transactions daily. However, most users lack effective tools to monitor and analyze their spending habits, which often leads to poor budgeting practices and financial instability. Traditional expense tracking systems rely heavily on manual data entry and provide limited analytical capabilities, making them inefficient for modern financial management needs. This paper introduces SMARTSPEND, an AI-driven expense tracking and financial analytics system designed to automate financial monitoring, expense categorization, and predictive anal- ysis. The proposed system integrates advanced machine learning algorithms to automatically classify financial transactions into predefined categories, analyze spending patterns, and forecast future financial behavior. Optical Character Recognition (OCR) technology is utilized to extract transaction details from receipts and invoices,

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reducing manual data entry. Additionally, Natural Language Processing (NLP) enables users to record expenses using voice or text commands, improving accessibility and user convenience. The system also incorporates interactive visualization dash- boards that present financial data through charts, graphs, and category-wise expenditure summaries. These visual insights allow users to better understand their financial habits and identify areas of excessive spending. Furthermore, predictive analytics techniques are employed to estimate future expenses based on historical transaction data, enabling users to make informed financial decisions and plan their budgets more effectively. Experimental analysis demonstrates that integrating machine learning techniques with financial analytics significantly im- proves the efficiency, accuracy, and usability of personal expense management systems. The SMARTSPEND platform not only simplifies expense tracking but also acts as an intelligent financial assistant that supports budgeting, spending control, and long- term financial planning.

178. IOT BASED SMART PARKING SPOT MANAGEMENT SYSTEM ALEENA ANNA MICHAEL, ABHISHEK JOHNS, ALFIGO ANTO, RAHUL JYOTHIKUMAR

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The rapid increase in urban vehicle density has intensified parking management challenges. Traditional systems rely on manual supervision, resulting in congestion, inefficient space utilization, and delays. This paper presents an AI-enabled IoT-Based Smart Parking Spot Management System that auto- mates slot allocation, vehicle authentication, gate control, and billing through a modern web-based mobile application. The system integrates Wemos D1 Mini microcontrollers, servo motors, LED indicators, and camera modules for OCR-based number plate recognition at entry and exit gates. Firebase services enable real-time monitoring and synchronization. The application is de- veloped using Next.js, React, TypeScript, Tailwind CSS, ShadCN UI, Firebase, Google Maps API, and Genkit AI, supporting slot booking, navigation, and wallet-based payments. The proposed system improves slot utilization, reduces manual intervention, enhances security, and provides a scalable, low-cost system suitable for public and commercial parking environments.

179. NEXT GENERATION MACHINE LEARNING MODEL FOR DETECTING ADVERSE DRUG REACTIONS IN DRUG-DRUG INTERACTIONS VIA GRAPH NEURAL NETWORKS AND SELF-SUPERVISED LEARNING

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Adverse drug reactions resulting from drug-drug interactions are still an important problem in clinical practice, often leading to serious health problems and reduced patient safety. The use of manual features and labelled datasets in traditional machine learning methods for detecting adverse drug reactions hinders their ability to accurately predict complex and evolving pharmacological interactions. This is a problem that requires further refinement. Using graph neural networks and self-supervised learning, this paper presents a new type of machine learning that can accurately detect adverse drug reactions caused by drug interactions. Graphs are used to represent drugs and their relationships, providing detailed information about their structural and relational relationships with multiple drugs, targets, and biological pathways. By using self-supervised learning, it is possible to learn strong representations of large-scale unlabelled data, which reduces the need for expensive expert annotations and increases adaptability to new or rare interactions. By incorporating relational graph-based learning and representation learning driven by intrinsic data patterns, the model enhances accuracy, robustness, and interpretability in comparison to traditional methods. The framework is intended to facilitate the scalable analysis of intricate drug interaction networks and to provide early warnings of adverse effects. The potential for improving pharmacovigilance systems is significant through this approach, which can facilitate clinical decision making and enable safer/more customized medication management in modern healthcare settings.

180. PREDICTIVE DEVOPS: FORECASTING BUILD AND DEPLOYMENT FAILURES

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In today's fast-paced environment of software development, a negative build and deployment failure can break a team's pipeline. Lost time, as well as distracting the team, are major drawbacks of the traditional DevOps process that always look for trouble after it occurs, and hopefully, react and fix without taking proactive measures. This research aims to encourage a predictive type of DevOps that employs machine learning (ML) methods for detection and advanced failure detection when there is enough time, and the produced categories of data are gathered periodically create logs, commits in the long run, test results, resource utilization, etc. thus important factors which occur. We will employ the Python toolkits (Pandas, Scikit-learn, XGBoost, LSTM) to develop our models and then combine our intelligent models with continuous integration (CI)/continuous delivery, (for example, Jenkins and GitLab), and employ SHAP to interpret and explain our predictions to the developer. The final outcome will be an even more powerful and deterministic delivery pipeline that allows their teams to react faster and smarter and prevent failures, better software delivery trust, and release more confidently.

181. SMART GLOVE COMM: AN IOT-BASED ASSISTIVE COMMUNICATION AND HEALTH MONITORING SYSTEM

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Patients with restricted mobility often face serious difficulties in communicating their needs and continuously monitoring their health conditions. To address this challenge, this paper presents Smart Glove Comm, an Internet of Things (IoT)–based wearable system that combines gesture-based communication with real-time health monitoring. The proposed smart glove integrates flex sensors to detect finger movements along with biomedical sensors to measure vital parameters such as heart rate, body temperature, and blood oxygen saturation (SpO). Sensor data is collected and processed through a microcontroller and transmitted via IoT connectivity to a cloud-based platform, where it is visualized through a dashboard accessible to doctors and caregivers. The system enables patients to convey predefined messages through simple hand gestures while simultaneously providing continuous monitoring of their physiological conditions. In addition, a rule-based health analysis module evaluates

the collected vital data to detect abnormal patterns and automatically generate alerts during potential medical emergencies. By integrating wearable sensing technology, IoT communication, and intelligent data analysis, the proposed system aims to enhance patient safety, improve caregiver response time, and support remote healthcare management. The developed prototype demonstrates the feasibility of using affordable and accessible technologies to create a practical assistive solution for patient communication and health monitoring in home and clinical environments.

182. GENAI VISION: UNIFIED REAL-TIME IMAGE UNDERSTANDING

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Recent advancements in the field of computer vision have led to significant improvements in tasks such as object detection, image enhancement, optical character recognition (OCR), and visual question answering (VQA). However, most existing solutions operate as standalone systems, resulting in increased computational cost and reduced efficiency in real-time applications. To address this limitation, this paper proposes a unified AI Vision Tool that integrates OWL-ViT for zero-shot object detection, DarkIR for low-light image enhancement, and SmolVLM for OCR and VQA. The proposed system enables simultaneous execution of detection, enhancement, text extraction, and reasoning within a single framework. Experimental results demonstrate the effectiveness of the system, achieving improvements in image quality (PSNR increase of 7–12 dB), OCR performance (character error rate of 2.1%), and VQA accuracy (91–94%). The system is deployed using a Streamlit- based interface for practical usability.

183. SMART DIRECT TORQUE CONTROL OF BLDC MOTORS FOR ELECTRIC TRANSPORTATION SYSTEMS

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Electric transport systems dictate motor drives of high-performance that can respond dynamically fast, are more efficient, and can withstand changes in operating conditions. The popularity of Brushless Direct Current (BLDC) motors as electric vehicle actuators has been attributed to their high-power density, operational efficiency and reliability. However, traditional control methods are often characterized by torque ripple, increased sensitivity of their parameters, and worsening behavior in changing load and speed operating conditions. This research suggests a smart Direct Torque Control (DTC) platform for BLDC motor drives in electric vehicles. The methodology is the synthesis of intelligent control principles and classical DTC to optimize the process of torque control, reduce ripple, and improve transient response. The research gap covered by this work is outlined in a detailed survey of the recent DTC-based and intelligent control strategies. The methodology includes the BLDC motor modeling, implementation of an intelligent torque and flux estimator, and evaluation of the system performance in dynamically working conditions. The results of the simulation indicate that it is a better torque smoothness, more rapid response, and more efficient than the classic patterns of the DTC scheme. This means that the findings indicate that intelligent DTC methods significantly enhance the performance of BLDC motors, making them the ones that can be used in the next- generation electric mobility.

184. CLASSIFICATION OF ORGANIC AND INORGANIC FRUITS USING MACHINE LEARNING ALGORITHMS

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With the growing awareness of food safety, sustainability, and environmental health, the demand for organic fruits has increased quickly. However, it is still difficult to tell them apart from conventional fruits because they look so similar. Traditional methods for verification, like manual inspection and chemical lab analysis, are accurate but also expensive, slow, and not practical for large-scale use. To solve this issue, this study proposes a machine learning-based classification system that distinguishes organic fruits from non-organic ones using thermography camera images and chemical composition data. Thermographic imaging captures temperature and moisture distribution on fruit surfaces without causing damage, providing useful thermal and textural features for analysis. The system includes image preprocessing, feature extraction, and classification using supervised learning algorithms like Support Vector Machines (SVM), Random Forest (RF), and Convolutional Neural Networks (CNN). Additionally, an ensemble model combines visual, thermal, and chemical classification results to improve accuracy. Experimental results show that the CNN model reaches 93.4% accuracy for image-based classification, the Random Forest model achieves 91.2% accuracy for chemical data, and the ensemble model provides the best performance with an overall accuracy of 96.1%. This demonstrates that combining thermographic imaging with multimodal machine learning offers a reliable, scalable, and non-destructive solution for certifying organic fruits.

185. AI-BASED ASL (AMERICAN SIGN LANGUAGE) INTERPRETER

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For those who are Deaf or Hard of Hearing, Amer- ican Sign Language (ASL) serves as their main communication tool. However, the general public's lack of knowledge and comprehension of ASL continues to impede communication in domains like public services, education, healthcare, and employment. These difficulties have spurred research into automated systems that can help translate sign language into forms of communication that are more commonly understood. Vision-based ASL recognition systems have been greatly im- pacted by recent developments in artificial intelligence (AI), computer vision, and deep learning. In contrast to sensor-based methods, camera-based approaches provide a non-intrusive and economical solution by analyzing hand gestures using visual information. In order to improve accessibility for ASL users, many current systems concentrate on converting hand gestures into spoken or textual representations. With a focus on vision-based frameworks, deep learning models, and the function of Natural Language Processing (NLP) in linguistic interpretation, this survey offers an organized evaluation of AI-based ASL recognition and translation methods. Input modalities, learning strategies, datasets, and application domains are used to classify previous research. The study also identifies persistent issues, such as dataset constraints, ambient unpredictability, dynamic gesture interpretation, and sentence- level translation. The need for reliable and inclusive ASL identi- fication systems is emphasized in the paper's conclusion, which also identifies open research gaps and future directions.

186. BLOCK DL-IDS: A BLOCKCHAIN AND DEEP LEARNING POWERED INTRUSION DETECTION SYSTEM FOR INTELLIGENT SENSING ENVIRONMENT

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The swift growth of Intelligent Sensing Environments (ISEs), including IoT networks and smart cities, has brought about unique cybersecurity difficulties. Conventional intrusion detection systems (IDS) struggle to keep up with the scope and complexity of modern cyber threats because they are often

centralized, creating single points of failure.While integrations of blockchain and deep learning have been proposed to enhance security, they frequently face issues like high computational latency, inefficient consensus mechanisms, and a lack of real-time contextual intelligence. This paper introduces BLOCK DLIDS, an innovative framework that combines a hyperparameter-tuned Time Series Transformer model for precise detection with a streamlined decentralized architecture to ensure data integrity and enhance scalability. The model leverages TSFRESH for automated feature extraction and achieves over 99% accuracy on the CIC-IDS2017 dataset. The system utilizes the IOTA Tangle for feeless, immutable transaction logging and IPFS for decentralized forensic data storage, creating a tamper-proof audit trail. Chainlink Oracles are incorporated to fetch real-time external threat intelligence, enhancing alert context. Deployed using TensorFlow Lite on edge devices and secured with AWS Nitro Enclaves in the cloud, BLOCK DL-IDS presents a scalable, efficient, and secure solution for protecting modern cyber-physical systems. Our experimental results demonstrate a significant improvement in accuracy and a viable pathway for real-world, resource- constrained deployment.

187. REVOLUTIONING HOME DESIGN: AI-POWERED HOUSE PLANNING AND VISUALIZATION

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Our system shall be an AI-powered home design mobile app that was designed to ensure ease, affordability, and convenience in constructing a dream house. Users won't have to deal with complicated designs or spend a lot of money on consultations when, in fact, the app will enable them to design a house that suits their budget and preferences with minimal details. The application utilizes artificial technology to develop functional, cost-effective, and aesthetic house designs. One can customize the requirements of their house, either it is the number of bedrooms, kitchen, working space, or living room. Accordingly, the system automatically generates a basic house plan to help users

understand the basic concept of their future house. To ensure the user makes better construction decisions, the app also gives estimates of the cost of materials. This eliminates unnecessary costs. The user can view the floor plans. This app also provides information regarding the housing subsidy given by the government, so it is quite helpful for those who belong to lower or middle class families. Besides design, the platform serves as a holistic home-building ecosystem. Users can connect directly with verified architects, material suppliers, and construction workers through an in-built messaging feature for on-the-spot chatting. This makes it easy to discuss requirements, ask questions, and get professional guidance without multiple phone calls or site visits. The customer can go through the profiles and previous works of the architect, suppliers, and workers for their choice with complete transparency and trust. Once they find appropriate professionals, they can actually send requests for the services directly through this application, as it is easy to coordinate and hire someone this way.

188. DECONSTRUCTING A JAVA PACKET SNIFFER: A DEEP DIVE INTO MAVEN AND PCAP4J

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In modern network environments, security, performance, and reliability can only be achieved and maintained by continuous monitoring and analysis of traffic data. A Network Packet Sniffer Tool is one important utility that captures network packets, examines them, and inspects them in real time for the detection of vulnerabilities, identification of unauthorized access, and troubleshooting of network problems. This research paper describes the design and implementation of a packet sniffer that will intercept packets crossing a network interface and read their headers to make sense of the data. This tool will be able to display packet flow, analyze payload, and apply filters based on specific parameters for further investigation. The system proposed here integrates libraries such as Pcap4J with an intuitive graphical interface and thus guarantees effective packet capture and simplification of data interpretation. Experimental results prove that the proposed tool successfully detects anomalies in network packets and measures performance metrics. In general, the packet sniffer developed in this work contributes to enhancing network visibility, supporting security auditing, and optimizing network performance; hence, it is a very useful tool in both educational and professional network analysis tasks.

189. IOT-BASED SMART AGRICULTURE FOR EFFICIENT CULTIVATION IN TERRAIN-CONSTRAINED AREAS

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Agricultural activities and development are limited and restricted to areas that lack accessibility, constant water supply, and management development. For some areas characterized by distinctive areas of land, places with uneven landscapes, many agricultural activities traditionally conducted result in reduced output. In a bid to ensure maximum output characterized by uneven landscapes resulting from uneven topographies, this specific examination aimed to design an IoT-based smart agricultural system to ensure smart agricultural practices characterized by environmental sensors that monitor environmental changes. Temperature, humidity, wetness, water levels will be monitored smartly by sensors. A specific microcontroller for transmission will connect to smart sensors.

190. HYBRID ML-LLM FRAMEWORK FOR INTELLIGENT DECEPTIVE REVIEW DETECTION IN E-COMMERCE

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Online reviews have been proven to considerably impact customer purchases on various e- commerce sites, travel agencies, food delivery services, and service-providing platforms. But with the recent increase in fraudulent online reviews, widely known as shilling attacks on online platforms, the efficacy and trustworthiness associated with online review systems have considerably diminished. The conventional methods for identifying and flagging fraudulent online reviews using machine learning algorithms have limitations with regards to identifying sophisticated and AI-created fraudulent reviews that resemble natural writing patterns.To address these challenges, we propose a Hybrid Fake Review Detection System that combines Machine Learning (TF-IDF + Logistic Regression) with a Lightweight

Large Language Model (LLM). The ML Module identifies language and statistical tendencies within the review text, and the LLM Module undertakes more intricate reviews with analysis on semantic consistency, emotions, composition,Hyperbole, and indication of manually manufactured reviews. The system will encompass an NLP Processing Chain, extraction of features via TF-IDF, classification via Logistic Regression, and an LLM Loss Scores System.A user-friendly interface designed with Streamlit makes it possible for there to be real-time user input, prediction, and interpretation of confidence values as well as an understanding of why a review might be labeled as either a false or authentic review. The fusion of conventional ML and LLM-based semantic intelligence boosts the accuracy and transparency with which an LLM-like model detects advanced shilling attacks. The solution would be seamlessly integratable with online platforms.

191. ADAPTIVE PRIORITY BASED ALGORITHM SELECTION FOR TASK SCHEDULING IN CLOUD SIDE DISTRIBUTED NETWORKS

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Task scheduling is a critical challenge in cloud computing as it directly impacts system performance and resource utilization. Static algorithms such as Round Robin and Priority Scheduling are simple but fail to adapt to dynamic workloads, while purely dynamic methods often neglect task priorities that are essential in real-time systems. To address these limitations, this paper proposes an Adaptive Priority-Based Task Scheduling System for distributed cloud environments. The proposed framework employs a hybrid approach that combines classical scheduling algorithms (Round Robin, Shortest Job First, Priority Scheduling) with metaheuristic optimization techniques such as Genetic Algorithm (GA), Particle Swarm Optimization (PSO), and Ant Colony Optimization (ACO). An Adaptive Algorithm Selector dynamically analyzes task characteristics including size, priority, deadline, and resource requirements to select the most suitable scheduling method in real time. The system ensures timely execution of high-priority tasks, balanced resource utilization, and reduced waiting time. Performance will be evaluated using CloudSim to measure improvements in throughput, turnaround time, and load balancing efficiency compared to traditional scheduling techniques.

192. LEAF SENSE: IDENTIFICATION OF DIFFERENT MEDICINAL PLANTS

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Medicinal plant identification has always relied heavily on expert knowledge, making it difficult for ordinary users to distinguish between similar species. This project introduces an AI-based system that automatically identifies medicinal plants from leaf images using deep learning techniques. Users can upload a leaf image from their gallery making the system flexible and practical in real- world conditions. Once the plant is identified, the application provides detailed information on medicinal uses, benefits, and preparation methods in multiple languages, allowing people from different regions and backgrounds to understand the information in their preferred language. This multilingual support ensures that traditional herbal knowledge becomes accessible, accurate, and easier to learn. Additionally, the system includes an intelligent multilingual chatbot that allows users to ask questions about medicinal uses, dosage, safety precautions, or plant properties through natural conversation. The chatbot responds in the user&s chosen language, making the platform more interactive and educational. This combination of automatic plant identification, multilingual medicinal guidance, and chatbot assistance makes the project a complete, user- friendly solution that supports healthcare awareness, research, and cultural knowledge sharing. It bridges the gap between traditional herbal practices and modern AI technology, helping communities safely use and understand medicinal plants.

