



International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.206

Volume 8, Issue 6, June 2025



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

AI and IOT-Based Healthcare

Ishwar T

PG Student, St Joseph Engineering, Vamanjoor, Mangalore, India

ABSTRACT: The convergence of Internet of Things (IoT) and Artificial Intelligence (AI) holds immense promise in revolutionizing healthcare assistance. Leveraging a multitude of sensors, IoT devices collect a diverse array of patient data, encompassing fitness metrics, medical reports, and health activities. AI processes this information to bolster the precision of patient assistance. Through a dedicated healthcare mobile application, this data is seamlessly transmitted to the cloud, where optimized machine learning techniques are applied. Recent technological advancements, including IoT and 5G, have ushered in a paradigm shift towards personalized healthcare services. The emerging Healthcare 5.0 paradigm focuses on real-time patient monitoring, privacy compliance, and the integration of AI driven technologies. Notably, the state-of-the-art Healthcare 5.0 seeks to address the limitations of prior healthcare systems by considering the interdependent effects of various health conditions on a patient. Within this landscape, Explainable AI (EXAI) emerges as a critical trend, enhancing the interpretability of traditional AI models in healthcare. This survey delves into the requirements of EXAI in Healthcare 5.0, proposing a comprehensive architecture.

I. INTRODUCTION

In the pursuit of global well-being and extended life expectancy, contemporary socioeconomic initiatives, exemplified by the UN Sustainable Agenda 2030, emphasize the pivotal role of technology in healthcare evolution. The emergence of Healthcare 5.0, a digital wellness paradigm, responds to the need for real-time patient monitoring and a new standard for healthcare services. Advancements in IoT technology stand out as a catalyst, facilitating seamless data transfer and communication in various applications, particularly in healthcare. By effectively interconnecting devices and objects, IoT sensors have become instrumental in enhancing accessibility to healthcare services, addressing the challenges of chronic diseases and improving diagnostics. The integration of IoT and Artificial Intelligence (AI) is a transformative force in healthcare, as highlighted in various papers. AI-driven platforms, coupled with IoT devices, contribute to personalized and efficient healthcare services, envisioning a future where prevention takes precedence over treatment. The ongoing global health challenges, exemplified by the COVID19 pandemic, underscore the urgency of intelligent healthcare systems. Smart health technologies, encompassing wearables, IoT, mobile Internet, and AI, offer dynamic frameworks for disease prevention, assessment, and patient-centric decision-making. As the world witnesses an increasing number of chronic patients and an aging population, the significance of early disease detection becomes paramount. The fusion of emerging technologies like IoT, Big Data, 5G, and AI creates a comprehensive ecosystem that empowers clinicians and patients alike. The integration of sensors into diverse healthcare systems enables rapid and reliable identification of critical situations, fostering informed patient decisions and advancing medical research. The trajectory of smart healthcare market growth further underscores the transformative potential of IoT and AI in reshaping the future of global healthcare delivery.

II. LITERATURE REVIEW

[1] "HealthFaaS: AI-Based Smart Healthcare System for Heart Patients Using Serverless Computing" by Muhammed Golec, Sukhpal Singh Gill, Ajith Kumar Parlikad, Steve Uhli. The paper "HealthFaaS" addresses the critical challenge of early detection of heart disease, a leading global cause of mortality. Authored by Muhammed Golec, Sukhpal Singh Gill, Ajith Kumar Parlikad, and Steve Uhli, the research leverages state-of-the-art artificial intelligence (AI) to assess the risk of heart disease. Notably, it introduces the HealthFaaS framework, integrating the Internet of Things (IoT) and Serverless Computing to enhance scalability and performance. The framework collects health data through IoT devices, utilizing a Google Cloud Platform-based serverless environment for AI model deployment. The study evaluates and compares five AI models for heart disease risk detection, highlighting the light gradient boosting machine model's impressive 91.80% accuracy. Additionally, the paper assesses HealthFaaS's performance against Quality-of-Service parameters, showcasing its efficiency in throughput and latency, particularly in comparison to non-serverless platforms. The findings underscore the framework's potential to significantly reduce heart disease-related deaths and financial losses through misdiagnoses, showcasing the synergy of AI, IoT, and serverless computing in advancing smart healthcare systems.



