



Indian Council for Research and Development (ICRD)

(A Unit of SK Research Group of Companies)

In Association with



SKRGC ACADEMY

**(A Unit of SK Research Group of Companies)
(Recognised by Government of India & Ministry of MSME & MHRD)**

INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE FOR FUTURE EDUCATION

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The Indian Council for Research and Development (ICRD) is a prominent research and development body dedicated to fostering innovation, advancing knowledge, and contributing to the scientific and technological progress of India. As a key unit of the SK Research Group of Companies (SKRGC) and a critical part of the SKRGC Academy, ICRD serves as a platform for interdisciplinary research and education, promoting an ecosystem of excellence in diverse fields including science, technology, healthcare, engineering, and social development. Founded with the vision of driving research that addresses global challenges, ICRD collaborates with academic institutions, industries, and government bodies to create cutting-edge solutions. The council's focus is not only on conducting world-class research but also on facilitating the development of human capital and encouraging a culture of continuous learning and innovation. ICRD is committed to bridging the gap between theoretical knowledge and practical application, empowering individuals and organizations to solve real-world problems. Through its partnership with SKRGC Academy, it offers a range of educational programs, workshops, and training sessions that aim to equip the next generation of leaders, researchers, and professionals with the skills and expertise needed to thrive in a rapidly evolving world. With a strong foundation built on values of integrity, excellence, and sustainability, the Indian Council for Research and Development continues to lead in pioneering research and development initiatives that contribute to India's global standing in the world of science and technology.

ABOUT THE ACADEMY

SKRGC Academy, a proud initiative of the SK Research Group of Companies, is a center of excellence committed to advancing education, research, and professional development. Established with the vision of bridging the gap between academia and industry, the academy provides a vibrant platform for students, researchers, and faculty to expand their knowledge and skills. The Academy organizes national and international conferences, faculty development programs, workshops, internships, training sessions, and journal publications, ensuring holistic growth and exposure to global standards. By fostering innovation, collaboration, and leadership, SKRGC Academy empowers learners to achieve academic excellence while preparing them to face real-world challenges with confidence. With its strong focus on quality, creativity, and continuous improvement, SKRGC Academy stands as a trusted destination for knowledge seekers and professionals aspiring to make a meaningful impact in their chosen fields.

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THE RISE OF AI IN HEALTHCARE: REVOLUTIONIZING MEDICINE AND PATIENT CARE

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Abstract

Artificial Intelligence (AI) is rapidly transforming healthcare by enhancing diagnostic accuracy, personalizing treatment, accelerating drug discovery, and improving patient monitoring. AI technologies, such as machine learning, natural language processing, and predictive analytics, are enabling earlier disease detection, more efficient care delivery, and more targeted therapies. In addition, AI is reshaping clinical workflows, assisting with administrative tasks, and providing virtual health support. However, the integration of AI in healthcare raises challenges, including data privacy, algorithmic bias, and the need for trust and transparency in medical decision-making. Despite these hurdles, the continued advancement of AI offers the potential to revolutionize healthcare, improving patient outcomes and global access to care. As AI technology evolves, its collaboration with human healthcare providers will be crucial to realizing its full potential.

Keywords: Artificial Intelligence (AI), Machine Learning, Healthcare Technology, Diagnostic Accuracy Personalized Medicine, Predictive Analytics, Natural Language Processing (NLP), Drug Discovery, Medical Imaging, Virtual Health Assistants, Robotic Surgery, Clinical Decision Support, Healthcare Innovation, Data Privacy, Algorithmic Bias, Patient Monitoring, Health Data Security, Digital Health, Healthtech, Healthcare Automation, Precision Medicine

Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative forces in healthcare. With the increasing availability of data, computational power, and advanced algorithms, AI is opening new frontiers in diagnosing diseases, personalizing treatment plans, improving operational efficiency, and enhancing patient outcomes.

As the healthcare landscape evolves, AI technologies are rapidly becoming integrated into everyday practices, showing immense potential to revolutionize how we prevent, diagnose, treat, and manage diseases.

Key Areas where AI is making an Impact

1. Diagnostics and Early Detection

One of the most significant contributions AI has made in healthcare is its ability to assist in diagnosing diseases more accurately and at an earlier stage. For instance, AI-powered image recognition systems can analyze medical imaging data (like X-rays, MRIs, and CT scans) with remarkable accuracy. These systems can detect abnormalities that might be overlooked by human doctors. In fields such as oncology, AI tools are being used to identify early signs of cancer, improving the chances of successful treatment. A notable example is AI's role in breast cancer detection, where AI systems like Google's DeepMind have demonstrated the ability to outperform human radiologists in identifying cancerous tumors in mammograms.