193. AUTOMATED ANTENNA ALIGNMENT SYSTEM

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The alignment of antenna is an important aspect in satellite communication systems since it impacts the quality and strength of a signal. In the past, this step has always been done manually. It required a constant observation of the signal to be monitored which is tedious and prone to lapses in attention. My purpose in this project is to create a system where an antenna can recognize a radio frequency, (RF) signals and turn its location towards the signal for the best reception. This system has an indicator that is known as Received Signal Strength Indicator (RSSI). Through it, the strength of the signal can be monitored continuously. In response to the feedback from the RSSI, this antenna moves towards achieving the optimal signal. This design requires a motorized platform with at least 2 or more degrees of movement which allows the changing of both directional angles and elevation for accurate measurement of direction. When the alignment of this process is automated, it has been proven in tests to increase both the accuracy and speed of search and track of signals in satellites and wide band communication. There’s less human action and it solves the time-consuming arrangement before project errors with overlapping alignments. It can be applied living and working areas that need better response from antennas to signals and improves depend.

194. ADAPTIVE SEQUENTIAL DECISION INTELLIGENCE USING META-REINFORCEMENT LEARNING AND UNCERTAINTY-AWARE POLICIES

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Sequential decision-making is a fundamental problem in artificial intelligence where an intelligent agent must continuously select optimal actions while interacting with a dynamic environment. These problems are commonly encountered in domains such as robotics, autonomous vehicles, healthcare decision systems, and intelligent energy management. In such applications, the decision-making process must account for environmental uncertainty, delayed rewards, and dynamically changing state transitions. Reinforcement learning (RL) has emerged as a promising paradigm for solving sequential decision problems by enabling agents to learn optimal policies through interaction with the environment. However, traditional reinforcement learning algorithms suffer from several limitations including poor sample efficiency, lack of adaptability to new environments, and insufficient mechanisms to represent uncertainty in decision policies. To address these challenges, this paper introduces an Adaptive Sequential Decision Intelligence (ASDI) framework that combines meta-reinforcement learning with uncertainty-aware policy estimation. The proposed architecture enables agents to rapidly adapt to new tasks by leveraging meta-learning while simultaneously estimating uncertainty associated with decision policies. The framework integrates three main components: a deep feature representation network for extracting environment features, a meta-learning module for cross-task knowledge transfer, and an uncertainty-aware policy optimization module that quantifies policy confidence. Extensive experimental evaluations on benchmark reinforcement learning environments demonstrate that the proposed approach significantly improves policy learning efficiency, convergence speed, and robustness under uncertain conditions. Experimental results show that the proposed system achieves faster convergence, higher cumulative reward, and improved policy stability compared with conventional deep reinforcement learning algorithms. The proposed approach provides a scalable and adaptive solution for real-world sequential decision-making applications.

195. LIBRAIRY - AN AL POWERED E – LIBRARY SYSTEM

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The rapid growth in digital education has increased the demand to manage and provide access to learning resources efficiently through smart systems. Traditional library systems rely completely on manual procedures and employ basic methods of searches, hence are time-consuming and inefficient to retrieve relevant material. This presents LIBRAIRY -An AI Powered E-Library System, a web-based digital library powered with artificial intelligence for easy access to books and recommendations of personal interest. This will allow users to search, read, and download books while analyzing user interest and reading behavior to recommend relevant resources with machine learning techniques. It ensures data scalability and security and ensures the availability of data by using cloud storage. The proposed system reduces manual effort, enhances search efficiency, and upgrades the learning experience, thereby making it worthy of being used in educational institutions by learners.

196. A DEEP HYBRID LEARNING MODEL FOR INTRUSION DETECTION IN IOT NETWORK TRAFFIC USING CNN- TRANSFORMER WITH PSO TUNING

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The rapid expansion of the Internet of Things (IoT) has introduced significant security challenges due to the increasing volume and diversity of network traffic generated by interconnected devices. Traditional intrusion detection systems often struggle to effectively capture complex spatial and temporal patterns present in IoT network data. To address this limitation, this paper proposes a deep hybrid learning framework that integrates Convolutional Neural Networks (CNN) and Transformer architectures for efficient intrusion detection in IoT network environments. The CNN component is employed to extract local spatial features from network traffic data, while the Transformer module captures long-range dependencies and sequential relationships to improve detection accuracy. Furthermore, Particle Swarm Optimization (PSO) is applied to optimize key hyperparameters of the hybrid model, enhancing overall performance and stability. The proposed model is evaluated using standard performance metrics including accuracy, precision, recall, F1-score, and Receiver Operating Characteristic–Area Under Curve (ROC–AUC). Experimental results demonstrate that the proposed CNN–Transformer model with PSO tuning achieves superior detection capability, obtaining an AUC value close to 0.999 and outperforming several conventional machine learning and deep learning approaches. The results highlight the effectiveness of the proposed hybrid framework in improving intrusion detection performance and providing a reliable security solution for modern IoT networks.

197. FINANCIAL FRAUD DETECTION USING HETEROGENEOUS GRAPH NEURAL NETWORKS

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The monetary system of the current world is shifting towards digital transactions, where the exchange of money is done bank to bank over the computer systems. Digital transactions made it easier for people to make transactions with people over long distances with out the need of making any physical contact, this also made it easier for thieves to steal money using digital transactions. To protect the hard earned money of the people many fraud detection systems are employed to detect and prevent any fraudulent transactions from happening but with the rapid increase of digital transactions the need of more robust and accurate systems have also increased. Graph Neural Networks(GNN) come into play in this scenario where the machine learning model is used to infer whether the transaction occurring is genuine transaction or is an act of fraud. The GNN model can be paired with other models to achieve higher accuracy leading to lesser false predictions, the model used in this paper has resulted a strong performance with an AUC score of 0.9002, PR-AUC score of 0.5046, and high top-K precision-detecting fraud with 96% precision in the top 50 predictions. These results in the evaluation show that the model can effectively pair up with other models creating a strong fraud detection system for fraud detection capturing the underlying patterns in the data and creates a strong baseline for real world use case scenarios.

198. AI-BASED DYNAMIC PRICING WITH MARKETING TREND FORECASTING

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In today's highly competitive and fast-evolving market, businesses must set the right price at the right time to remain responsive and profitable. Traditional pricing methods often fail to keep up with rapid changes in customer preferences, competitor activities, and market conditions. Many businesses still rely on static or slow manual pricing processes, which are not capable of adapting to real-time fluctuations. As a result, companies may either overprice their products and lose customers or underprice them and sacrifice potential revenue. To address these limitations, this research proposes an AI- based dynamic pricing model that automatically adjusts product prices based on real-time data streams. The system continuously monitors market trends, customer behaviour, competitor pricing, and demand patterns to generate optimal pricing decisions. By integrating marketing trend forecasting, the model not only reacts to current market events but also predicts future changes, enabling businesses to plan ahead and maintain a competitive advantage. The proposed system uses Linear Regression and K-Means Clustering as its core machine learning algorithms. Linear Regression helps forecast future demand and customer purchasing trends, while K-Means Clustering groups similar customer behaviours or product patterns to enable targeted pricing strategies. Together, these algorithms allow the model to constantly update and refine its pricing predictions, ensuring that price adjustments remain accurate, relevant, and data driven. Scalability and usability are key considerations in the system's design. The model is built to handle large volumes of data and can be integrated into existing business platforms without significant complexity. Its user-friendly interface ensures that even non-technical business managers can interpret results and apply pricing insights effectively. The system's adaptability makes it suitable for various industries, including retail, e-commerce, hospitality, and transportation. Overall, the AI-based dynamic pricing model equips businesses with an intelligent tool for maximizing revenue, maintaining competitive pricing, and staying aligned with market trends. By leveraging predictive analytics and real- time data processing, the system enables companies to make faster, more informed pricing decisions in an increasingly dynamic and competitive market environment.

199. AI-DRIVEN PERSONALIZED NUTRITION AND FITNESS SYSTEM

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As personalized medicine gains prominence, arti- facial intelligence (AI) is also stepping into the limelight in people following healthier dietary habits and lifestyles.[8] The following discusses an AI-enabled system that generates personalized diet plans and adaptive fitness recommendations as a function of a user&s specific information regarding age, gender, height, weight, lifestyle factors, diet preferences, and other health conditions. A single dataset is used containing 50,000 samples across 22 features, allowing the generation of an accurate estimation of BMI, BMR, calorie needs, macronutrient distribution, stress level assessment, and personalized exercise routine. A hybrid intelligence framework has been implemented that uses rule-based decision-making coupled with machine learning components for better decision quality. The platform provides granular meal planning with micronutrient detail, dynamic fitness suggestions, and health-based insights through an intuitive and interactive Streamlit interface. Results prove that the developed system assists and provides real-time dietary and fitness recommendations that are aligned with the user&s goals and health constraints. This concept and approach will provide a better foundation for developing AI-driven systems for improved living and healthy choices.

200. AZT - SAFE - ADAPTIVE ZERO TRUST SECURITY FRAMEWORK FOR ACCESS WITH FACIAL AUTHENTICATION & ANOMALY ESTIMATION

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Small and midsized companies are using digital solutions to store and share sensitive information at an increasing rate. However, they lack comprehensive cyber security infrastructure for that information. Conventional perimeter security strategies depend on trusting members inside of their networks; this benefits attackers who have gained initial access. File access security is of paramount importance, particularly as the SMBs serve as a stepping stone to large companies. This paper introduces AZT-SAFE an Adaptive Zero Trust Security Framework to provide file access security, and biometric verification- anomaly estimation by cooperation with continuous authentication suited particularly for SMBs. Utilizing multi-factor authentication, including usernames and passwords, as well a Cryptographic Security Key (CSK) and facial recognition with FFDK to achieve the Zero Trust paradigm of "never trust, always verify" Files are encrypted using Elliptic Curve Cryptography (ECC). An anomaly detection module tracks the behaviour of files in order to detect malicious activities. If the face verification process fails when a legitimate user (with valid credentials) logs into the system, a photo is taken of the intruder and sent to right person. Implemented using Python-Flask, MySQL, and web technologies, this framework provides a streamlined, low-cost security solution for organizations

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with limited resources. Experimental findings demonstrate improved authentication integrity, reduced instances of unauthorized access, and enhanced detection of insider threats compared to current security solutions. AZT-SAFE validates that an effective Zero Trust solution is attainable for enhancing cybersecurity in SMBs without the necessity for specialized infrastructure.

201. A LOW-CODE FRAMEWORK FOR CONVERSATIONAL AI ASSISTANTS LEVERAGING RETRIEVAL-AUGMENTED GENERATION AND LLMS

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With the recent advancement in the field of Artificial Intelligence in the development of the large language model which paves way for the rapid improvement of the conversational AI allowing the smart and context aware interaction between the humans and the computer in a variety of fields. These models demonstrates the ability of understanding the natural language and generates the human like response to the user queries. Many business applications has the potential to make use of these conversational AI for effective usage. But Integrating this into their applications is still difficult and requires a high level of technical expertise to incorporate these AI into their application, since it requires large amount of programming work, AI knowledge and system modification. To overcome this limitation, this paper presents a low-code framework approach of creating a domain specific conversational AI assistant with the help of LLMs and combining with the retrieval augmented generation (RAG). By using the low code platforms like Oracle APEX, the developers or the business users can easily create and integrate the smart assistants into their business applications with less technical expertise. By combining the generative AI along with the retrieval-based methods, the assistants can deliver the accurate response by referring the business knowledge sources like documents, database etc.

202. DECISION DRIVEN DEEP LEARNING FOR STRUCTURED PATHOLOGICAL IMAGE CLASSIFICATION

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Structured pathological image classification is a vital component of modern diagnostic systems that can help identify patterns of disease in complex structures of tissues. In this context, this research aims to introduce a novel decision- driven deep learning framework that aims to increase the accuracy and reliability of pathological image classification. Specifically, this proposed framework combines various state-of- the-art image preprocessing techniques with a lightweight ShuffleNet CNN model to increase the accuracy of image classification. First, pathological images are preprocessed to increase their accuracy and emphasize the region of interest. Then, a lightweight ShuffleNet CNN model is utilized to extract efficient image features. In this proposed model, a decision mechanism is also introduced to increase the accuracy of decision-making and reduce the possibility of misclassification. Moreover, this proposed model is also trained and tested using various accuracy, precision, and F1-score metrics. The proposed approach demonstrates that computationally efficient models can deliver high-performance diagnostic assistance without requiring expensive hardware, thereby supporting the development of intelligent automated medical image analysis systems that balance speed, accuracy, and reliability.

203. IOT & ML ENABLED SMART STORAGE FOR ONION PRESERVATION

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IoT & ML Enabled Smart Storage For Onion Preservation: Onions are highly sensitive to environmental conditions such as temperature, humidity, and gas accumulation during storage, leading to significant post-harvest losses. Traditional storage methods lack real-time monitoring and predictive mechanisms, resulting in approximately 30–40% spoilage in rural storage systems. This paper proposes an IoT and machine learning enabled smart onion storage system designed for rural deployment. The system utilizes an ESP32 microcontroller integrated with DHT11 and MQ135 sensors to monitor temperature, humidity, and gas levels in real time. An edge-based machine learning model predicts spoilage conditions based on environmental trends. The system transmits data to a cloud platform for visualization and alert generation. A rechargeable battery-based power system ensures uninterrupted operation in power-deficient regions. Experimental results from field deployment demonstrate effective monitoring and early spoilage detection, reducing losses and improving storage efficiency. The proposed system is cost-effective, scalable, and suitable for small-scale farmers.

204. RISK FACTOR–INTEGRATED DEEP LEARNING FRAMEWORK FOR BREAST CANCER PREDICTION USING THERMAL IMAGES

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Breast cancer is among the leading causes of mor- tality amidst women across the world. When identified promptly future prognosis and therapy can also be very beneficial. Our research is a deep learning method of classifying and detecting breast cancer based on thermography images. Thermal imaging is an economical, radiation free and non-invasive alternative to traditional imaging techniques in early detection. The proposed approach consists of image preprocessing, extracting features with the help of convolutional neural networks (CNN), and a classification into normal, benign or malignant categories. The model applies the risk factor assessment based on the history of the patient, age, family background, and lifestyle parameters to improve the quality of diagnosis. Our experimental results show that combining thermal imaging properties with clinical risk information leads to an increase in the accuracy of the classification, which leads to the high level of specificity and sensitivity.

205. AI-DRIVEN PROCTORING: REAL-TIME EXAM MALPRACTICE DETECTION WITH PRIVACY-PRESERVING CRYPTOGRAPHIC MEASURES

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With the growth of online education we see that many exams are now taken via the internet. While this is making learning more flexible it also brings out issues related to the fair conduct of exams. In online exams it is hard for teachers or proctors to watch over students, which in turn gives some students an unfair edge. To put forth a solution to this issue this paper introduces ProctorGuard which is an automated online exam monitoring system that which puts into play during exams. The system uses the student's webcam to track their actions. Also, it analyzes captured video frames using computer vision to watch the student's doings. The face detection module reports on whether the student is within view of the camera for the duration of the exam. If the system does not see the student's face for a while it notes this as an issue. Also, we see how the head is moving that's used to figure out if the student is looking at the exam material or not if instead the head is turning away that is also noted. Also, they are

using an inbuilt object detector which reports back on unauthorized items like smart phones that appear in the field of view. Also, the system notes when there is tab switching or leaving full screen mode that which may indicate an attempt to go to outside online resources. All questionable behaviors are logged and documented for analysis. Additionally, the system creates alerts when behavioral anomalies are detected so exam administrators can observe the exam session as it happens. Overall, the system provides exam security by automatically tracking students and flagging probable malpractice during exam sessions

206. COMPACT CIRCULARLY POLARIZED FILTERING DIPOLE ANTENNA FOR 2.4 GHZ ISM APPLICATIONS

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The rapid expansion of Internet of Things (IoT), wearable devices, and wireless sensor networks has led to an increasing demand for compact, lightweight, and high- performance antennas capable of providing reliable communication links. Circularly polarized (CP) antennas are particularly attractive for such applications due to their ability to maintain stable radiation characteristics irrespective of the relative orientation between transmitting and receiving devices. Furthermore, the integration of filtering functionality into antenna structures—resulting in so-called “filtennas”—has emerged as an effective solution for eliminating external filtering components, thereby reducing system complexity, cost, and size. This project presents the design and development of a compact circularly polarized filtering dipole antenna operating at the 2.4 GHz Industrial, Scientific, and Medical (ISM) band. By combining the radiating and filtering functions into a single structure, the antenna eliminates the need for external filters while simultaneously improving system performance. The design methodology focuses on achieving miniaturization through substrate selection and dipole geometry optimization, enabling the antenna to be suitable for portable and wearable IoT applications. Simulation and parametric analyses are conducted using CST Studio Suite, targeting an impedance bandwidth with S11 < –10 dB, an axial ratio (AR) below 3 dB, and a peak gain greater than 6 dBic. The proposed design demonstrates significant potential for integration into next-generation wireless devices, offering improved radiation stability, reduced system complexity, and enhanced electromagnetic compatibility. This work contributes to the ongoing development of compact, efficient, and multifunctional antennas tailored for modern wireless communication systems operating in the ISM band.

207. A PERSONALIZED FULL STACK SAAS SOLUTION WITH AIDRIVEN INSIGHTS FOR MSMEFOCUSED ENDTOEND SMART RETAIL OPERATIONS

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Micro, Small, and Medium Enterprises (MSMEs) form the backbone of global retail, yet they face persistent challenges in adopting digital technologies due to limited technical expertise and fragmented solutions. Traditional retail management systems often lack personalization, scalability, and AIdriven insights, leaving MSMEs unable to compete effectively in dynamic markets. This paper introduces Shop Manager 360°, a personalized full stack SaaS solution designed to deliver endtoend smart retail

operations. By integrating inventory management, billing, customer engagement, and predictive analytics into a unified platform, the system empowers MSMEs to automate workflows and gain actionable insights without requiring advanced technical skills. The proposed solution leverages AI models for demand forecasting, anomaly detection, and customer behavior analysis, ensuring operational efficiency and cost savings. Results demonstrate improved productivity, reduced manual workload, and enhanced decisionmaking, positioning Shop Manager 360° as a transformative tool for MSME digitalization.