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

[2] "Lightweight and Anonymity-Preserving User Authentication Scheme for IoT-Based Healthcare" Mehedi Masud , Gurjot Singh Gaba ,Karanjeet Choudhary, M. Shamim Hossain Mohammed F. Alhamid. In the last few years, the healthcare industry has witnessed significant growth in the wireless medical sensor networks (WMSNs) for IoT. The sensors in WMSN are an essential component for the healthcare applications that allow a better quality of patient care without compromising the comfort, and health. Connecting body sensor networks to the Internet has also improved patients' monitoring in realtime . The monitoring system's primary services are observing key health measurements like the ECG pattern, blood pressure, pulse rate, and respiration rate. As small wearable sensors have come into the picture, combining them with wireless communication technologies has made monitoring even more effective. The advantages of wireless sensor networks include easy access to the patient's medical records and patient mobility, which is highly beneficial. Like any other wireless network, WMSNs are at high risk AI and IoT Based Health Care 2023-24 CEC Department of IS&E Page 3 from eavesdropping, tampering, and impersonation attacks. The information exchanged in the healthcare applications is critical; a little malicious activity by an adversary could endanger the patient's life. The security of the data transmitted through open public channels is the main issue that needs to be addressed.

A Comprehensive Survey of IoT and AI-Based Smart Healthcare

Fatima Alshehri, Ghulam Muhammad. This paper conducts a thorough exploration of the intersection between the Internet of Things (IoT) and Artificial Intelligence (AI) in the realm of smart healthcare. Addressing the escalating challenges posed by an increasing number of chronic patients and an aging population, the study emphasizes disease prevention and early detection. With the onset of COVID-19, the significance of eHealthcare and intelligent healthcare systems has been underscored, emphasizing the need for comprehensive and accurate diagnostic capabilities. The global smart health market's forecasted growth, reaching USD 143.6 billion in 2019 with a projected 16.2% average growth rate between 2020 and 2027, highlights the industry's momentum. Smart healthcare, leveraging wearable devices, IoT, and the mobile Internet, unfolds as a dynamic framework encompassing disease prevention, assessment, healthcare management, patient decision-making, and medical research.

Reliable and Resilient AI and IoT-Based Personalised Healthcare Services

A Survey" by Najma Taimoor and Seemeen Rehman. This paper explores the transformative landscape of healthcare, propelled by recent technological and economic developments. The convergence of Internet of Things (IoT) and artificial intelligence (AI) has ushered in a new era of personalized healthcare services. While current personalized healthcare focuses on technological gadgets in specific environments, it falls short in addressing interrelated health conditions, impacting longterm patient wellbeing. Introducing Healthcare 5.0, the paper envisions a fully autonomous healthcare service considering the intricate interdependencies of diverse health conditions. The survey comprehensively outlines key requirements for Comprehensive Personalized Healthcare Services (CPHS), delving into a three-layer architecture for IoT-based healthcare systems. Emphasizing both AI and non-AI-based approaches, the paper evaluates their strengths and weaknesses within the context of personalized healthcare. Additionally, it addresses security threats in IoT architecture layers, proposing AI and non-AI-based solutions. The paper concludes by proposing a methodology for developing reliable, resilient, and personalized healthcare.

Explainable AI for Healthcare 5.0

Opportunities and Challenges" by Fatima Alshehri, Ghulam Muhammad. This paper conducts a thorough exploration in healthcare 5.0, medical science technology foresees the interconnection of millions of IoT-based sensors that would communicate data through fifth-generation (5G) network infrastructure to provide digital wellness, smart healthcare and improved healthcare metrics. 5G and IoT combined with AI form a scenario where smart mobile wearables are integrated with mobile communication and medical technologies for easy and remote healthcare delivery. Advanced IoT devices attached to patients collect medical vitals, monitor progress, and diagnose health conditions to the doctor/medical institutions without significant human interaction. 5G in IoT promises 10 Gbps throughput, < 10ms latency, secure future communications, increased cellular coverage, enhanced network performance, and enhanced battery lifetime by almost 90%. AI algorithms, like convolutional neural networks (CNN) or deep neural networks (DNN).



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Author	Title	Tools/Methods used
[1] Muhammed Golec, Sukhpal Singh Gill, Ajith Kumar Parlikad, and Steve Uhlig	HealthFaaS: AI-Based Smart Healthcare System for Heart Patients Using Serverless Computing	Feature extraction followed by machine learning
[2] Mehedi Masud , Gurjot Singh Gaba ,Karanjeet Choudhary, M. Shamim Hossain Mohammed F. Alhamid ,GhulamMuhammad	Lightweight and AnonymityPreserving User Authentication Scheme for IoT- Based Healthcare	Comprehensive analysis
[3] Fatima Alshehri and Ghulam Muhammed	A [3] Fatima Alshehri and Ghulam Muhammed	Systematic review process PRISMA (Preferred Reporting)
[4] Najma Taimoor and Semeen Rehman	ReliableandResilientAIandIoTBase d Personalised Healthcare Services:ASurvey	Autonomous supporting
[5] Deepthi Saraswat, Pronoya Bhattacharaya, Vivek Kumar and Prasad	ExplainableAIforHealthcare5.0: OpportunitiesandChallenges	Form real-time prediction models and business analytics