2. Personalized Medicine

AI is playing a key role in the customization of healthcare treatments to suit individual patients. By analyzing vast amounts of data, including genetic information, medical history, and lifestyle factors, AI algorithms can predict which treatments are most likely to be effective for a particular patient. For example, AI models can help oncologists decide on the best course of treatment for cancer patients based on the molecular makeup of their tumors, leading to more targeted therapies that are both effective and less toxic.

3. Drug Discovery and Development

The process of developing new drugs is notoriously long, expensive, and fraught with risk. AI is accelerating this process by predicting how different compounds interact with biological systems, reducing the time it takes to find viable candidates for clinical trials. Machine learning algorithms can also analyze vast datasets to identify promising drug molecules, and AI can simulate how they might perform in the human body. During the COVID-19 pandemic, AI-driven approaches were used to identify existing drugs that could be repurposed to treat the virus, fast-tracking the discovery process.

4. Predictive Analytics for Patient Monitoring

AI is increasingly being used for continuous monitoring of patients, particularly those with chronic conditions like diabetes, cardiovascular disease, or COPD (chronic obstructive pulmonary disease). Wearable devices and sensors collect real-time health data, which AI algorithms analyze to predict potential health complications before they occur. For example, AI models can analyze heart rate variability, blood glucose levels, or oxygen saturation levels to predict and prevent serious events like heart attacks or diabetic crises.

5. Natural Language Processing (NLP) in Clinical Documentation

AI-powered natural language processing tools are helping doctors manage the overwhelming amount of documentation required for patient care. By transcribing and interpreting voice recordings and written notes, AI allows clinicians to spend more time with patients and less time on administrative tasks. These tools can also extract critical information from medical records to aid in decision-making, ensuring that physicians have access to all relevant data when making a diagnosis or treatment plan.

6. Virtual Health Assistants and Chatbots

AI-powered chatbots and virtual assistants are becoming an essential part of patient care. These digital assistants can provide patients with instant answers to medical questions, offer advice on managing chronic conditions, and even help with appointment scheduling. They are also improving healthcare accessibility by providing round-the-clock assistance to patients who may not have immediate access to healthcare providers. In mental health, AI-driven chatbots such as Woebot are offering therapy-like interactions, helping people manage stress and anxiety by providing cognitive-behavioral therapy (CBT) techniques and emotional support.

7. Robotic Surgery

AI is also transforming surgical procedures. Robotic surgery systems, such as those used in minimally invasive surgeries, are increasingly relying on AI to guide precise movements and improve the overall safety of procedures. These systems can analyze patient data and provide real-time feedback, allowing surgeons to make better decisions during operations. Robotic systems, like the Da Vinci Surgical System, have been used to perform complex surgeries with greater precision, smaller incisions, and faster recovery times.

Challenges and Ethical Considerations

Despite the immense potential of AI in healthcare, its integration is not without challenges. One of the biggest hurdles is ensuring that AI systems are transparent, explainable, and free from bias. If AI models are trained on biased data, they can perpetuate disparities in healthcare outcomes. For example, an AI system trained mostly on data from one demographic group might not work as well for others, potentially exacerbating inequalities in healthcare. Privacy and data security are also major concerns. As healthcare increasingly relies on vast amounts of sensitive patient data, the need for robust cybersecurity measures becomes more urgent. Ensuring that AI systems comply with health data regulations, such as HIPAA in the U.S. or GDPR in Europe, is critical. Moreover, there is the issue of trust. Patients and healthcare providers need to trust AI systems and understand their limitations. AI is not meant to replace human doctors, but rather to augment their capabilities. A partnership between AI and medical professionals is crucial to ensure the best patient outcomes.

The Future of AI in Healthcare

The future of AI in healthcare is full of promise. As technology continues to evolve, AI systems will become more sophisticated, accurate, and capable of solving increasingly complex medical challenges. The convergence of AI with other emerging technologies like genomics, robotics, and 3D printing will likely result in even more innovative healthcare solutions. AI could ultimately enable more precise, efficient, and personalized healthcare at a global scale, improving access to quality care and outcomes for patients around the world. However, its widespread adoption will require continued research, regulatory oversight, and collaboration between tech developers, healthcare providers, policymakers, and patients. In conclusion, AI is poised to redefine the healthcare industry. While challenges remain, its potential to improve patient care, optimize resources, and drive medical innovation is undeniable. As we move toward a more digitally integrated healthcare system, AI will undoubtedly play an essential role in shaping the future of medicine.