208. AI-POWERED OPTIMIZATION OF CRICKET BATTING ORDER FOR REAL-TIME DECISION MAKING

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Cricket is not just a game of skill; it is equally a game of strategy. One of the most pivotal decisions in any match is determining the optimal batting order, as it significantly influences a team's performance. Traditionally, such decisions are based on the intuition and experience of captains and coaches. However, with the rise of data science, machine learning (ML), and artificial intelligence (AI), it is now possible to make real-time, data-driven decisions that go beyond gut instinct. This project aims to develop an intelligent system that dynamically selects the most effective batting lineup by analyzing a combination of player performance metrics, match conditions, and real-time game scenarios. While previous research has focused on using supervised learning methods such as Support Vector Machines (SVM), K-Means clustering, and K-Nearest Neighbors (KNN) for team selection and match outcome prediction, the application of advanced techniques like Reinforcement Learning (RL), Genetic Algorithms (GA), and Deep Learning models for in-game tactical adjustments remains underex-plored. This work proposes a novel approach that leverages these advanced AI methods to optimize batting orders in real time, enhancing strategic decision-making and potentially transforming modern cricket analytics.

209. SMART FRIDGE COMPANION: A MOBILE BASED SYSTEM FOR FOOD INVENTORY MANAGEMENT AND EXPIRY MONITORING

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Food wastage occurs a lot in ordinary and widespread homes, and I suppose it is due to people forgetting what they stored in the fridge or simply because of a mess inside their refrigerators, and people not checking the expiry dates of the food items frequently enough. That leads to throwing out stuff that could have been used, which costs money and furthermore pains the environment since all that wasted food ends up in landfills or something, and then there is the risk of getting sick from eating substandard food if you do not notice. Smart refrigerators these days have cool features like monitoring what is in there automatically, dispatching warnings about expiry, and keeping an eye on everything, but they are way too expensive for most folks, notably if you stick with an essential and primary fridge that everyone else has. So, really, we need something simpler and less expensive that anyone can employ to handle their food better without buying new gadgets. This is where this idea comes in, a Smart Fridge Companion App for phones which is like a little aid for an ordinary fridge. It just uses the items you put in, the dates they are about to expire, and can send you alerts at the appropriate times so you do not end up having stale food items (this should reduce some of the waste quite significantly). In addition to this, it suggests meals based on the food you currently have, and so will make meal planning simpler and prevent your food sitting there unconsumed. The whole application is intended to be easy to use, able to be accessed anytime and inexpensive to obtain and so appeal to a variety of people. By combining a system for checking what is in your fridge, those timely notifications, and an app suggesting recipe ideas together, it will not only remove the frustration associated with checking the contents of the fridge but I think, also help with food safety. It could possibly even make people think more about what they are eating at home although some of the connectivity will likely need to be changed.

210. CYCLICAL LEARNING RATE OPTIMIZED AI MODEL FOR DETECTING FREEZING OF GAIT IN PARKINSON'S DISEASE

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Freezing of Gait (FoG) is a motor complication in Parkinson's disease (PD) that affects walking and increases the risk of falls. Early detection of FoG is crucial for continuous monitoring and timely clinical intervention. This work proposes Cyclical Learning Rate optimized Deep Neural Network (CLR- DNN) to identify FoG events in PD patients. The proposed model performs two essential activities: temporal feature extraction and temporal modeling. Convolutional Neural Network (CNN)

is utilized to capture spatial and temporal characteristics of gait. Bidirectional Long Short-Term Memory (BiLSTM) network extracts gait patterns from forward and backward time stamps. A fully connected layer predicts the output class. Cyclical Learning Rate optimization is employed to improve network training. The CLR-DNN is evaluated using the Daphnet FoG dataset, and experimental results show that the proposed framework outperforms state-of-the-art methods in terms of accuracy and error rate.

211. MACHINE LEARNING BASED KIDNEY STONE PREDICTION USING COMPARATIVE STUDY OF CNN AND SVM

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Kidney Stone Disease appears in many people&s medical history. Dehydration is an important factor in this disease, along with poor eating patterns and/or unbalanced activity each day. If caught early, before becoming large, you can avoid a lot of pain from passing the stone, avoid possible infections, and prevent additional permanent damage to the kidney over time. Current diagnostic methods (ultrasound or CT scans) all require an expert to interpret the images based on viewing them visually by hand and therefore will allow for opportunities for error due to timing delays and/or missing elements of the results when reviewing visually. This research investigates the forecasting of kidney stones using two separate machine learning systems: CNN-based and SVM-based machine learning methodology. CNNs utilize CT or ultrasound imaging for risk assessment, while SVMs utilize organized patient medical data. As both approaches use traditional measurement methods (accuracy, precision, recall, F1), this study compares both systems using real data to determine which approach(s) work more efficiently. While CNNs yield higher performance in image prediction, SVMs produce quicker classification (based on identifiable patterns) with less computational power. Using this side-by-side

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evaluation method, physicians can leverage artificial intelligence (AI), thereby supporting GOAL 3 of the UN Sustainable Development Goals of improving human health by developing better tools through the use of AI. In addition, because systems can adjust to changing behavior of incoming data faster than before, the time from risk recognition to decision-making will be reduced significantly; consequently, the system will react quicker to anticipated changes in patient condition.

212. USER PERCEPTION ON AI-POWERED GREEN NUDGE MESSAGES IN FOOD DELIVERY PLATFORMS

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This research paper aims to investigate the impact of green nudge messages using AI on the perception of green behavior among food delivery platform users. A quantitative method was employed, and 306 valid responses were collected based on five constructs: Environmental Responsibility, Socio- Cultural Responsibility, Awareness, Belief/Trust, and Environ- mental Concerns. The results of reliability analysis showed ac- ceptable internal consistency (Cronbach's Alpha = 0.807). Linear regression analysis showed poor explanatory power (R2 = 0.091), but Random Forest analysis improved the model significantly (R2 = 0.801; cross-validated R2 = 0.735), suggesting the existence of complex non-linear relationships. Feature importance analy- sis showed that Socio-Cultural Responsibility and Belief/Trust were the two strongest predictors of user perception. Logistic regression classification analysis further supported the model with 93.48% accuracy. The results of this study confirmed that AI-based sustainability nudges are most effective when combined with Socio-Cultural Responsibility, Credibility, Awareness, and Environmental Concern mechanisms, hence having a positive impact on user perception of sustainable behavior in food delivery platforms.

213. MAESTRO – MULTI-AGENT ENGINE FOR SMART TASK ROUTING AND OPTIMIZATION

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The ways that people use technology have changed because of intelligent automation yet current digital assistants show limitations because they can only perform one-step tasks. The system cannot handle multiple tasks which include travelling booking and product comparison and complete scheduling of an entire process. The AI- Agent exists at MAESTRO to solve this limitation through its multi-agent system which executes autonomous tasks while its intelligent design optimizes operations. The system implements Large Language Models (LLMs) with specialized AI agents to control decision-making from planning through execution using Python with LangChain and FastAPI and Streamlit to create a web interface for real-time reasoning and decision-making and acting. MAESTRO divides user objectives into distinct subtasks which it assigns to various agents while it manages their activities through web automation and external APIs.MAESTRO demonstrates how AI agents work together to improve human workflows. The foundation of digital assistants will be established through this research which enables them to make effective decisions about complicated problems that require knowledge from multiple fields.

214. NUMERICAL STUDY ON THE BENDING RESPONSE OF SWCNT FUNCTIONALLY GRADED PLATES WITH AN IMPROVED SHEAR DEFORMATION THEORY

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This study presents a novel hyperbolic shear deformation theory (HSDT) for finite-element analysis of the bending behaviour of functionally graded reinforced plates incorporating single-wall carbon nanotubes (SWCNTs), employing C 0 -continuity. The study of ceramic-based SWCNTs used the power-law model for material homogenisation, which inherently fulfils the traction-free boundary criteria on both sides. The HSDT approach provides the benefit of eliminating the need for a shear correction factor, leading to merely eight unknowns and lower computational demand. The finite element method employs a nine-node isoperimetric Lagrangian element and Gauss quadrature to achieve complete integration. The execution of the FE model is uncomplicated, modular, adaptable,

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and appropriate for various boundary conditions, loadings, and material characteristics. The Rayleigh-Ritz method is used to approximate a basic bending solution, whereas the virtual work principle is applied to formulate the equations for flexural analysis. In comparison to prior investigations, the results exhibit significant accuracy and convergence. A thorough and methodical parametric analysis investigates the impacts of variables, including SWCNT volume %, boundary conditions, and plate thickness. The computed average bending underscores the substantial influence of SWCNT on flexural characteristics and shows the significance of the study for material improvement.

215. AI-POWERED TRIAGE AND APPOINTMENT SCHEDULING: INTEGRATING MACHINE LEARNING AND LARGE LANGUAGE MODELS

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Patient triage and appointment scheduling are two major areas where the healthcare sector continues to struggle with efficiency. Patients frequently lack the medical knowledge to choose the right specialist, which results in &patient misdirection,& underuse of resources, and more administrative work and waste of time. An AI-Powered Triage Chatbot is an integrated AI-driven solution that this paper suggests. The system uses a Scikit-learn machine learning classifier for predictive disease triage and Google Gemini (Large Language Model) for natural language symptom normalization. Most importantly, the system employs a multi-level resource allocation strategy by suggesting the right hospital department and doctor seniority (Junior vs. Senior) according to the anticipated severity of the

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illness. With the help of MongoDB for persistence and a BigQuery-Looker Studio pipeline for operational analytics, the system is developed as a full-stack web application utilizing React and FastAPI. High accuracy in symptom extraction and disease prediction is demonstrated by experimental validation on synthetic datasets, indicating a substantial potential for minimizing patient misdirection and maximizing hospital resource allocation according to the expected severity of the illness.

216. ONION CONDITION ANALYSIS AND SHELF LIFE PREDICTION USING MACHINE LEARNING TECHNIQUES

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Quality degradation during onion storage occurs from the following: rotting, sprouting, fungal infections, and other defects. The issue also results in significant post-harvest losses. Damage in its early stages goes unnoticed and unreported in most cases, and the conventional, manual inspections do not provide accurate reports in most cases and are time consuming. Because of this, the purpose of the paper is to develop the first-ever 'AI-based Real-Time Onion Quality Evaluation and Shelf Life Prediction System' employing 'Computer Vision' and 'Machine Learning' Techniques'. The Onion Shelf Life Prediction System utilizes the YOLOv8 Deep Learning Architecture that classifies onions as either, 'Fresh', 'Infected', 'Rotten', or 'Sprouted'. Each categorized onion is boxed and labelled with the predicted class and 'Confidence' level. The System also predicts the classes as 'High', 'Medium', or 'Low' and predicts shelf life using, 'Logistic Regression, Support Vector Machine, K-Nearest Neighbor, Random Forest', and 'Gradient Boosting' algorithms. The 'Gradient Boosting' algorithm predicts the class with an accuracy of 85.7%. The System generates a detailed report of the detected onions, the quality of the onions, and the predicted shelf life. The proposed system significantly reduces the amount of time that is spent during inspections and improves the amount of accurate reporting. The solution is 'AI-based', contactless, and is geared to significantly reducing the losses that come with onion storage.

217. ECO-VISION AI: INTELLIGENT WASTE CLASSIFICATION AND SHAPE-PRESERVING GENERATIVE ART USING DEEP LEARNING

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Eco-Vision AI is a deep learning framework that creates digital artwork from waste images through a multi-stage process. The framework identifies the objects using YOLOv8, classifies them as biodegradable or non-biodegradable, and only processes non-biodegradable items.In the ControlNet process, the structure and color of the images are preserved, along with the styles, which are integrated into prompts and embedded with Sentence-BERT for consistency. The artwork is created through a process of Stable Diffusion, which retains the identity of the objects and the artistic intent, thus bringing together computer vision, language, and AI for sustainable creativity.

218.DATA-DRIVEN PROGNOSTICS AND MACHINE LEARNING-BASED FORECASTING OF LITHIUM-ION BATTERY AGEING IN ELECTRIC VEHICLES

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The rapid growth of electric vehicles (EVs) has increased the need for accurate prediction of lithium-ion battery ageing to improve performance and lifetime. This study investigates dynamic battery ageing using real-world driving data and machine learning techniques, specifically Artificial Neural Networks (ANN) and Random Forest (RF). The dataset includes operational parameters such as time, voltage, current, temperature, and capacity. ANN is employed to model nonlinear degradation patterns, while RF is used to enhance predictive robustness under multidimensional data conditions. The proposed approach enables reliable estimation of battery ageing and remaining useful life (RUL), supporting improved battery management and sustainable EV operation.

219. DUAL-BACKBONE CNN FUSION FOR MULTI-CLASS GASTROINTESTINAL DISEASE CLASSIFICATION

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Wireless capsule endoscopy (WCE) generates extremely large volumes of gastrointestinal (GI) images, making manual interpretation time-consuming and increasing the risk of missed pathological findings. Automated analysis using deep learning has emerged as a promising solution; however, accurate classification remains challenging due to subtle mucosal variations, imaging artifacts, and high intra-class variability. This work proposes Fused, a dual-backbone convolutional framework that integrates EfficientNet-B4 and ResNet-50 through a weighted early feature fusion mechanism to capture complementary texture-sensitive and structural representations. The model is evaluated on a four-class GI disease classification task comprising Normal, Ulcerative Colitis, Polyps, and Esophagitis using combined public endoscopic datasets. Experimental results demonstrate consistent improvements over individual backbone networks and a Vision Transformer baseline across macro-averaged evaluation metrics, achieving an accuracy of 98.47% and a macro F1-score of 98.54%, with macro ROC-AUC and PR-AUC values of 0.9997 and 0.9993, respectively. Grad-CAM++ visualizations further confirm that the model focuses on clinically relevant mucosal regions, supporting interpretability and diagnostic reliability. These findings suggest that heterogeneous convolutional fusion provides an effective and computationally efficient approach for automated gastrointestinal disease classification and may serve as a supportive tool in large-scale endoscopic screening workflows.

220. AN INTEGRATED AI-DRIVEN FRAMEWORK FOR SEMANTIC RESUME INTELLIGENCE AND ADAPTIVE VIRTUAL INTERVIEW SYSTEMS

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In the last few years there have been multiple instances of Artificial Intelligence (AI) impacting automated systems used in recruitment and education. Most existing systems have addressed the problems of resume parsing and or virtual interview simulation or skill development for a particular job requirement. A preparation pipeline that is inconsistent in nature lacking any adaptive intelligence. In our work, we present Skill- SageAI, an AI-enabled Career Readiness framework. Expertise. The proposal of architecture where contextual embeddings from BERT, hybrid TF-IDF similarity scoring and RAG is utilized to engage semantically grounded evaluation and feedback generation. It suggests a scoring that quantifies the similarity of resumes to a job and the coherence of a response. The experimental evaluation of 500 resumes and 300 structured interview responses show a 13% improvement in F1-score compared to classical keyword-based keyword systems and a 20% increase in accuracy of contextual response evaluation over rule-based baselines. Ensuring the use of explainable AI principles in the evaluation process. The results achieve a screening accuracy, reliability of adaptive assessment and endorsements of confidence that are statistically significantly better than the current standards. SkillSageAI supplies a technology architecture for intelligent career readiness systems that is scalable, modular, and ethically- designed for education and recruitment.

221. AI POWERED WEBSYNTHESIZER USING WEBCONTAINER: A NOVEL APPROACH TO IN-BROWSER CODE GENERATION AND EXECUTION

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Conventional web development requires extensive technical skills, expensive infrastructure, and significant time investment, creating barriers for non-technical users and small organizations. The rapid advancement of Large Language Models (LLMs) and browser-based execution environments presents an opportunity to democratize web development through intelligent automation. This paper introduces Kraft-2.2 (WebSynthesizer), an AI-powered platform that integrates multiple LLMs with WebContainer API for complete in-browser code generation and execution. The system aims to eliminate traditional development complexities while maintaining production-grade code quality and security standards through browser-based sandboxing. The platform employs a dual-AI model architecture featuring Claude 3.5 Sonnet and Google Gemini 2.5 Flash with intelligent fall- back mechanisms, advanced prompt engineering, and real-time code generation with live preview

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capabilities. An enhanced file management system with reactive state management using Zustand, XML parsing optimization, and split-view interface enables seamless development workflows. Kraft-2.2 democratizes web development by enabling non-technical users to create com- plex applications through natural language interaction, reducing development time from hours to minutes. This platform has significant potential to lower barriers to digital entrepreneurship and accelerate innovation across industries by making profes- sional web development accessible to broader populations.

222. FAIL-SAFE MOTORCYCLE SECURITY SYSTEM WITH PHYSICAL IMMOBILIZATION USING DUAL-COMPLIANCE CONTROL

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Motorcycle theft and unauthorized vehicle usage have been increasing to be a significant challenge, specifically due to the limitation of any security system to avoid single point of failure which can commonly occur in two-wheelers. Existing solutions such as RFID based authentication, fingerprint based unlocking system, and facial recognition-based security provide a certain level of protection but remain vulnerable to real world constraints such as tampering devices, and single unit failure. To address these problems this project proposes a Fail-safe Motorcycle Security System with Dual Compliance Control that defines more security to motor-vehicles by integrating a bike-mounted security module and a helmet mounted backup module to provide redundancy and create a robust cyber-physical protection system. In the proposed system, the bike mounted module will configure the presence of an authorized helmet module to be connected before accessing the ignition. The bike's power supply to ignition and spark plug is directly controlled by the bike module ensuring physical immobilization during any unauthorized access of the bike is detected. Each time the vehicle is powered on the user receives a real-time authorization request via a mobile application, prompting the user for immediate approval or denial. If access is denied or any suspicious activity is detected by either of the modules then immediate lockdown procedure is followed by engine being stalled and shut down of the power supply to the entire bike system via relay. To enhance tamper resistance, the helmet module functions as a secondary backup unit. Any attempt to disconnect or damage the bike module triggers an alert from the helmet device while maintaining the lockdown protocol to completely shut down power supply to the entire bike system. Dual GPS units embedded in both modules provide redundant location tracking and a vibration sensor inside the bike module to monitor any unauthorized external movement. An RFID-based emergency override is also incorporated in the bike module for legitimate access recovery from lockdown mode by the original user. The proposed dual compliance architecture significantly improves reliability, rider awareness and theft prevention compared to traditional security systems while remaining cost effective and suitable for real-world deployment.