III. METHODOLOGY OF PROPOSED SURVEY

The methodology to address the challenge of varied capabilities and technical specifications of IoT devices involves developing standardized protocols and interfaces. Establishing industrywide norms ensures seamless interoperability and enhances the overall safety and execution of healthcare IoT. Addressing the challenge of varied capabilities and technical specifications of IoT devices involves developing standardized protocols and interfaces. Establishing industrywide norms ensures seamless interoperability and enhances the overall safety and execution of healthcare IoT. **Managing geographically** dispersed IoT deployments requires the implementation of robust connectivity solutions.

Utilizing technologies like edge computing and distributed networks helps mitigate latency issues and ensures efficient data transmission across diverse locations. Incorporating comprehensive security policies involves defining clear guidelines for data encryption, access control, and device authentication. Regular audits and updates to security protocols are essential to adapt to evolving threats and ensure a proactive approach to healthcare IoT security.

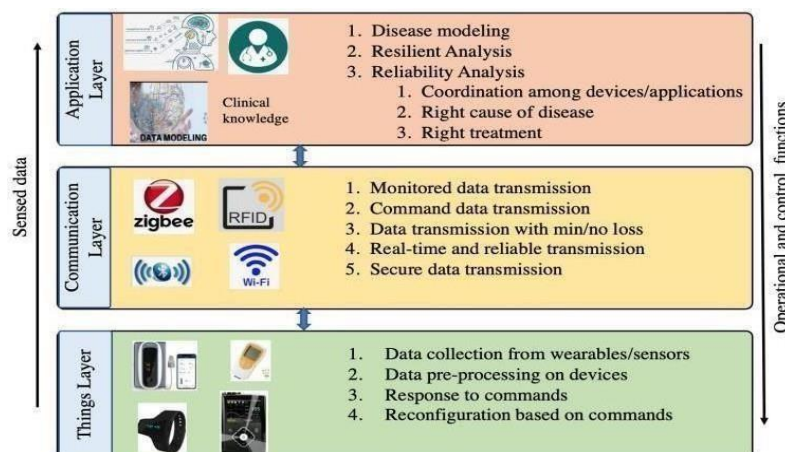


Fig1: IoT system architecture.



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. IMPLEMENTATION

Healthcare systems have evolved significantly, from Medicine 1.0 dependent on highly qualified doctors to the current era of Medicine 5.0, marked by the integration of advanced communication technologies like 5G. This evolution has laid the foundation for a more connected and personalized healthcare approach.

- The implementation involves understanding the historical progression from Medicine 1.0 to Medicine 5.0, emphasizing the role of industrialization, technological advancements, and the emergence of digital wellness in shaping the current healthcare landscape. Healthcare 5.0 focuses on personalization by developing customer models and digital wellness, considering the well-being of individuals beyond just patients. The implementation of Healthcare 5.0 involves integrating intelligent devices, smart microelectronics, and fast transmission technologies to provide personalized healthcare services.
- Given the critical nature of healthcare services, robust security measures are essential. This section outlines security requirements, including confidentiality, integrity, availability, privacy, data freshness, and overall system security. The implementation discusses AI and non-AI-based solutions to address security threats at each layer of the IoT architecture. The implementation plan ensures the development of reliable, resilient, and secure personalized healthcare services, aligning with the identified weaknesses of existing approaches.
- In the fig.2 here we discuss the key features of Healthcare 5.0, emphasizing the role of personalization, customer models, and digital wellness in delivering improved healthcare services.