223. AUTONOMOUS INDUSTRIAL ROVER

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Industrial work places can be really dangerous for workers. They often face hazards, like fires tripping over things, bad air and sudden health issues. Having someone always watching over them in these places would require a lot of staff. This also keeps workers at risk. The robots that follow a line and are used in industries can only follow a path. They do not have the ability to monitor safety in time or make their own decisions.They are not smart enough to handle emergencies or keep workers safe in a changing environment.Industrial work environments need a solution that can watch over workers and respond to emergencies. To address these challenges, this project introduces a Smart Autonomous Industrial Rover. It aims to improve workplace safety, reduce human exposure to dangerous environments, and boost overall operational efficiency. The system combines several safety-focused technologies. These include IR sensors for precise path guidance along set industrial routes, an ESP32-CAM for real-time image-based obstacle and fire detection, and biomedical sensors like temperature and pulse monitors to continuously check the health of workers in critical areas. Upon detecting any hazard or unusual condition, the rover automatically sends instant alerts through Wi- Fi to notify supervisors and safety personnel who are not on-site. This quick reporting system leads to faster decision-making and timely emergency responses. By using self-driving capability, smart environment sensing, and online safety monitoring, the proposed rover serves as a dependable partner for smart industrial automation. It greatly lowers the risk of accidents while enhancing worker safety and operational sustainability.

224. DECENTRALIZED TRUSTLESS FREELANCING ECOSYSTEM LEVERAGING ETHEREUM SMART CONTRACTS AND AI- DRIVEN SKILL MATCHING FOR TRANSPARENT AND AUTOMATED WORKFLOWS

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The existing systems of freelancing require intermediaries which are centralized and charge high service prices, which are not transparent and do not practically resolve payment failures between employers and freelancers, resulting in mistrust between employers and freelancers. This paper will suggest a decentralized freelance model that will run on Ethereum smart contracts allowing the secure, transparent and automated workflows free of any intermediaries. This system uses Solidity-based smart contracts to apply automated escrow payments, milestone tracking, and conditional fund release in order to guarantee the security of payments. The presence of Web3.py to be used in blockchain interaction and AI-driven freelancer-employer matching system using TF-IDF vectorization and cosine similarity is used to increase the accuracy of project allocation. A user interface written in Stream-lit will be user-friendly, and SQLite will handle the data on an off-chain value and the Ganache will help run tests on a local blockchain. Through experimental assessment, enhanced transparency of transactions, lower dependency on a platform, better security in payments, and more accurate matching is witnessed than traditional platforms. The suggested system adds to a scalable, trustless and empowering to the user system that fosters fairness, effectiveness and responsibility in the freelancing ecosystem.

225. AI-POWERED CUSTOM COURSE GENERATOR FOR PERSONALIZED LEARNING

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With the rapid expansion of digital learning platforms, there is an increased demand for scalable, personalized, and efficiently structured educational content. Traditional course creation requires significant time, expertise, and manual effort, creating bottlenecks for educators and institutions. This research proposes an AI-based Automated Course Generator, built using Google Gemini, Next.js, and PostgreSQL, capable of generating complete course structures including chapter modules, summaries, quizzes, curated learning resources, and recommended instructional videos. The system uses structured

prompting, semantic text generation, and modular architecture to deliver coherent course content. Experimental evaluation demonstrates that the system produces high-quality, consistent, and pedagogically aligned course modules with minimal latency. The proposed framework significantly reduces content production time and enhances the scalability of online learning environments. Furthermore, the system integrates interactive learning tools such as discussion forums, progress tracking, and embedded multimedia to enhance learner engagement. The automated pipeline ensures reproducibility and consistency across diverse course domains, making it suitable for academic, corporate, and self-learning contexts. Performance analysis indicates that the framework maintains stable generation speed even under heavy user load. The platforms architecture supports modular expansion, enabling integration with additional AI models and learning analytics engines. Overall, this research demonstrates the potential of generative AI in revolutionizing digital pedagogy and enabling large-scale autonomous curriculum development.

226. HYBRID PHISHING DETECTION MODULE IN A SECURE PASSWORD MANAGER

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Phishing attacks involving fake URLs mimicking trusted applications, which violate the privacy of users, are still a threat to cybersecurity. Heuristic or learning approaches with high precision are likely to have high false positives, but traditional approaches using a blacklist are shown to be effective for a finite number of known malicious domains. However, these methods are not able to identify novel phishing URLs. This research work proposes a lightweight module to identify phishing pages using a blend of real-time lexical URL analysis with optional blacklist verification .Different structural and

lexical features, including length, IP address, presence of suspicious keyword content, unusual top-level domain, entropy, digit, and subdomain depth, are identified by the proposed method. These techniques are used to create a weighted risk score using a combination of these features to identify possible phishing behaviors, without relying on page content and intensive models. Moreover, a verification technique using a blacklist of previously known malicious domains improves this analysis. The proposed model is also proved to have higher detection coverage compared to using a blacklist, while maintaining low computational complexity, according to experimentation with a set of phishing and legitimate web page URLs. The findings indicate that this approach could be used in security applications for web browsers in real-time.

227. REAL-TIME SOCIAL MEDIA ANALYTICS FOR E-COMMERCE TRENDS USING BERT, LSTM, AND GEMINI-ASSISTED INSIGHTS

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Modern e-commerce decisions are becoming more influenced by constant changes in social media conversations, however, these signals are noisy, high-volume and difficult to interpret in real time without a proper analytics pipeline. This work is proposing an integrated platform with sustainable combination of live data ingestion, contextual sentiment modeling, temporal forecasting, risk detection, and AI assisted explanation for knowledge transformation of unstructured user chatter into actionable business intelligence. A BERT based sentiment layer looks for subtle positive, neutral and negative intent in product-related posts, whereas an LSTM based forecasting layer looks at the short-term dynamics in mentions and the progression of sentiment. Confidence-aware fallback logic of reliability in operation as well as Gemini-powered narrative layer summaries, comparisons, and more decision

oriented insights completes the system. The predictive analytics and interpretable outputs integrated into the platform allow product teams, marketing teams, and the stakeholders of the strategy to make campaigns-related, price-related, inventory- related, reputation-related, and speedy decisions.

228. A QA/SA REMOTE AUTONOMOUS MOBILE INSPECTION SYSTEM USING SLAM AND ROS 2 NAV2

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Work quality and safety monitoring are becoming increasingly crucial in industrial automation, infrastructure management, and construction sites. Traditional methods, such as relying heavily on manual labour or Environmental Health and Safety (EHS) officers to give regular updates on the safety protocols and compliance maintenance in the site causes operational fatigue. Additionally, the temporary nature of construction sites often prevents the installation of fixed monitoring infrastructure like CCTV systems due to the absence of permanent electrical installations. In this paper we introduce an autonomous robotic system for remote safety and quality monitoring using SLAM (Simultaneous Localization And Mapping) and ROS2, utilizing the Navigation Stack NAV2 for localization accuracy [1][4]. It includes a 2D YDLidar X2 LiDAR, wheel odometry, and an HC-SR04 ultrasonic sensor to enable autonomous navigation and mapping in a construction environment. In addition to this functionality, we have added an additional system which includes a TVS 130S webcam, which will enable us to use the YOLO algorithm and deep learning [2] to ensure that safety is maintained by having specific protocols and details such as safety (hard hat on/off), worker presence in height work zones,

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and scaffolding activity monitoring mapped in the algorithm to alarm the EHS officer regarding compliance with safety protocols. It can be used to monitor all of these parameters.

229. ADAPTIVE COMBAT AGENT USING REINFORCEMENT LEARNING

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Historically, for gaming and tactical training tactics, simulated combat systems have made full use of regulated AI techniques such as finite state machines and behavior tree structures that, although deterministic, have little room for adaptation and, as a matter of course, are predictable in the face of constantly changing standard game theory strategies [14], [15]. It introduces an Adaptive Combat Agent, which uses Deep Reinforcement Learning (DRL) to escape the constraints of these methods [6], [13]. Using Unreal Engine 5.6 as a high-fidelity physics simulation environment, this system combines PPO (Proximal Policy Optimization) and DQN (Deep Q- Networks) to train autonomous agents for both weapon- armed and hand-to-hand combat scenarios. With a low- latency communications channel, Unreal Engine&s C++ runtime ties into powerful Python-based education platforms: training can occur in real time. A multi- objective reward function comprising strike efficiency, stamina preservation, and survival duration guides our agent, meaning that it can learn realistic tactical scripts without being directly programmed to do so. It has been observed experimentally that DQN in the simpler environment has good convergence, while the PPO performance in biological combat is much more solid and adaptable [11], [12].

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230. DESIGN AND IMPLEMENTATION OF A SUPERVISED MACHINE LEARNING FRAMEWORK FOR TEXT-BASED SENTIMENT ANALYSIS

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In the current digital landscape, individuals express their opinions across a wide array of platforms, including reviews, blogs, and social media posts. This extensive volume of user-generated content offers organizations valuable insight into customer perceptions of their products and services. However, manually analyzing such a vast dataset is impractical. To address this challenge, sentiment analysis leverages natural language processing to automatically assess whether user opinions convey positive, negative, or neutral sentiments. In this study, a sentiment classification framework was developed to analyze Twitter data, categorizing user opinions according to their emotional tone. The process begins with comprehensive tweet preprocessing, which involves removing extraneous elements and standardizing textual input while preserving the original semantic content. Rather than employing traditional feature engineering techniques, this work utilizes a transformer-based language model, which excels at capturing contextual nuances and inter-word relationships. The model was fine-tuned on a labeled corpus of tweets to enable it to accurately identify diverse sentiment expressions as they appear in authentic online discourse. Empirical evaluation demonstrated that the proposed approach achieves high performance across accuracy, precision, recall, and F1-score metrics. Additionally, a user- friendly interface was implemented, allowing users to input text and receive immediate sentiment analysis feedback. In summary, the proposed system facilitates efficient analysis of large-scale social media data, enabling the extraction of meaningful insights regarding public sentiment.

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231. ROADSENSE: AI-POWERED MOBILE SYSTEM FOR AUTOMATED POTHOLE DETECTION AND GEOSPATIAL MAPPING

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The road infrastructure plays a significant part in both road safety and efficiency of transportation. Nevertheless, pestilence of potholes remains to cause havoc to vehicles damages, accidents, and maintenance expenses. Traditional ways of identifying potholes have been relying on manual survey or even descriptions provided by people passing by these holes which are not only tedious and resource intensive but also inaccurate. The primary contribution of this paper is Pothole Detection and Monitoring System which is a mobile based application that can be used to detect and monitor potholes using real-time processing of images and advanced deep learning algorithms.The backside is driven by Flask and the frontside by React Native to provide a rich user interaction with simple server side calculation. The user is able to take pictures and then send those images to the server where a YOLOv8 object detector model is used in the correct identification of potholes in the road pictures. The server will provide bounding box and confidence scores of the image in order to give the user a chance to visualize the prediction.In addition to the above, GPS metadata can also be recorded to output spatial maps of road conditions allowing the potential for predictive analytics concerning pothole maintenance activities.

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232. INTELLIAGENT: A RESEARCH GRADE ADAPTIVE MULTI-DOMAIN AI-SYSTEM

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The rapid growth of artificial intelligence has introduced a wide range of tools for summarization, question answering, and workflow assistance; yet most of these systems are narrow in scope, task-specific, and prone to unreliable or hallucinated outputs. This fragmentation forces users to rely on multiple disconnected platforms and prevents the development of domain-aware, trustworthy, and explainable assistance. To address these challenges, we present IntelliAgent, a unified adaptive AI system that integrates multi-agent reasoning, retrieval-augmented generation (RAG), knowledge graph–driven verification, and workflow automation. The framework consists of two tightly coupled layers: a reasoning and retrieval engine adaptable across domains such as education, healthcare, and finance, and an automation layer powered by n8n for seamless orchestration of real-world tasks. It enhances reliability through fact-checking, confidence scoring, and citation-linked outputs. Its collaborative multi-agent design enables coordinated problem solving, improving both personalization and adaptability. Unlike conventional assistants, IntelliAgent delivers explainable and verifiable results while reducing overhead in enterprise and academic workflows. By uniting adaptive language understanding, knowledge graph reasoning, and agent collaboration, IntelliAgent sets a new paradigm for AI assistants that prioritize accuracy, adaptability, and automation, with transformative potential for professional development, corporate decision-making, healthcare, and education.

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233. GEOINFORMATICS DRIVEN SMART URBAN ROAD NETWORK PLANNING WITH RENEWABLE ENERGY ROAD ELEMENTS AND ACCIDENT HOTSPOT ANALYSIS

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Sustainable urban transportation is necessary as cities deal with rapid urbanization, continuous traffic congestion, and environmental pressures, requiring modern planning tools capable of providing accurate, real time, and spatially detailed information. This study develops a comprehensive GIS driven framework for smart road network planning using high-resolution datasets from USGS Earth Explorer, DIVA GIS, and Survey of India topographic sheets. By integrating multiple spatial layers in ArcGIS 10.8 including land use/land cover (LULC), Digital Elevation Model (DEM), drainage networks, population density, and mobility characteristics the research assesses terrain limitations, environmental sensitivities, and functional needs of the urban area. Multi Criteria Decision Analysis (MCDA) techniques guide suitability evaluation, while GIS based network analysis identifies connectivity gaps, optimal paths, and feasible alternatives for sustainable route development. This systematic, data-driven methodology produces suitability maps, optimized road alignments, and strategic recommendations that enhance connectivity, minimize environmental impacts, and align with broader sustainable urban development goals, demonstrating the transformative role of advanced geospatial technologies in creating resilient, future-ready transportation systems. It also proposes the integration of renewable energy-based road designs such as solar-powered pavements and wireless vehicle charging systems to promote green and smart mobility. The project aims to develop an optimized, safe, and eco-friendly transportation network that supports the vision of sustainable smart cities.

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234. PERFORMANCE EVALUATION OF VARIOUS MODULATION TECHNIQUES FOR UNDERWATER WIRELESS OPTICAL COMMUNICATION SYSTEM

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Underwater Wireless Optical Communication (UWOC) is an emerging communication paradigm that enables high data rate transmission with low latency compared to traditional acoustic systems. However, Optical signal propagation in underwater environments is severely affected by absorption, scattering, and turbulence caused by water turbidity. This paper presents a performance evaluation of On- Off Keying (OOK), Binary Phase Shift Keying (BPSK), and Quadrature Phase Shift Keying (QPSK) modulation schemes for UWOC systems. MATLAB-based simulations are conducted under three representative underwater environments: clear ocean water, coastal water, and turbid harbor water. System performance is analyzed using Bit Error Rate (BER) with respect to Signal-to-Noise Ratio (SNR) and transmission distance. The results indicate that BPSK and QPSK outperform OOK in low-turbidity conditions, while all modulation schemes exhibit severe performance degradation in highly turbid environments. The findings provide useful insights for selecting suitable modulation schemes for reliable underwater optical communication links.

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235. CYBER THREAT DISCOVERY IN CLOUD-INTEGRATED CPS USING COGNITIVE DEEP LEARNING FUSION

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Cyber-physical systems (CPS) enabled by the cloud provide effective resource management and scalable computation but are more vulnerable to security threats because of their interconnectedness and dynamic nature. For the protection of such environments, conventional security measures are frequently insufficient. By combining a Convolutional Neural Network (CNN) for classification and a Deep Belief Network (DBN) for feature learning, this study suggests a hybrid deep learning framework for attack detection in cloud-based CPS. A Seagull Adapted Elephant Herding Optimization (SAEHO) algorithm is used to adjust model parameters in order to improve model performance. For comparative analysis, the Firefly Algorithm (FA) is also included as a baseline optimization technique. The suggested framework evaluates network traffic on publicly accessible datasets using common metrics, such as accuracy, precision, sensitivity, and specificity, to determine whether it is malicious or benign.

236. LANDSLIDE DETECTION USING CONVOLUTIONAL NEURAL NETWORKS (CNNS)

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Landslides rank among the most destructive and least predictable natural hazards, endangering human lives, damaging property, disrupting ecosystems, and threatening critical infrastructure. These rapid downhill movements of soil and rock can strike without warning, often triggered by intense rainfall, seismic activity, deforestation, or construction on unstable terrain. Due to their sudden onset and large-scale impact, effective early warning and rapid intervention systems are vital for disaster mitigation. Conventional approaches to landslide detection—such as on-site inspections and manual analysis of satellite imagery—are often slow, labor-intensive, and lack the scalability needed for real-time response. Recent advancements in artificial intelligence (AI) and geospatial technologies are transforming disaster monitoring capabilities. In particular, Convolutional Neural Networks (CNNs), a subset of deep learning models, have proven highly effective in image recognition and feature extraction tasks.

237. PREDICTING DISEASE RISK FROM ELECTRONIC HEALTH RECORDS USING ATTENTION-BASED TEMPORAL CONVOLUTIONAL NETWORKS FOR HEALTHCARE MANAGEMENT

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Early risk stratification of people who are prone to chronic diseases is a crucial step in the transition from reactive healthcare to proactive health management. Electronic Health Records (EHRs) are a rich source of longitudinal clinical information that can be used for large-scale predictive modeling, but it is difficult to effectively capture long-term temporal dependencies while ensuring interpretability. This paper presents an Attention-Based Temporal Convolutional Network (ATCN) for disease risk prediction on structured EHR data. Clinical entities are encoded using Word2Vec embeddings to model the semantic relationships between medical concepts. The ATCN model architecture uses dilated causal convolutions to efficiently capture long-term temporal dependencies, along with a combined attention mechanism to focus on the clinically important time periods that have an impact on predictions. The proposed method is compared with Logistic Regression, Random Forest, XGBoost, BiLSTM, and Transformer models. Experimental evaluation shows that ATCN obtains an AUC of 0.93 ± 0.008, outperforming recurrent models while improving training speed by 34% compared to transformer models. SHAP interpretability analysis also confirms that the method is aligned with known clinical risk factors. The proposed method offers a scalable, interpretable, and computationally efficient solution for large-scale disease risk prediction on EHR data.

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238. NEXTGEN HIRING: AN AI-DRIVEN PLATFORM FOR ROLE-BASED CAREER READINESS AND SMART JOB MATCHING

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Today's job market expects students to understand not just their subject knowledge but also how well it lines up with what companies actually need. Most existing recruitment tools fall short, they match keywords and leave students guessing why they were rejected. NextGen Hiring takes a different approach. The platform extracts skills from uploaded resumes, discovers relevant job listings from both internal and live external sources, and uses a large language model to score how well a student fits a role, with clear written reasoning. Students also complete role-specific mock tests in a secure proctored environment and receive AI-generated feedback on weak areas. Testing with 50 final-year IT students showed over 93% skill extraction accuracy, a matching score error of just 4.2 points out of 100, and 86% of participants reporting that the platform helped them understand their profile gaps far better than conventional job portals.

239. A GENERAL-PURPOSE AI AGENT FOR AUTOMATED TASK EXECUTION

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Task Mind is a general-purpose AI agent system and is also intelligent, capable of autonomously completing a broad selection of daily digital tasks according to user instructions or the environment. In use, the system is integrated with natural language (NLP), machine learning to perform the rules in order to understand the instructions, devise action plans and perform actions in an efficient way. Covering not only the possibility to make appointments and send notifications but also to retrieve information, control smart gadgets, and manage schedule, Task Mind is a single virtual assistant that can learn constantly and optimize the tasks. It uses context conscious reasoning, user behaviour Modelling, and multi agent communication as a priority task scheduler and responds to dynamic settings. The project would help to minimise human workload, improve productivity and introduce intelligence into everyday life- make technology more active, personal, and human-centred.

240. WEARABLE SMART BIOMEDICAL SENSOR NETWORK FOR ACTIVE AGING SUPPORT AND HEALTH MONITORING

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With the global rise in the elderly population, ensuring continuous health monitoring and rapid emergency response has become a pressing healthcare need. This paper presents a Wearable Smart Biomedical Sensor Network for Active Aging Support and Health Monitoring designed to provide real-time safety and health supervision for older adults. The system integrates an ESP32 microcontroller with multiple biomedical and motion sensors, including an MPU6050 accelerometer and gyroscope for fall detection, a DS18B20 digital sensor for body temperature monitoring, an analog pulse sensor for heart rate measurement, and a respiratory sensor for breathing rate assessment. Upon detecting abnormalities such as sudden falls, irregular heartbeat, abnormal temperature, or breathing irregularities, the system generates an SOS alert. A GSM module sends instant SMS notifications to caregivers or family members, while a GPS module provides the individual's real-time location.

241. ENSEMBLE EXPLAINABILITY FRAMEWORK WITH XAI CONSISTENCY SCORE FOR PNEUMONIA DIAGNOSIS USING DENSENET-121

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Pneumonia remains one of the leading infectious causes of mortality worldwide, particularly among children and elderly populations. Early and accurate detection from chest radiographs is critical for timely clinical intervention. This paper presents an Explainable Deep Learning Framework that integrates DenseNet-121 with three complementary Explain- able AI (XAI) methods — Gradient-weighted Class Activation Mapping (Grad-CAM++), Integrated Gradients, and SHapley Additive exPlanations (SHAP) — to produce highly accurate and clinically interpretable pneumonia predictions from chest X-ray images. A novel XAI Consistency Score is introduced as a cross- method spatial agreement metric, quantifying the reliability of explanations using Intersection over Union (IoU) and Pearson correlation across explanation maps. An Ensemble Explanation Map is further derived through weighted combination of all three methods, producing a unified consensus heatmap for clinical interpretability. The proposed framework achieves an AUC-ROC of 96.90%, a sensitivity of 99.49%, and an F1-Score of 89.50% on the Kaggle Chest X-Ray (Pneumonia) dataset, demonstrating its potential as a reliable and transparent diagnostic aid.

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242. MACHINE LEARNING–DRIVEN PROPHET-BASED FORECASTING OF FINANCIAL INCLUSION USING DIGITAL PAYMENT SYSTEMS

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India&s financial ecosystem is being rapidly transformed by the proliferation of digital payment systems; recently, several significant improvements have occurred in Financial Inclusion as a result. The financial ecosystem has provided low-cost, real-time access to a wide variety of financial services for many demographic segments through platforms such as the Unified Payments Interface (UPI), Immediate Payment Service (IMPS), and systems enabled by Aadhaar. This study aims to examine the impact of digital payment systems on the Financial Inclusion Index in India by assessing the relative contribution of various digital payment platforms, analyzing historical trends, and forecasting future movements based on past data. These results demonstrate that digital payment systems serve as structural drivers for financial inclusion. Since the RBI&s (2021) framework gives significant emphasis to the Usage dimension, the impact of increasing transaction frequency is to create greater levels of inclusion by enabling customers access to their money in a variety of ways.

243. AUTOMATED DELIVERY BOT INTEGRATED ONLINE SHOPPING PLATFORM

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Demand for last mile delivery solutions have increased due to rapidly increasing ecommerce sales increasing last mile delivery method challenges include delivery methods with high operational costs, many delays, risk for packages to be stolen or damaged. This paper describes the implementation of a low cost autonomous delivery rover for use in ecommerce combined with a cloud based online shopping platform. The rover has an ESP32 Microcontroller as the core control unit for navigating and communicating through wireless communication, it obtains its position and heading by sensor fusion of NEO-7M GPS module, HMC5883L magnetometer, and MPU-6500 inertial measurement unit. The rover moves by differential drive mechanism controlled by BTS7960 motor driver. Users can create orders and submit delivery locations through a web application developed in Spring Boot. The backend sends optimized route via Google Maps Directions API and the waypoints are transmitted via AWS IoT Core using MQTT communication protocol. The keypad authentication mechanism uses one time passwords to ensure secure retrieval of package. Results of experiments showed reliable navigation, consistent cloud communication, and successful verification of delivery for short range autonomous delivery applications.

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244. DEEP LEARNING-BASED INTELLIGENT FRAMEWORK FOR EARLY DETECTION OF VITAMIN DEFICIENCY USING MEDICAL IMAGE ANALYSIS

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Currently in this world, there were more than 2 billion person who are suffering from Vitamin Deficiency. Due to these deficiencies, they could result in defects in bones and variety of chronic diseases. At present, the most effective way to know about Vitamin Deficiency is through blood tests, but they are costly, painful, time-consuming process and it might not be easily available to remote areas. So, our research is to overcome these challenges by developing an intelligent system to detect vitamin deficiencies by performing medical images analysis. The preprocessing is done by converting the images into RGB format and the normalization is done by resizing. Deep Learning is used and for the Feature Extraction Module is implemented transfer learning using the Inception v3 convolutional neural network architecture. The Classification is done by mapping from extracted features to categories. The output and recommendation give the result and reports and can be used by healthcare practitioners and patients. These processes give best performance by detecting vitamin deficiencies and gives recommendation.

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245. REAL TIME SIGN LANGUAGE TO VOICE CONVERTER

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Sign language is a major means of communication among the deaf and the hard of hearing community. Nevertheless, lack of smooth translation systems frequently poses communication barriers between the signers and the non-signers. Real Time sign language to voice converter system that combines the use of deep learning-based gesture- recognition, speech synthesis and natural language processing. The system uses hand landmark extraction using the MediaPipe method to extract the spatial temporal features and classify them using a dynamic gesture using a Bidirectional Long Short-Term Memory (BiLSTM) network. A frame buffering and confidence - based filtering smoothing mechanism has been added in order to achieve better predictability under real time conditions. Canonical gloss sequences are converted to grammatically structured English sentences by a rule based Natural Language Processing (NLP) module coupled with context aware pronoun correction and phrase disambiguation. Moreover, sentence fluency is promoted with the help of pattern matching and the location aware transformations, which is put forward by a gloss to English semantic conversion layer. The end product is then turned into a point of audible speech by use of non-blocking, thread safe text to speech engine which allows smooth communication. Experimental data indicate that classification accuracy and real time performance is high and the latency is low.

246. PERSONALIZED MEMORY AND HEALTH ASSISTANCE IN ALZHEIMER'S AND DEMENTIA CARE

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Alzheimer's disease and related dementias (ADRD) affect over 55 million people globally, creating an urgent need for scalable, accessible, and emotionally intelligent assistive technologies that can complement human caregiving. This paper presents MemoryVault, a multimodal AI system providing compassionate memory assistance through biometric authentication, personalized conversational retrieval, and intelligent multimodal services. The system integrates a FastAPI- based backend with facial recognition using 128-dimensional local encodings,Retrieval-Augmented Generation (RAG) with ChromaDB and Pinecone vector storage, Google Gemini 2.5 Flash for empathetic multilingual dialogue, Deepgram Nova-2 speech-to-text and Aura text-to-speech, FLUX-based generative image synthesis, medical consultation tracking with prescription image analysis via Gemini Vision, AssemblyAI audio transcription, five therapeutic cognitive games, adaptive memory exercises with gamification, automated medication reminders with an interactive calendar dashboard, mood and activity logging, monthly health summaries, a conversational AI chatbot aggregating all user data, and a CopilotKit-powered agentic action assistant enabling natural language control of all application functions via Llama 3.3 70B through Groq inference. Multilingual support covers English, Hindi, Tamil, Telugu, Marathi, and Bengali. A compassionate AI design philosophy enforces dignity-preserving, non-clinical, and culturally appropriate responses throughout. This paper presents the system architecture, service implementation, prototype-level technical evaluation conducted on controlled datasets and simulated interactions, and a discussion of limitations and future validation directions.

247. A COMPARATIVE STUDY OF MACD AND RSI INDICATORS IN INVESTMENT DECISION- MAKING IN THE INDIAN STOCK MARKET

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Technical analysis is a major tool of making investment decisions by predicting the future market behavior by examining the past price trends. Among various technical indicators, the MACD and the RSI are widely used to identify trading opportunities. This study examines the comparative performance of RSI and MACD trading strategies in the Indian banking sector using daily stock price data from April 2022 to March 2025. The analysis is based on 15 selected banking stocks listed on the NSE. Performance is evaluated using four key financial metrics: net profit, win ratio, average P/L per trade & maximum drawdown. The SPSS is used to conduct a paired-sample t-test in order to conclude that there are statistically significant differences between the two strategies. The findings indicate that nothing statistically significant exists between the RSI and the MACD in the net profit, win ratio, and

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average P/L per trade (p-value > 0.05). However, a statistically significant difference is examine in maximum drawdown (p-value < 0.05), suggesting that RSI exhibits lower downside risk compared to MACD. The results suggest that while both indicators generate comparable returns, RSI may be more suitable for risk-averse investors due to its lower drawdown. The research adds to the literature on technical analysis by providing empirical support on risk-return trade-offs between two widely used momentum indicators in the Indian stock market.

248. AI-BASED CRIME PATTERN ANALYSIS AND EVIDENCE MATCHING SYSTEM USING NLP AND DEEP LEARNING

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To find links between different crimes, crime investigators have to look at a lot of case records, written reports, and visual evidence. Traditional investigative methods depend a lot on people looking through crime reports and evidence by Manual way, which can take a long time and be wrong. As digital crime records grow quickly, there is a growing need for smart systems that can automatically analyze crime data and help investigators find other crimes that are linked to the first one.This paper proposes an Artificial Intelligence based Crime Pattern Analysis and Investigation Support System that incorporates Natural Language Processing (NLP), deep learningbased image analysis, and geographic crime visualization to aid investigators in recognizing analogous crime cases. The system uses Sentence Bidirectional Encoder Representations from Transformers(SBERT) and cosine similarity to look at Descriptive crime reports. The system uses deep feature extraction with the ResNet18 convolutional neural network for image evidence analysis. It also uses color histogram similarity analysis to improve visual similarity detection. The system also uses geographic mapping techniques to find areas with a lot of crime and show them on a map An experimental evaluation of a crime case dataset shows that the suggested hybrid approach works better than traditional keyword-based search methods for matching crime evidence. The system gives investigators a smart way to find crime patterns, look at evidence, and make criminal investigations more efficient.

249. A CONSENT-LOCKED QR IDENTITY FOR PRIVACY-PRESERVING CLINICAL RECORD ACCESS

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This paper introduces a consent-locked QR code framework that empowers patients to control access to their medical records through a secure, consent-based mechanism. Before any data is shared, the system verifies both the healthcare provider's identity and the patient's consent, ensuring complete privacy protection. Real- time consent validation prevents Role-Based Access Control (RBAC) limits data visibility based on user responsibilities, whereas unlawful entrance. The framework employs advanced encryption and authentication to safeguard information at every stage. By integrating security, scalability, and interoperability, it enhances trust between patients and healthcare institutions. The system promotes transparent data exchange while maintaining confidentiality. Overall, this approach supports a patient- centered and secure digital healthcare ecosystem.

250. AI DIAGNOSING RESPIRATORY DISEASE USING COUGH SOUNDS COMBINING CNN AND RNN

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This paper presents a novel architecture that combines Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) to diagnose respiratory diseases through cough sound analysis. Early detection of respiratory conditions such as pneumonia, bronchitis, or asthma can help individuals

avoid experiencing negative health effects; however, most method of diagnosing respiratory diseases rely on clinical evaluation, imaging techniques, and laboratory tests. Unfortunately, these traditional methods are not always easily accessible in rural areas that lack resources. The proposed method uses live cough recordings as a non-invasive and low- cost initial screening tool. The cough signals will be pre- processed and converted into Mel-spectrogram images to capture the temporal and frequency characteristics of the cough. A CNN will be used to extract the spatial features from the Mel-spectrogram images, and a RNN with Long Short-Term Memory (LSTM) units will be used to model the temporal dependencies that exist within the cough. By combining the CNN and RNN, the proposed architecture will provide better feature representation and sequential pattern learning capabilities, resulting in improved classification accuracy than the individual architectures. The proposed system will classify coughs into 4 categories (pneumonia, bronchitis, asthma, or healthy) via multi- class classification techniques. A recommendation system will be created based on the output of the classifier, providing users with disease-specific recommendations for obtaining early medical care. Collectively, using a hybrid CNN/RNN approach to analyze coughs for diagnosing respiratory diseases will provide an opportunity for developing and deploying automated telehealth solutions for respiratory disease screening and diagnosis.

251. NIMBUS: AN INTELLIGENT WEARABLE ASSISTIVE SYSTEM FOR VISUALLY IMPAIRED INDIVIDUALS USIN YOLOV5-BASED REAL-TIME OBJECT DETECTION AND FALL ALERT MECHANISM

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Visual impairment is extremely limiting to the in- dependent mobility and presents a considerable level of safety hazard to millions of people around the globe. Throughout this paper, NIMBUS is introduced as an all-inclusive wearable assistive system, combining object detection using YOLOv5, optical character recognition, and a accelerometer based Fall Detection system. The system employs a Raspberry Pi camera v2 installed on a pair of wearable glasses in combination with a Raspberry Pi

model 4B (4GB RAM) processing unit with a throughput of 20 FPS. The Key innovative features are a distance estimation algorithm based on a bounding box-based algorithm and custom calibrated object datasets, multilingual audio feedback with support of Hindi and Marathi, filtering of object announcement based on intelligence, and automatic emergency notification through Twilio SMS with GPS positioning. Object detection accuracy of 87% distance estimation error of ±0.28m within 3m, 94% sensitivity of fall detection and 10 seconds delivery of an emergency alert were demonstrated by extensive field-test results. The system operates predominantly offline based and uses pyttsx3 as the real-time feedback mecha- nism with only selective cloud connection only for OCR (gTTS) and emergencies. NIMBUS is priced at 9,999 INR, providing an affordable alternative compared to the business/ commercial solutions exceeding 3,00,000 INR while providing comparable functionality with essential safety features.

252. RAILWAY TRACK HEALTH MONITORING AND FAULT DETECTION ROBOT

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A number of factors contribute to the likelihood of train accidents as well as interruptions in service, including track problems like cracks, severe vibration, fire dangers, and physical impediments. When it comes to long- distance continuous monitoring, traditional manual inspection techniques are expensive, time-consuming, and prone to error. This project suggests an autonomous robotic system based on the ESP32 to monitor railway track health and detect faults, which would overcome these restrictions.In order to identify track cracks and anomalous movement, the proposed system incorporates a number of sensors. These include a vibration sensor, a temperature sensor, a flame sensor, and an ultrasonic obstacle or track discontinuity detector. The goal is to monitor rail overheating and detect early fires near tracks. The ESP32 microcontroller processes all sensor data in real-time and displays it on an LCD for local viewing.The track health data is sent to a distant monitoring station using LoRa technology, which allows for long-distance with low-power communication. In the event of a serious problem, the GSM module sends out fast SMS notifications. Quick maintenance responses and reduced downtime are made possible by the GPS modules accurate location information of identified defects. A motor driver propels the robotic device along the rails autonomously, and a buzzer sounds an instant local alarm. Improving railway safety, minimizing human reliance, and averting accidents via early problem detection are all goals of this system, which provides a computerized approach for real-time railway track surveillance that is both cost-effective and dependable.

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253. DESIGN AND IMPLEMENTATION OF HUMAN MOTION INFORMATION COLLECTION SYSTEM

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In order to improve healthcare prevention, fitness tracking, along with medical diagnostics, it is crucial to monitor human mobility and evaluate physiological data. A system for collecting data on human motion is shown in this project. It makes use of an ESP32 microcontroller in conjunction with a number of motion and biological sensors. An analog pulse sensor measures heart rate, a digital temperature sensor (DS18B20) measures body temperature, an MPU6050 (accelerometer while gyroscope) measures motion and posture, and a Galvanic Skin Response (GSR) sensor measures emotional or stress levels. The ESP32 is the central processing as well as communication unit that allows for the wireless transfer of data to a cloud-based system for viewing and analysis, as well as its capture and preparation in real- time. Wearable health gadgets, sports analytics, with patient rehabilitation applications may all benefit from the system architectures support for low-power operation with remote data monitoring. Local and cloud storage of the acquired data allows for trend analysis and further health interpretation based on machine learning. The device accurately and quickly records physiological changes and dynamic movements, according to the experimental findings. Telemedicine, healthcare for the elderly, and predictive healthcare solutions powered by artificial intelligence are all possible extensions of the scalable platform that this work offers for continuous monitoring of human activities and real-time evaluation of health.