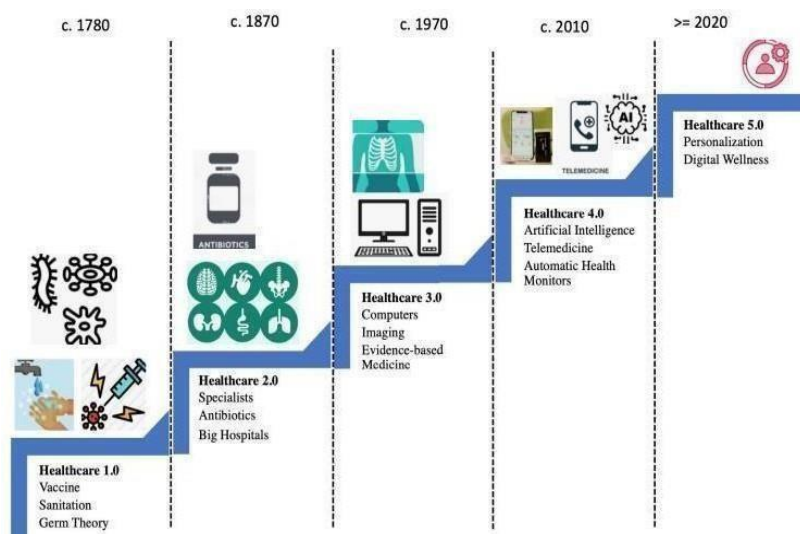


Fig2: Timeline of Healthcare evolution

In fig.1 Healthcare IoT system is layered. Wearable sensors and devices collect patient data (things layer). This data is transmitted via protocols like RFID and Wi-Fi (communication layer). Finally, the application layer analyzes the data, generating responses or commands sent back to the sensors, with the overall goal of providing personalized healthcare through AI and IoT.

V. IMPLEMENTATION

The report underscores the transformative potential residing at the dynamic intersection of Artificial Intelligence (AI) and the Internet of Things (IoT), marking a pivotal juncture for healthcare evolution. Through the fusion of IoT sensors and AI techniques, a paradigm shift towards precision, accessibility, and personalized well-being emerges, aligning with global health improvement initiatives such as the UN Sustainable Agenda 2030 while effectively addressing pressing healthcare challenges. This synergy facilitates the seamless integration of data from diverse sources, including wearable devices and medical sensors, empowering AI-driven algorithms to revolutionize diagnostics, treatment approaches, and real-time



International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

patient monitoring. Beyond technological advancements, this amalgamation promises to redefine healthcare delivery fundamentally, offering solutions to the escalating burden of chronic diseases by enabling early detection, proactive intervention, and enhanced patient outcomes. As modern healthcare landscapes grow increasingly complex, the convergence of AI and IoT emerges as a guiding beacon, illuminating a path towards a future where medical interventions transcend reactivity to become predictive, personalized, and universally accessible. Embracing this convergence not only prioritizes individual well-being but also contributes to the overarching mission of augmenting both the quality and duration of human life. Furthermore, the report underscores the potential of AI-enabled predictive analytics to optimize resource allocation, streamline administrative processes, and improve healthcare delivery efficiency. By harnessing the vast amounts of data generated by IoT devices, healthcare systems can identify trends, forecast patient needs, and tailor interventions accordingly, thus maximizing both clinical and operational outcomes.

VI. CONCLUSION AND FUTURE WORK

Healthcare 5.0, our focus has been on personalized healthcare services, emphasizing their key requirements of reliability, resilience, and personalization. The definition of personalized healthcare services as a relationship among various health conditions, grounded in both biological processes and associated mechanical monitoring systems, forms the foundation for our exploration. Our investigation into the reference architecture of a modern IoT-based healthcare system revealed ongoing efforts to meet these key requirements. However, identified gaps in current research underscore the need for further advancements to develop robust and resilient personalized healthcare systems for the future. Further research is needed to enhance modeling techniques for capturing complex clinical and biological dependencies among various health conditions. This will contribute to more accurate and comprehensive personalized healthcare monitoring. Future work should focus on developing interoperable solutions to ensure seamless coordination among diverse healthcare applications and devices. This will address challenges related to data exchange and system integration.

REFERENCES

- [1] M. Golec, S. S. Gill, A. K. Parlikad and S. Uhlig, HealthFaaS: AI-Based Smart Healthcare System for Heart Patients Using Serverless Computing in IEEE Internet of Things Journal, vol. 10, no. 21, pp. 18469-18476, 1 Nov.1, 2023, doi: 10.1109/JIOT.2023.3277500
- [2] M. Masud, G. S. Gaba, K. Choudhary, M. S. Hossain, M. F. Alhamid and G. Muhammad, Lightweight and Anonymity- Preserving User Authentication Scheme for IoT-Based Healthcare, in IEEE Internet of Things Journal, vol. 9, no. 4, pp. 2649- 2656, 15 Feb.15, 2022, doi: 10.1109/JIOT.2021.3080461.
- [3] F. Alshehri and G. Muhammad, A Comprehensive Survey of the Internet of Things (IoT) and AI-Based Smart Healthcare, in IEEE Access, vol. 9, pp. 3660-3678, 2021, doi: 10.1109/ACCESS.2020.3047960.
- [4] N. Taimoor and S. Rehman, Reliable and Resilient AI and IoT-Based Personalised Healthcare Services: A Survey, in IEEE Access, vol. 10, pp. 535-563, 2022, doi: 10.1109/ACCESS.2021.3137364.
- [5] D. Saraswat et al., Explainable AI for Healthcare 5.0: Opportunities and Challenges, in IEEE Access, vol. 10, pp. 84486-84517, 2022, doi: 10.1109/ACCESS.2022.3197671.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com