254. ENHANCED LANE DETECTION SYSTEM WITH INTELLIGENT SIGN VISION INTEGRATION

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Modern transportation systems face significant issues, the most significant of which are road safety and efficient traffic management. Advanced Driver Assistance Systems (ADAS) and autonomous driving solutions have become increasingly vital for the purpose of enhancing road safety and minimizing the number of errors that are caused by human drivers as a result of the rapid development of intelligent transportation technologies. Lane detection and traffic sign recognition are two of the many perceptual tasks that are included in these systems. They play an important part in assisting drivers in making safe judgments and in understanding the environment in which they are traveling. Unfortunately, many of the currently available systems regard the detection of lanes and traffic signs as independent modules. This may result in a reduction in contextual awareness and an increase in the complexity of the computations involved. Within the scope of this study, an Advanced Lane Detection System with Intelligent Sign Vision Integration is presented. This system integrates lane detection and intelligent traffic sign recognition into a single framework. In order to achieve its goal of enhancing road scene comprehension, the system that has been presented is designed to concurrently recognize lane borders and recognize significant traffic signs from video input. Several image processing techniques, such as grayscale conversion, Gaussian filtering, and edge recognition, are utilized by the system in order to improve the visibility of significant road elements. The system processes video frames that are collected from a camera that faces the front of the vehicle. Methods such as the Canny edge detector and the Hough transform are utilized in the process of detection. These techniques enable the system to recognize lane markings and ascertain the location of the vehicle within the bounds of the road. The proposed system includes lane detection and an Intelligent Sign Vision module that classifies traffic signs using deep learning–based object detection. The model detects speed restrictions, stop signs, and warning signs. Lane detection and traffic sign recognition improve contextual understanding of the driving environment and allow intelligent vehicles to perceive more accurately. Accuracy, precision, recall, and F1- score are used to evaluate the proposed system. Experimental results show that the combined technique outperforms computer vision and deep learning in detection accuracy. The systems real-time processing performance is also good, making it appropriate for ADAS and autonomous vehicle applications. Advanced Lane Detection with Intelligent Sign Vision Integration delivers a robust and efficient perception framework that improves road safety and supports intelligent transportation systems.

255. REAL-TIME AUTOMATED WEAPON DETECTION IN SURVEILLANCE FEEDS USING EFFICIENTDET-LITE WITH IMMEDIATE AUDIO ALERTING

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Armed violence in the open spaces has also become an issue, which makes armed robberies and active shooter inci- dents increasingly relevant; therefore, proactive security systems have to be developed.

Conventional video surveillance primarily revolves around the post incident forensic investigation, and human operators frequently struggle to maintain a constant view of numerous camera feeds.In efforts to narrow this gap, this study presents a real-time weapon detecting system that detects life-threatening weapons such as handguns, rifles, and knives in live video. The system is based on the EfficientDet implicitly Lite deep-learning model because it has a high level of detection and meets speed requirements in edge devices.We created a custom data set through the resultant combination of multiple open-source collections. We used data-augmentation methods, including rotation, scaling and changing brightness, to make the images in various lighting, angles, and environments stronger.It has been tested to be as precise as more complicated, state-of-the- art models in the Mean Average Precision (MAP) of the system and can achieve a speed of more than 30 frames per second in typical hardware.There is also the system with low-latency audio alert, which is a real-time alert that suggests security staff immediately when a threat is detected with high confidence in order to reduce the response time and could potentially save lives in the emergency cases.

256. MULTIMODAL AI INTERVIEW SIMULATOR FOR COGNITIVE SKILL ENHANCEMENT IN COMPUTER ENGINEERING EDUCATION

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For a substantial segment of computer engineering students, traditional interview preparation methods are not effective, specifically 50-75%. This is because existing resources are fragmented, do not provide real-time feedback, and do not offer objective feedback on the accuracy of responses or the quality of the responses. In this paper, we propose a novel multimodal interview preparation tool based on artificial intelligence, specifically cognitive informatics, which is consistent with Track 1:

Advancement in Computer Engineering. The tool provides real-time feedback on the accuracy of the responses to the interview questions. It does audio recording, audio formatting with FFmpeg, audio transcription with OpenAI Whisper, assessment of the accuracy of the responses with Google Gemini AI, personalization of the questions based on user- uploaded course syllabi with Gemini's large language model, and the addition of gaming elements such as badges and a leaderboard to keep students interested in various topics such as OS, DBMS, programming, etc. In a trial involving 70 students from computer science and engineering departments, the proposed tool resulted in a 20-25% increase in the students' mock interview scores compared to traditional preparation methods ($p < 0.01$). It was also found to have a correlation of 0.82 with the ratings of experts and a SUS score of 85. In addition, the proposed tool was found to have a better performance compared to unimodal approaches through ablation studies. This research contributes to the development of fair AI systems to support the advancement of cognitive skills. Future work includes the addition of video analysis to the tool to examine body language.

257. EVALUATION OF PULSED CHARGING PROCEDURES AND THEIR IMPACT ON LITHIUM-ION BATTERY LIFETIME FOR ELECTRIC VEHICLE FAST CHARGING APPLICATIONS

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Electric vehicles are taking over the roads, and thats great for the environment. But theres one problem that every EV owner faces - charging takes forever. You cant just fill up in five minutes like a petrol car. The obvious solution is to charge faster, but heres the catch - fast charging kills your battery. It degrades faster, heats up more, and sometimes even becomes dangerous. So what do we do? This is where pulsed charging comes in. Instead of pushing constant current continuously, you give the battery little breaks in between. Sometimes you even reverse the current briefly. Sounds illogical, right? But research shows this can actually make your battery last way longer - were talking up to 105% longer life compared to normal charging. Ive gone through 14 different research papers to figure out whats really going on. The key finding? Frequency is everything. Charge at very low frequencies below 1 Hz or very high frequencies above 1 kHz, and youll see amazing results. But if you pick something around 6 Hz, youre basically wasting your time - the benefit is minimal. Now heres something important - pulsed charging wont make your battery charge faster. Thats not what it does. The charging speed depends on the average current, not whether you push it in pulses or continuously. But it will make your battery last longer, which means you save money and the planet gets less e-waste. This paper gives you the complete picture - what pulsed charging is, how it affects batteries, which frequencies work best, and how to actually use it in real life. Whether youre designing chargers or just curious about making your EV battery last longer, youll find useful stuff here.

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258. REAL TIME DRIVER MONITORING SYSTEM FOR VEHICLE SAFETY USING DEEP LEARNING ALGORITHM

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Introduction: Road accidents are happening at an alarming rate. The main causes being drunk driving, drowsiness, distraction and over speeding while driving in pedestrian or zebra crossing areas. These accidents can result into huge loss of life all over the globe. Today, there exists a great need for detection as well as taking preventative actions that can provide some safety measures in driving vehicles. Methods: This Methodology emphasizes usage of an AI driven deep learning vehicle safety system with YOLOv8- type model with self-collected and COCO subsets as dataset that detects all the aspects like drunk driving, tiredness/distraction and speed control on zebra/pedestrian crossings in real time. The proposed system will consider the driver condition as well as the road environment which will lead to enhanced safer driving. This system will enable drivers who are not drunk, fully awake, not distracted able to drive the vehicle in a safe manner. This system uses alcohol sensor which detects the alcohol vapors in the driver's breath, use two web cameras which observe the facial gestures of the driver specially the eyes which indicate tiredness due to long closing or distraction, and to catch the speed limit sign boards and able to detect the pedestrian / zebra crossings for the purpose of speed control. Ultrasonic sensors are also included for collision avoidance for giving added safety measures. Results: This Research work obtains Alcohol level, Present condition of the driver, Status of the Motor, Driver distraction detection level, Fatigue and Drowsiness detection level, Obstacle detection in both front and side portion of the car. Based on the above statistical details. This research work obtain 92.2% Accuracy, 220ms Latency, 93% Efficiency for the set of YOLOv8-model with self-collected and COCO subsets of pedestrian crossing, Sign board information, Distracted and Drowsiness images of the drivers. Conclusion: These Statistical results of the new proposed Work which is compared to the other methods and show the significance and novelty of the proposed works.

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259. PILL MATE: AN IOT-ENABLED SMART MEDICATION ADHERENCE SYSTEM WITH SENSOR-BASED VERIFICATION AND AUTOMATED DISPENSING

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Medication non-adherence continues to be a large and costly problem in managing long-term conditions, as roughly half of all patients do not take their prescribed medications as instructed. This gap leads to numerous preventable hospi- talizations and high costs associated with providing care. All existing solutions designed to remind patients of medication doses have not been able to establish if doses were actually taken. In this paper, we will describe Pill Mate; an automated medication management device based on IoT technology which combines an ESP32 microcontroller, servo motor for dispensing medication, infrared sensor for detecting ingestion, real-time clock for scheduling, and the capability for notifying caregivers through the cloud all in a single and inexpensive solution. Validation testing showed that Pill Mate had an alarm accuracy rate of 99%, dispensing reliability rate of 98%, and infrared detection accuracy of 95% with less than five seconds required to notify the caregiver upon dispensing. Pill Mate represents a significant advancement in the current state of the art by completing the loop between reminding and verifying the receipt of medication, and serves as a low-cost solution to support the care of elderly patients with chronic conditions.

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260. ENHANCED ELECTRIC VEHICLE CHARGING THROUGH PV INTEGRATION WITH HIGH GAIN SEPIC CONVERTER

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The increasing demand of EVs (electric vehicles) globally has promoted the development of high-performance and sustainable charging systems. Renewable energy is required when charging is expensive and causes concern about the environmental impact. The integration of the SEPIC converter with PV array provides flexibility for an improved EV charging model. It not only allows an increased use of renewable energy but also reduces the dependence on the traditional grid and opens up opportunities for decentralized energy systems. The energy conversion function is applied to charge lithium- ion batteries through charging a step-up SEPIC converter by controlling the PV array to generate DC power. The performance of the system at different solar irradiance level was evaluated using MATLAB/Simulink simulations. Results show improved output stability output.

261. WAITLESS360: A SMART WEB-BASED REAL-TIME QUEUE AND TOKEN MANAGEMENT SYSTEM FOR HOSPITALS WITH PREDICTIVE WAIT-TIME INTELLIGENCE AND SMS NOTIFICATIONS

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Traditional queue management rely on manual token allocation, lack accurate waiting time prediction, long waiting time and inefficient queue management leads to patient dissatisfaction, miscommunication with patients and inefficient utilization of healthcare resources. This project proposes a Smart web-based hospital queue and token management system with predictive wait-time intelligence and SMS notifications. The queue is managed using First Come First Serve (FCFS) and the Priority queue algorithm. This project allows patients to register through a web application. To improve transparency and reduce uncertainty, the system predicts the estimated waiting time using a hybrid prediction approach combining Mean Service Time and Exponential Moving Average (EMA). The Estimated time will be sent to the registered mobile number as an SMS notification using Twilio API, whenever the doctor calls the next patient and the patient who enter insides token number will be displayed to the public board. By combining queue algorithms, waiting time prediction, and real-time communication, the proposed system is used to reduce the waiting time, improve hospital workflow efficiency, and enhance patient experience. The implementation of this project helps in managing patient flow more effectively, minimize overcrowding in waiting areas, and provide a transparent, efficient queue management solution and save patient's time.

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262. POSECHECKAI: REAL-TIME YOGA POSTURE ANALYSIS AND CORRECTION FEEDBACK SYSTEM

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Good posture is key during yoga as it lets you do moves right without getting hurt. Yet beginners or those practicing alone often lack help to correct their stance or posture. This system gives real-time feedback using basic webcam technology combined with clever algorithms. Any standard camera can track your motion, picking up major joints straight away through a MediaPipe system. Angles between limbs are calculated live.A MobileNetV2 model analyzes and finds the pose the user is in, making the system power-efficient with ideal performance and instantaneous responses. Joint angles are compared to typical ranges for pose correction, triggering alerts when there is considerable deviation. Additionally, visual and audio cues help to guide the user's posture. Experimental results prove accurate detection and categorization of good and bad postures. The systems capabilities and ease of use ensure that users are able to do yoga safely at home, with support for integration with rehab and healing routines.

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263. GENARETIVE AI FOR FINANCITIAL TIME SERIES FORECASTING A CASE STUDY ON CRUDEOIL

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Crude oil price fluctuations significantly affect the global economy, but traditional forecasting models such as (ARIMA) Autoregressive Integrated Moving Average and (GARCH) Generalized Autoregressive Conditional Heteroskedasticity struggle with the nonlinear and unstable dynamics of these markets. Advances in deep learning, including LSTM Long Short-Term Memory and Transformer architectures, have improved predictions but remain limited by data scarcity and unexpected disruptions. To address these issues, this work develops a hybrid framework that integrates LSTM for short-term sequence learning, Transformers for capturing long- range patterns using attention, and TimeGAN for generating synthetic time-series data to strengthen model training. Using historical datasets from the U.S. Energy Information Administration (EIA), the system is assessed with error measures such as RMSE Root Mean Squared Error, and MAPE stands for Mean Absolute Percentage Error Results indicate that this combined approach achieves more reliable and accurate forecasts than standalone models, highlighting the value of combining predictive and generative AI for robust commodity price forecasting.

264. BROWSER SECURITY EXTENSION FOR WEB THREAT DEFENSE

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The steadily increasing rate of web-based attacks, including phishing, malicious URLs, and script injection threats, still remains a challenge for the conventional browser security mechanisms. The existing approaches appear to focus on individual detection techniques like blacklist filtering or machine learning classifiers, which lack the comprehensiveness required to protect against dynamic and zero-day web-based threats. This paper presents a browser-native security extension with a focus on real-time web threat protection, which combines multi-layer security mechanisms into a single client-side framework. The proposed approach combines two-stage malicious URL classification, adaptive script injection protection with runtime monitoring and dynamic policy enforcement, privacy-preserving behavioral anomaly detection, and contextual user awareness notifications. The system architecture is designed to have low browser resource utilization and uses model optimization strategies to ensure low latency and low memory overhead. The experimental results show improved detection accuracy and consistency for various types of threats with acceptable runtime performance and usability. The outcome of this research work clearly indicates the efficacy of combining machine learning, behavioral, and user-aware security mechanisms within a browser extension infrastructure. This research work also explores the challenges, trade-offs, and future research directions for improving zero-day web threat resilience and cross-browser compatibility.

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265. DIGITAL IDENTITY WITHOUT EXPOSURE: A PRIVACY PRESERVING DECENTRALIZED APPROACH FOR BANKING SYSTEM

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The rapid digitization of banking services has significantly increased the reliance on electronic documents such as Know Your Customer (KYC) records, loan agreements, and compliance reports. While digital transformation improves efficiency, it also exposes banking institutions to risks including document forgery, unauthorized modification, and regulatory non-compliance. Traditional centralized document management systems are vulnerable to insider threats, single points of failure, and cyberattacks, making it difficult to guarantee long-term document integrity and transparency. To address these challenges, this paper proposes HashMorph, a privacy-preserving, blockchain-based document authentication framework designed specifically for the banking sector. The proposed system utilizes the SHA-256 cryptographic hashing algorithm to generate unique digital fingerprints for sensitive documents and stores only these hashes on the Ethereum blockchain using smart contracts deployed on the Ganache test network. By avoiding on-chain storage of actual documents, the framework ensures confidentiality while enabling tamper-evident verification. HashMorph is structured into three core modules—User, Staff, and Admin—supported by role-based access control to ensure accountability, transparency, and regulatory compliance. The system allows customers to independently verify document integrity, enables bank staff to validate and securely register records, and provides administrators with an immutable audit trail for compliance monitoring. The proposed approach strengthens trust in digital banking operations, reduces fraud risk, and offers a scalable foundation for secure document management in modern financial ecosystems.

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266. BERT-BASED DEEP LEARNING FRAMEWORK (FEDERATED LEARNING) FOR ENHANCED ALZHEIMER&S DISEASE AND BRAIN TUMOR CLASSIFICATION USING NEUROIMAGING DATA

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This paper proposes a powerful deep learning model that integrates Bidirectional Encoder Representations from Transformers (BERT) and federated learning to give a privacy-saving and precise method of classifying Alzheimer and brain tumor diseases using neuroimaging data. BERT is incorporated into the framework to perform semantic, meaning-based access to structured clinical metadata that is combined with the recognition of image-level features using convolutional neural networks (CNN) applied to magnetic resonance imaging (MRI) and other neuroimaging modalities. DL also requires a decentralized model training across many institutions by adhering to privacy legislations as FHIR and HIPAA and GDPR through non-storage of centralized data. The framework shows a higher level of accuracy, sensitivity, and comprehensibility in experimental assessments, which have been performed on labeled neuroimaging databases than traditional centralized methods. The suggested system would introduce a highly scalable, well-protected, and clinically applicable system of early-detecting neurological disorders to enhance the efficiency and privacy-preserving nature of healthcare.

267. HERBAL PLANT ANALYSIS AND RECOMMENDATION SYSTEM USING DEEP LEARNING

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Medicinal plants play a crucial role in traditional healthcare systems, but identifying plant species and detecting leaf diseases is difficult because of visual similarity, lack of knowledge, and limited diagnostic tools. This paper proposes a smart system for analyzing and recommending herbal medicinal plants using deep learning and machine learning techniques. A Vision Transformer (ViT) based deep learning model is used to classify medicinal plant leaf images and determine whether the leaf is healthy or unhealthy. A symptom-based disease prediction module also analyzes symptoms provided by users using a machine learning classifier. By combining image analysis and symptom prediction, the system provides herbal remedy recommendations and explains the medicinal benefits of the identified plants. The system is implemented as a web-based platform where users and verified medical professionals can interact for consultation and validation of the recommendations. Experimental evaluation on a medicinal plant dataset shows that the proposed model achieves 98% classification accuracy. The platform provides a simple digital solution for medicinal plant identification, disease analysis, and herbal treatment guidance.

268. PETFED: AN IOT-ENABLED SMART PET FEEDING SYSTEM WITH VISION-BASED AUTOMATION

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Conventional automatic pet feeders operate on fixed timers without any awareness of the pet&s actual presence, which can lead to food wastage and unreliable feeding cycles. This paper presents PetFed, an IoT and AI-enabled smart pet feeding system that integrates real-time pet detection and automated dispensing with cloud-based remote management. The system uses a YOLOv11 deep learning model for detection, achieving a mAP@0.5 of 0.863, an F1 score of 0.83, and a recall of 0.94. An ESP32 microcontroller controls all of the hardware, including a NEMA 17 stepper motor that drives a 3D-printed auger screw for portion-controlled food dispensing. Firebase Realtime Database is used to synchronize all system states, feeding schedules, and status flags. The viability of combining IoT, embedded systems, and computer vision for intelligent pet care automation is demonstrated by experimental results that confirm stable operation, accurate detection and dispensing, consistent portion delivery, and reliable cloud synchronization.

269. (FUEL AND BATTERY TRACK) FBT: REAL-TIME FUEL AND BATTERY MONITORING SYSTEM FOR TWO-WHEELERS

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The riders of the motorcycles and scooters commonly face the problem of faulty fuel indicators, fuel contamination, and battery malfunctions. We have developed a product that will track the fuel level, the quality of fuel and the health of the battery in real-time. The system has six sensors such as fuel flow, ultrasonic, colour, gas, voltage and current that collect accurate information on your car. This information is processed by a microcontroller in a programmed logic with preset thresholds which check fuel and battery status. It immediately displays a warning on an LCD screen with the actual values on low-quality fuel, low fuel or a weak battery voltage. Since it does not need to use cloud services or the internet connection, the system remains low-cost and feasible in the case of a regular motorcycle and scooter. It will assist you in ensuring that you are receiving the amount of fuel that you paid, preventing transmission of contaminated fuel into your engine, and preventing battery issues before you are left stranded; it will make your ride safer, more transparent, and more reliable.

270. WEB APPLICATION VULNERABILITY SCANNER

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Web applications are widely used in modern digital environments for services such as banking, e-commerce, healthcare, and education. However, these applications are increasingly targeted by cyber attackers due to vulnerabilities present in their design and implementation. Manual security testing is time-consuming and often fails to identify hidden vulnerabilities in complex systems. This paper proposes an automated Web Application Vulnerability Scanner capable of identifying common web security vulnerabilities such as SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF), and security misconfigurations . The proposed system performs automated crawling of web pages, identifies input parameters, injects test payloads, and analyzes server responses to detect potential vulnerabilities. The scanner also supports domain-based and subdomain-based vulnerability analysis and generates detailed reports with vulnerability severity levels. Experimental evaluation demonstrates that the system effectively detects common security issues while reducing manual effort

in penetration testing. The proposed scanner improves web security assessment and assists developers in securing their applications against cyber threats.

271. A HYBRID CNN-TRANSFORMER ARCHITECTURE FOR ROBUST NEURAL STEGANOGRAPHY: BALANCING LATENT PAYLOAD CAPACITY AND ADVERSARIAL RESILIENCE

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This paper presents a CNN-Transformer hybrid architecture for steganography. Steganography is the technique of hiding data within media, making it invisible to the human eye. Many traditional techniques are available to do this, including the Least Significant Bit (LSB) method, which alters the binary values of each pixel of an image to hide the data. Although this method ensures the image looks undistorted as it hides the data, it is also lossy, meaning the secret data stored in the image is lost when the image is compressed. This is a problem that the proposed hybrid model aims to tackle. The ability of a CNN model to extract textures, edges and shapes from an image and the ability of a transformer to focus on different pixels in an image at a time using a self-attention mechanism are leveraged. While using this hybrid model to hide a secret image in a cover image leaves the resultant image with some distortion, it does an excellent job of retaining the secret image after the resultant image is compressed. This is verified by using metrics like PSNR and SSIM. This method can find its use in secret data sharing, digital watermarking, machine learning defence and digital data provenance.

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272. AN INTERPRETABLE AI FRAMEWORK FOR DEMENTIA SCREENING

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Dementia is a progressive disorder that leads to a decline in cognitive abilities. The objective is to identify dementia as early as possible and provide necessary care to patients. The objective of this study was to develop a hybrid model of artificial intelligence based on machine learning and deep learning techniques to identify dementia early, using clinical data as well as MRI brain imaging techniques. To measure performance, various machine learning models were used to identify clinical data to detect dementia early. The machine learning models used were SVM, RFC, and XGBoost. RFC was observed to have the highest accuracy of 85.71%, making it better than others. Another model, a Convolutional Neural Network (CNN), was used to identify MRI brain images to detect dementia early. The model had the highest accuracy of 90.6%, making it better than others. The study contributed to the development of a Large Language Model (LLM).

273. ADAPTIVE AI-BASED CRIMINAL INVESTIGATION FRAMEWORK WITH EVIDENCE-DRIVEN JUDICIAL REASONING AND EXPLAINABLE DECISION SUPPORT

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Manual legal analysis or static rule-based systems are often utilized in criminal investigations, and may exhibit a lack of objectivity, stability, and efficiency. The AI-Adaptive Criminal Investigation Model summarized in this paper collects multi-modal evidence, conducts dynamic user interaction, and makes judicial reasoning based on evidence. Through querying a user multiple times, accepting evidence as textual statements, images, audio recordings and documents and scoring the verified information through machine learning means in simulating real-life investigative processes. The system keeps refining its training data until confidence reaches a certain level, as opposed to classical models which must rely on static datasets. To predict judgments and maintain human-in-the- loop, evidence indicators are combined using a probabilistic learning model with structured investigative inputs. The system produces an explainable narrative judgment of the investigation scenario, the assessment of evidence and eventual recommendation on judgment. We show through experiments that our adaptive questioning procedure is able to reduce the amount of biased predictions and enhance interpretability. This framework is intended to assist judicial authorities as decision- support assistant model rather than their replacement, in order to adhere ethical and transparent.

274. CUSTOMIZABLE VIRTUAL NAVIGATION AND ASSET MANAGEMENT SYSTEM

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Indoor navigation has emerged as a critical research domain due to the increasing complexity of modern infrastructures such as hospitals, airports, universities, and corporate buildings. Conventional navigation systems based on the Global Positioning System (GPS) fail in indoor environments due to signal attenuation and multipath interference. This limitation has driven the development of alternative indoor positioning technologies such as Wi-Fi fingerprinting, Bluetooth Low Energy (BLE), Ultra-Wideband (UWB), Radio Frequency Identification (RFID), and vision-based localization systems. This paper presents a customizable virtual navigation and asset management system that integrates RFID-based tracking, QR code-based user interaction, and a web-based mapping interface. The proposed system enables real-time indoor navigation and efficient asset tracking within complex environments. The system architecture consists of a frontend interface built using HTML, CSS, JavaScript, and Leaflet.js, along with a backend server and relational database. The proposed solution provides an intuitive navigation experience by displaying digital indoor maps and optimized navigation paths. Additionally, RFID-enabled asset tracking improves operational efficiency by allowing administrators to monitor the location of critical equipment. Experimental analysis indicates improved navigation efficiency, reduced search time, and enhanced user experience. The system offers a scalable and cost-

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effective solution for smart buildings. Future enhancements include integration of advanced pathfinding algorithms, mobile applications, and augmented reality-based navigation.

275. REAL-TIME CLASSROOM ACTIVITY MONITORING USING YOLOV8 AND DISTRIBUTED STREAMING ARCHITECTURE

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Classroom Activity Monitoring Systems have emerged as an important application of Artificial Intelligence and Computer Vision in modern educational environments. These systems enable automated analysis of student behavior, such as attentiveness and distraction, through real-time visual data processing. Conventional approaches to classroom monitoring involve manual monitoring techniques. However, such approaches have been found to be subjective and inefficient. The need for data-based information and prompt feedback has created a need for more efficient and accurate monitoring techniques. Various methodologies have been explored to overcome this problem. YOLO-based object detection models have been explored for real-time activity recognition. Convolutional neural networks have been explored for facial expression analysis. Multimodal approaches have been explored for gaze tracking, head pose estimation, and body posture analysis to increase the efficiency of detection techniques. Edge-based inference approaches have been explored to increase the efficiency of the system. Distributed streaming systems such as Apache Kafka have been explored for data processing. Privacy-preserving strategies using struc- tured metadata instead of raw video storage have also been considered. The findings indicate that combining deep learning with distributed architectures improves real-time performance and scalability. Such approaches also ensure efficient monitoring while maintaining privacy in classroom environments.

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276. MUTED VIDEOS TO AUDIO EXTRACTION USING LIP MOVEMENTS

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To predict the spoken words. Recent developments in deep learning and computer vision have significantly improved the performance of such systems, particularly with architectures designed to model sequential visual data. Self- supervised models like AV-HuBERT have demonstrated strong capability in extracting speech from visual inputs. Speech is a primary mode of communication, yet many real- world video recordings contain corrupted audio. This project proposes an artificial intelligence-based system capable of generating audio from muted videos by analyzing lip movements. The system uses visual speech recognition techniques to analyze lip movement patterns and predict spoken words, which are then converted into audio. The LRS3 dataset is used for training and validation due to its large vocabulary, real-world speech scenarios, and integrated video-audio-text. A visual representation model inspired by AV-HuBERT is used to extract lip movement, while OpenAI Whisper is used during dataset preparation for text generation. The predicted text is converted into This project proposes an artificial intelligence framework that generates audio from muted video by analyzing lip movements. The system extracts lip movements, learns visual speech features, predicts the corresponding words, and converts them into audio. Unlike other systems, the proposed system works entirely on visual input during runtime. This capability makes it suitable for applications such as surveillance analysis, assistive communication technologies and silent interfaces. audio using a lightweight text-to-speech engine. Experimental results show that the muted videos can be easily reconstructed into audio. The proposed system pays a way for applications in surveillance, forensic, and silent communication systems. This work mainly contributes in the development of modular pipeline that combines visual speech and text-to-speech conversion into a unified system capable of reconstructing audio from muted videos. The remainder of this paper describes related work, methodology, implementation, results, and future research directions.

277. AN AUTOMATED LUNG CANCER DETECTION SYSTEM USING SSA-BASED SEGMENTATION AND RESIDUAL DEEP CONVOLUTIONAL NETWORKS

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Lung cancer is one of the leading causes of cancer-related deaths worldwide, and early and accurate diagnosis plays a crucial role in improving patient survival rates. This paper presents an automated lung cancer detection system using advanced deep learning techniques applied to medical images. The proposed system incorporates image preprocessing steps such as normalization and denoising to enhance data quality. Image segmentation is further performed to isolate relevant regions and eliminate background noise, ensuring effective feature extraction. A Convolutional Neural Network (CNN) is employed for classifying lung images into Normal and Cancerous categories. To improve classification performance, the Salp Swarm Algorithm (SSA) is utilized for optimizing the hyperparameters of the CNN model. The system is trained and evaluated on a labeled dataset, and performance is measured using standard metrics such as accuracy, sensitivity, and specificity. Experimental results demonstrate that the proposed model achieves a classification accuracy of 96.75%, indicating high reliability and efficiency. The proposed system can serve as an effective computer-aided diagnosis tool to assist medical professionals in the early detection of lung cancer and support timely clinical decision-making.

278. A SCALABLE WEB FRAMEWORK FOR CERVICAL CANCER DETECTION USING ENSEMBLE MACHINE LEARNING

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Cervical cancer remains a major cause of mortality among women despite being highly curable when detected early. We present WFC2DS, a web-based clinical decision support system that integrates advanced ensemble machine learning for early cervical cancer detection. The proposed pipeline augments classical models (RFC, DT, SVM, KNN, ANN, AdaBoost) with gradient-boosting learners (XGBoost, LightGBM, CatBoost) and a stacked meta-learner for probability fusion. To ensure clinical reliability, we employ stratified nested cross-validation, class-imbalance mitigation (SMOTE/class weights), and probability calibration (Platt/Isotonic), with operational explanations provide model transparency at both cohort and patient levels. Evaluation uses accuracy, sensitivity, specificity, F1-score, and calibrated AUC, with robustness assessed under missing values and noise. Results indicate that the calibrated stacked ensemble consistently outperforms individual baselines, particularly in sensitivity (screening priority) while preserving specificity. The web framework implements secure, auditable deployment with monitoring for data drifts and model versioning. The system demonstrates practical readiness for screening workflows and offers a transparent, scalable approach to reducing the global burden of cervical cancer.

279. A HYBRID LEARNING AND OPTIMIZING AUTISM SPECTRUM DISORDER DETECTION USING NEUROFUSION PARALLEL ATTENTION FRAMEWORK

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Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder impacting social communication, behavioral, and adaptability in a broad spectrum of severity. Functional MRI (fMRI) is one of the different neuroimaging measures that have been found especially useful in terms of capturing the nature of connectivity impairments that define patterns of ASD that cannot be effectively detected by exclusively using behavioral observation. The deep learning techniques have gained considerable traction in this area over the last ten years, however, with Parallel Deep Convolutional Neural Networks (PDCNN) demonstrating good performance in feature classification. With that said, there are several significant shortcomings of the current PDCNN systems: they are prone to neglect inter-regional connectivity information, are prone to dimensional noise due to inertial feature concatenation, and have convergence strategies that may omit convergence. NeuroFusion Parallel Attention Framework, the hybrid framework addressed in this paper, is constructed using Graph Convolutional Neural Network (GCNN) encoding, Multi-Scale Attention Parallel CNN (MSA-PDCNN) with 3×3, 5×5 and 7x7 kernel branches, and Hybrid Differential Evolution Teaching Learning Based Optimization (DE-TLBO), feature selection algorithm. Channel and Spatial Attention modules are added to allow the network to learn what is really an important diagnostic feature, and not to weight all features equally. The system is fully CPU based i.e. it does not need a GPU. Our method outperforms the default PDCNN-ELTLBO model (96.71) on the ABIDE-I dataset in all of the reported measures, providing a more robust and practically feasible path to automated ASD classification.

280. EMERGENCY HEALTH ALERT SYSTEM USING MACHINE LEARNING AND DEEP LEARNING

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Early diagnosis of life-threatening diseases is the most crucial factor in reducing mortalities and easing the severity of the disease on patients. This paper proposes an integrated, end-to-end Emergency Health Alert System, putting into practice machine learning and deep learning under a Flask-based web application to early diagnose heart disease, chronic kidney disease, and skin cancer. The proposed system provides secure user authentication, role-based access control, and an administrative dashboard to ensure that the system is reliable and used in a controlled manner. Random Forest classifiers are employed for predicting heart disease and chronic kidney disease using structured clinical datasets, whereas for skin lesion classification, a MobileNetV2-based convolutional neural network is utilized for multi-class classification. The training pipeline comprises data preprocessing, imputing missing values, handling class imbalance, and optimized model training with early stopping. It allows the user to input medical parameters or upload images and gives real-time predictions along with risk alerts in severe cases. Experimental evaluation reveals that the proposed system performs both accurate and efficient predictions, hence making the system scalable and practical for early disease screening and preventive healthcare support.

281. REVIEW ON STRENGTH AND COMPACTION BEHAVIOUR OF SOIL REINFORCED WITH PALM KERNEL SHELLS AND HYBRID FIBER

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Soil stabilization is a very important part of geotechnical engineering that makes weak soils used in construction stronger and more compact. Using sustainable and waste materials as an eco-friendly alternative to traditional stabilizers has become very popular in the last few years. Palm Kernel Shells (PKS), a by-product of the palm oil industry, along with several natural and synthetic fibers, have demonstrated potential in enhancing soil quality. This review paper provides a comprehensive analysis of previous research projects focused on the experimental evaluation of soil reinforcement using Palm Kernel Shells and hybrid fibers. The study looks at how Palm Kernel Shells (PKS) and fiber reinforcement affect important geotechnical properties as maximum dry density (MDD), optimum moisture content (OMC), unconfined compressive strength (UCS), California Bearing Ratio (CBR), and shear strength. The review also talks about how the amount, size, and mix of PKS and fibers effect how soil acts when it is compacted and tested for strength. Adding PKS to soil makes it drain better and less dense, while adding hybrid fibers makes it stronger and better at preventing cracks. This makes the

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soil stronger and more durable. When building foundations and subgrades for pavements, using PKS and fibers together is an inexpensive and long-lasting solution to improve the ground. This paper discusses the advantages and disadvantages of the existing research on PKS and hybrid fibers for soil stabilization, along with the deficiencies in that research. It also gives ideas for how to use these resources better in the future.

282. FAKE DETECTION USING DEEP LEARNING MODELS

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Fake news has emerged as a significant online problem that threatens public opinion, social cohesion, public health, and democratic elections—particularly in times of global emergency like pandemics. Given the size and speed of the spread of false information, manual fact-checking is no longer a viable option, highlighting the pressing need for automated detection systems. Using advanced architectures like Convolutional Neural Networks (CNNs), Long Short-Term Memory (LSTM) networks, and Transformer-based models like BERT, this study examines how well deep learning models detect fake news. Standard benchmark datasets that offer both text and meta- data features, such as LIAR, ISOT, and FakeNewsNet, are used to train and validate these models. Using contextual word embeddings

283. ENHANCING SMART DIABETES PREDICTION USING MACHINE LEARNING ALGORITHMS

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Diabetes mellitus is a global health problem of significant proportions, resulting from the body's impaired capacity to control blood glucose because of inadequate insulin synthesis or cellular resistance. The cause of diabetes mellitus is multi-factorial and includes both genetic and environmental determinants of diet and lack of exercise. Diabetes mellitus carries a significant risk of serious sequel, including cardiovascular and renal disease, and thus represents an important target for early intervention. To address this, we suggest an innovative new system, "Enhancing Smart Diabetes

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Prediction Through Machine Learning Algorithms," that proactively determines a participant's diabetes risk by applying sophisticated machine learning. The system consists of a fully responsive front end developed using HTML, CSS, and JavaScript that is fully integrated with a powerful Python/Flask back-end that contains and runs two potent predictive models: the CatBoost Classifier and the LightGBM (LGBM) Classifier. Built and trained with an enriched set of relevant and associated clinical and demographic indicators, this tool takes important patient inputs of age, BMI, glucose and HbA1c concentrations, pregnancy, and previous heart disease, and smoke and hypertension—along with applying algorithms to analyze data comprehensively and provide an accurate risk estimate. Overall, this efficient and extensible predictive system will emerge as a valuable resource within clinical, hospital, and public health environments and aid health care professionals with individualized management of patients, anticipatory decision-making, and substantially better health outcomes by way of earlier diagnosis.

284. SMART UNDERGROUND CABLE FAULT DETECTION USING IOT

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Underground power cables are widely used in mod- ern power distribution systems due to their improved safety, reliability, and reduced visual impact compared to overhead lines. However, identifying faults in underground cables is a difficult and time-consuming process because the cables are buried beneath the ground, making manual inspection challeng- ing. Faults such as short circuits, open circuits, and insulation failures can occur due to environmental factors, aging of cables, or mechanical damage, which may lead to power interruptions and increased maintenance costs. This paper presents a Smart Underground Cable Fault De- tection System Using Internet of Things (IoT) to enable efficient monitoring and rapid identification of cable faults. The proposed system utilizes sensors and a microcontroller to detect abnormal electrical parameters and determine the location of faults in underground cables. The collected data is transmitted through an IoT communication module to a cloud-based platform, allowing real-time monitoring and instant notifications to maintenance personnel. The proposed solution improves the accuracy and speed of fault detection, reduces manual effort, and enhances the relia- bility of underground power distribution networks. The system offers a cost-effective and scalable approach for smart monitoring and maintenance of underground cable infrastructure.

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285. AI-BASED TOOL FOR EARLY DEMENTIA DETECTION USING ELECTROENCEPHALOGRAPHY SIGNALS

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Since dementia is a gradual neurological condition marked by a decline in memory, attention, and executive function, early and objective screening is essential. Neuropsychological testing and neuroimaging, which are expensive, time-consuming, and expert-dependent, form the foundation of conventional diagnosis. A low-cost, noninvasive option with great temporal resolution is electroencephalography, where spectrum alterations indicate cognitive impairment. The EEG-based screening framework NeuroDementia-AI, which combines signal processing, machine learning, visualization, and web deployment, is presented in this research. After segmenting EEGLAB recordings into predefined windows and extracting spectral features, an efficient XGBoost classifier distinguishes between patterns associated with dementia and those that are healthy. 98.8% segment level accuracy is attained by the system. Scalp topography maps, spectrograms, and raw signal graphs all improve transparency. EEG upload, visualization, automatic screening, and reporting are all supported by a Streamlit interface.

286. IOT-BASED SLIPPERY FLOOR DETECTION AND MONITORING SYSTEM

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The existence of slippery floors due to moisture, spillages, cleaning fluids, or due to humidity in the environment are the leading causes of indoor accidents in commercial buildings, hospitals, industries, and even in public areas. Manual inspection systems are very ineffective and do not guarantee real-time inspection of safety. The paper provides an IoT- based Slippery floor Detection System, which continuously monitors the level of moisture, possible slippery floors, and notifies the facility managers via a cloud-based dashboard. It is based on distributed moisture and slip-detection sensors combined with microcontrollers, wireless connectivity modules and cloud database. A web-based dashboard will help users have real-time visualizations of the level of moisture, sensor health, alert, and environmental conditions. The prototype is shown to have responsive detection, correct classification of hazards, and alerts with low latency. Findings establish that monitoring through IoT enables a better floor safety system, less manual control and more accident prevention in smart buildings.

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287. A TYPE-AWARE STATIC FIREWALL ARCHITECTURE FOR SECURING SENSOR DATA IN IOT NETWORKS

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The Internet of Things (IoT) is expanding quickly, which is generating a lot of sensor data and posing several security vulnerabilities for IoT networks.
The traditional firewall does not understand the semantics of sensor data, which mostly handles packet headers. Attacks in the modern era that involve data field modificati on which are beyond the capabilities of the conventional firewall. The Type-Aware Static Firewall Architecture, a rule-based firewall architecture that can evaluate, categorize, and validate sensor data based on their type rather than network factors, is proposed in this study. The suggested firewall filters out malicious, corrupted, and contextually incorrect sensor data using a lightweight rule engine, protocol parsing, and type validation criteria. In comparison to conventional firewalls, the suggested firewall exhibits great accuracy with few false positives and low processing cost when tested using simulated IoT traffic. The proposed firewall architecture is highly efficient in improving IoT network resilience with low maintenance costs and can be used in edge, fog, and gateway-based IoT applications.

288. LECTUREMATE: AN AI LECTURE SUMMARIZER

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Thus, this proliferation of learning material in the form of video and audio leads to a phenomenon called information overload in the students. The traditional way of passive learning leads to inefficient retention of knowledge in the brains of these students. The following study proposes a system called LectureMate, an integrated approach that combines the use of AI to develop a system that will make raw audio/video of lectures into actionable study material. With the cascading system approach, the proposed system plans to use the whisper model to generate an accurate ASR system to generate a complete transcript of the audio/video, and then this will undergo drafted by the LLaMa 3.1 large

language model in the Groq API to create summaries, notes, and quizzes to generate complete summaries, in-depth notes, and customized knowledge check tests. It will also support an individual digital filing system. Throughout this study, an in-depth explanation will be established that will prove the system's effectiveness in optimizing post-learning efficiency and promoting an element of active learning.

289. DEEPCHECK: CROSS MODALITY FAKE DETECTION FOR AUDIO-VISUAL MEDIA: A COMPREHENSIVE LITERATURE REVIEW

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Since deepfake technology is becoming increasingly prevalent in online material, it poses a significant danger to digital authenticity. While there are several detection systems, the most are still limited to single-modality analysis, which limits their efficacy across a variety of media formats. Neural networks, such as Generative Adversarial Networks (GANs), Autoencoders, and Diffusion Models, are a major component of current deepfake creation and detection techniques. Real-world performance is frequently hampered by overfitting, poor generalization across datasets, and inconsistent findings when applied to dynamic Multimedia Content Creation environments, even though several platforms report accuracy surpassing 95%. The limitations of single-modality algorithms and typical hazards such dataset overfitting and domain shift are highlighted in this thorough overview of state-of-the-art deepfake detection. Significant developments in adversarial defense tactics, robust feature extraction, object identification, speech recognition, and new real-time deepfake forensics systems are also examined. Building on these discoveries, this work presents DeepCheck—Fast and Reliable Deepfake Detection, a next-generation multi-modal platform that can analyze speech, video, audio, and image-based information. DeepCheck offers a fast, dependable, and all-encompassing method for detecting and reducing quickly changing deepfake risks across a variety of content modalities.

290. AN EXPLAINABLE MACHINE LEARNING FRAMEWORK FOR CYBER ATTACK CLASSIFICATION AND DEFENSE STRATEGY OPTIMIZATION

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The Cyber Attack Detection and Simulation Dashboard is an AI-powered web tool that focuses on sophisticated machine learning for analysis, categorization, and modeling cyberattack scenarios. To generate effective and extremely precise attack classification, the ensemble learning system combines several high-performance classifiers (XGBoost, LightGBM, Random Forest, Gradient Boosting, and MLP / Neural Network) into a single classifier. The model achieves the maximum accuracy, as evidenced by a perfectly diagonal confusion matrix and excellent classification metrics, after being trained on a balanced and feature-rich synthetic dataset that includes three primary attack types: DDoS, intrusion, and malware. In order to extract valuable information from system logs and network traffic features, the application&s overall structure includes comprehensive data pre-processing stages such target encoding, feature scaling, and advanced feature engineering. The program may also identify crucial elements that influence the model&s predictions, like anomaly score, destination ports, and packet length statistics, by using SHAP-based parameter importance. In addition to its visibility capabilities, the dashboard has attack simulation modules and defense analysis that visualize the diversity of attack methodologies, attack duration, evasion techniques, and likely effectiveness of countermeasures. The dashboard developed in Streamlit allows for interactive data visualization using Plotly and Seaborn, thereby ensuring the user knows how the model behaves, threat success, and the effectiveness of defense systems. This intelligent platform acts as a decision-support tool for cybersecurity, providing organizations a means to assess their vulnerabilities, evaluate defensive approaches, and project the likelihood of agile cyber-attack behaviors based on data.

291. GUIDE: A QUANTITATIVE FRAMEWORK FOR EVALUATING AI COLLABORATION PROFICIENCY IN SOFTWARE ENGINEERING CANDIDATES

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The rapid adoption and integration of LLMs and AI agents into the workflow of software engineering has identified the critical skill gap that the traditional skill evaluation methodologies fail to account for in the hiring process. This paper presents GUIDE, a five-pillar quantitative skill evaluation framework that is proposed to be used to determine the level to which the skill set of the candidate aligns with the capability to collaborate with AI agents in the context of human–AI teams. The five pillars that the GUIDE framework is based on are the capability to break down goals into smaller objectives, the capability to efficiently utilize the AI prompting mechanism, the capability to iteratively improve the outputs generated by the AI, the capability to detect and validate errors, and the capability to generate high-quality end results through the human–AI collaborative mechanism. The paper presents the design and the structure that the GUIDE framework is based on and the proposed weighted scoring mechanism that can be used to determine the skill set of the candidate in the context of the Software Engineer (SWE) role.

292. A SELF-HEALING AIOPS FRAMEWORK FOR INTELLIGENT LOG ANOMALY DETECTION AND AUTOMATED REMEDIATION

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AIOps driven self-healing framework which eliminates the need for manual tracing and rule-based monitoring by completely automating the logging analysis, anomaly detection, explanation, and incident remediation using machine learning and AI-based reasoning. The system continually gathers application logs, preprocesses and categories them Info, Warning, Error, and Critical levels, and applies supervised machine learning models like Random Forest Classifier to identify anomalous patterns. The latest techniques of AI transparency and trust, namely Explainable AI (XAI), are used to automatically generate human-readable explanations for each detected anomaly. Aside from the fact that the framework automaticity also add to the achievement besides the following are the non-exhaustive list of some of the predefined self-healing actions including service restarts, resource cleanup, alert notifications that the framework automatically triggers after an anomaly is detected, thus minimizing system downtime and operational overhead. Streamlit which is a real-time dashboard application is used to visualize logs, anomalies, explanations, and executed actions in a way that provides full observability of the system. Deployment of simulated high-frequency logs and representative real-world patterns in the settings has led to a substantial rise in the detection accuracy, a shortening of the incident response time and an overall increase in system reliability as evident from the experimental evaluation. The framed AIOps is the showpiece of practicality for theoretical concepts on the way to intelligent, autonomous, resilient IT systems.

293. WIRELESS APPLICATION CONTROL USING HAND GESTURES

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Hand gesture recognition has emerged as one of the research fields that has revolutionized development of human-computer interaction (HCI) with capacities to handle digital applications by an intuitive and effortless handling of digital devices using hand gesture manipulations. Before now, technologies utilize deep learning, motion-history images and 3D spatiotemporal models to learn better gesture recognition in diverse settings [1][2][7][9]. Though the existing literature has shown successful application of gesture based control of media devices, PowerPoint presentation control, and system controls with CNNs and motion- based properties [3][4][5][6], most of the systems continue to be plagued by environmental sensitivity, hardware dependence, and system-specific constraints. To overcome these challenges, the suggested system will consider a gesture recognition architecture with webcams to recognize the repetitive hand gestures precisely and apply them in real-time to control media, move slides, or manage applications with the model built on CNN and VGG-16 architectures without the need of any special hardware. Based on a tailored dataset, and with preprocessing pipeline, the system fosters accessibility, detached latency, and a properly designed framework accessible to a variety of applications such as, but not restricted to, smart environments, assistive technologies, and day-to-day user interfaces.

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294. OFFLINE VOICE ASSISTANT USING VOSK MODEL

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Cloud-based voice assistants such as Amazon Alexa and Google Assistant have significantly improved human–computer interaction by enabling natural voice-based control. However, these systems rely heavily on continuous internet connectivity, which limits their usability in low-network environments and raises privacy concerns due to data transmission to remote servers. This paper presents an offline voice assistant using the Vosk speech recognition model to enable reliable voice interaction without internet dependency. The proposed system processes audio locally by converting speech to text using lightweight pre-trained acoustic models and executes commands directly on the device. The architecture includes modules for audio capture, speech recognition, lightweight intent extraction, and command execution for tasks such as application launching and system control. Experimental evaluation indicates that the system achieves an average word error rate of approximately 8–12% under test conditions, with response times in the range of 150–250 ms depending on device performance. Since all processing is performed locally, the system reduces latency and improves user privacy while maintaining consistent performance in offline environments. The results demonstrate that efficient and practical offline voice assistants can be developed using lightweight on-device models, making them suitable for privacy-sensitive and connectivity-limited scenarios.

295. IOT BASED WATER QUALITY AND CONTAMINATION CONTROL DEVICE

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Clean water access is a global challenge which becomes worse because of industrial and agricultural contamination. The research presents an intelligent system which provides real-time monitoring and forecasting capabilities through its low-cost solution while IoT systems struggle with predictive functions and manual testing processes move at a slow pace. The hardware system uses an ESP32 microcontroller together with multi-sensor equipment to measure pH and Turbidity and TDS and Temperature and Flow. Data transmission happens through the Wi-Fi/GSM which will send information to ThingSpeak server for historical storage and Blynk for displaying the real-time data. The project introduces an innovative Machine Learning layer which uses Scikit-learn and TensorFlow to identify anomalies. The system uses data analysis methods to predict contamination events which initiate automatic notification through Telegram and SMS messages. The prototype shows accurate sensor measurements which deliver notifications at the right time to enable water management beyond basic monitoring functions. The system provides a scalable solution which helps achieve SDG 6 (Clean Water and Sanitation) by using smart automated systems to decrease health hazards.

296. AI BASED QUESTION PAPER GENERATOR

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Question papers making in formal academic examination is a very vital responsibility which falls upon the teacher; however, it is usually a tedious task that requires a lot of manual work and a lot of planning. When preparation is done manually, there is a likelihood of redundancies being created, uneven difficulty curves and limited diversity in studied examinations. To counteract these shortcomings, the current study proposes a web-based system QGen, an actually artificial intelligence-supported system that is designed to facilitate the process of drafting question-papers by the educators. This system allows

teachers to drag teaching content (documents, pictures, plain text, etc.) and to set up test standards such as topics of interest, type of questions and the level of difficulty. The system uses these inputs to generate question sets in preliminary form and answer keys as well. Teachers can later review and revise the generated materials before the ultimate approval hence maintaining academic integrity. The main objective of the system is to make the process of creating question papers more effective and at the same time not to spend too much money on authors to provide the teachers full control over the final work. The available information on preliminary deployment evidence is an indication of a reduction of the preparatory time and the resultant questions remain consistent with the provided curriculum material.

297. INTELLIGENT VIDEO SURVEILLANCE FOR MONITORING INDUSTRIAL SAFETY COMPLIANCE

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The safe working conditions of workers in the industrial environment that is usually messy and has varying lighting conditions is a continuous challenge, and the non-compliance behavior with the rule is often slight and can be challenging to detect by traditional methods of monitoring. This paper presents a vision-based system that is aimed at proactive safety management through the integration of real-time detection and prediction of potential risks. The system takes the customized YOLOv8 model to detect personal protective equipment (PPE) and unauthorized zone entries which is supplemented with an image enhancement module that improves the detection accuracy of the system in low-light situation by 22.3%. Moreover, a Gradient Boosting predictor considers historical data of incidents to forecast the areas of high risks and allows preemptive intervention. When compared to the models, including YOLOv5 and YOLOv7, the suggested framework achieved a mean Average Precision (mAP@0.5) of 91.6 percent, and their performance at 46-50 frames per second proved that the proposed framework is effective and reliable in active safety management in dynamic industrial conditions.

298. STARTUP FEASIBILITY OPTIMIZATION ENGINE

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Entrepreneurial decision-making is often challenged by limited access to reliable market intelligence, subjective evaluation methods, and the lack of structured data-driven validation during early planning stages. Although recent AI- based advisory systems employ generative models to provide business recommendations, many of these approaches rely primarily on language generation and are therefore not grounded in measurable market evidence. To address this limitation, this study introduces an AI-powered startup feasibility and business recommendation platform designed as a hybrid decision-support system. The framework integrates statistical analysis, semantic understanding, and generative reasoning within a unified architecture. The system consists of two primary components: a constraint-driven business recommendation module and a venture feasibility analysis pipeline. Large-scale Amazon and Yelp review datasets are processed offline to derive industry-level intelligence indicators such as demand patterns, sentiment trends, competition intensity, and potential risk factors. A transformer-based semantic matching module aligns user-defined startup ideas with relevant industries using embedding representations and cosine similarity. Venture feasibility is evaluated using a weighted analytical scoring model, after which a Large Language Model (LLM) produces grounded strategic insights including SWOT analysis and actionable recommendations. Experimental evaluation suggests improved contextual alignment, reduced hallucination tendencies, and more structured decision-support outputs compared with purely generative AI approaches. Overall, the proposed hybrid framework demonstrates a scalable method for combining deterministic analytics with generative intelligence in entrepreneurial decision-support applications.

299. REAL-TIME HYBRID DROWNING ALERT SYSTEM

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Drowning has been reported to be one of the most prevalent accidental causal factors of death in the world and it usually takes place quietly over a few moments time and thus detection is very important. Conventional forms of monitoring are highly involved in the use of lifeguards whose work can be spoilt by tiredness, distractions and restricted field of view. In this paper, the author introduces a real-time hybrid drowning detector system that combines the behavioral analysis using computer vision with the wearable sensors used to perform physiological monitoring. Deep learning techniques are applied to detect the drowning-related motions in the visual module of the systems based on the overhead camera feeds, and the wearable module continuously measures the heart rate, blood oxygen level (SpO2), and motion data. A decision-level data fusion system is used to integrate the results of the two modules to enhance detection and minimize false alarms. The system is executed with the help of a Raspberry Pi/edge device and experimented with simulated swimming conditions. Experimental findings demonstrate that the hybrid method is more reliable with a high rate of detection and low latency. The system offered here offers an affordable and scalable way of improving safety in swimming pools and aquatic life. Drowning is a significant people problem with annual deaths of thousands throughout the globe. Global health reports indicate that a lot of drowning cases are done in the swimming pools, water parks, and recreational centers. Drowning also tends to be silent and occur in a few 20-60 seconds, unlike other emergencies, which makes it extremely hard to detect it in time. The traditional pool safety relies primarily on the guards. Human monitoring however possesses a few drawbacks including the problem of fatigue, short attention span, blind spot, and interference caused by the environment like glare and water reflections. These aspects could slow down the response rate and expose them to risk. Recent progress in the Artificial Intelligence (AI) and the Internet of Things (IoT) makes it possible to create automated safety systems. The visibility of systems can be used to track the movement of the swimmer and wearable devices can monitor the physiological parameters. Nevertheless, a single method of operation of the system may have false alarms or signals overlooked. To address these shortcomings, this paper suggests a hybrid drowning detection system, which is a combination of AI-based visual surveillance and wearable sensor data. The task is to make it more accurate, minimize false positives and offer real-time notifications in order to rescue more quickly.

300. RANVIZ RANSOMWARE VISUALIZATION AND CLASSIFICATION

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The main idea of this project is to look at patterns that happen over time in sequences of API calls. This will help us build a system that can find ransomware in time. We present to you a system which we have made to act as it is performing API calls. We do not in fact run any harmful code. Instead what we have done is made the system to play the role of what ransomware does and also what a user does while they are using the system. The system is at all times watching over what is going on and is equipped with a machine learning model to determine what is bad and what is not. We use the machine learning model to study what the system is doing at that moment and to determine if the action is malicious or is that of a regular user. We are trying to create a system which can tell us of ransomware presence as it happens in real time. The system is simple to use thanks to a Tkinter-built graphical user interface that provides activity simulation, secure login capabilities, and immediate classification results. Genuine API behavior logs from a publicly accessible dataset are used to train the detection model, guaranteeing realistic learning patterns. All things considered, the system mimics ransomware behavior in a secure setting and demonstrates improved detection performance in comparison to conventional techniques.

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