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SMART HEALTHCARE EARLY WARNING SYSTEM WITH IOT AND AI

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ABSTRACT
The increasing burden of chronic diseases and the rising demand for timely medical intervention have necessitated the development of advanced healthcare monitoring systems. This project presents a smart healthcare early warning system (ews) that leverages internet of things (iot) sensor integration combined with artificial intelligence (ai) analytics to provide real-time patient monitoring and early detection of critical health conditions. The integration of ai not only improves the system's sensitivity and specificity but also reduces false alarms that can lead to alert fatigue among healthcare providers. This intelligent monitoring approach supports remote patient management, making it suitable for hospitals,home care, and telemedicine applications. Overall, the proposed system offers a scalable, cost-effective solution that addresses current limitations in healthcare monitoring by combining real-time iot data acquisition with advanced ai analytics to improve patient outcomes and optimize clinical workflows.

Keywords:
IoT Healthcare Monitoring, Secure MQTT Communication, AI-Driven Health monitoring

INTRODUCTION

The integration of Internet of Things (IoT) technology with healthcare opens new frontiers in this regard. IoT sensors can collect physiological data such as temperature, heart rate, and oxygen saturation from patients in a non-invasive and continuous manner. Coupling this sensor data with Artificial Intelligence (AI) analytics enables sophisticated processing, predictive analysis, and decision-making capabilities. These smart healthcare systems not only improve patient outcomes by facilitating early intervention but also reduce healthcare costs by minimizing unnecessary hospital visits. The motivation behind this project is to leverage affordable IoT hardware and AI models to build a scalable, reliable, and user-friendly Early Warning System (EWS) that can be deployed in both hospital settings and remote healthcare environments.

OBJECTIVES

The main objective of this project is to design and implement a Smart Healthcare Early Warning System (EWS) that integrates IoT-based sensors and AI analytics to monitor vital health parameters such as body temperature, heart rate, and blood oxygen levels in real-time. The system will utilize ESP8266-based wireless sensor nodes to transmit the collected data to a cloud-based MQTT broker, where it can be visualized, analyzed, and used for generating early health warnings. The integration of AI-based prediction models enables proactive health risk alerts, ensuring timely intervention and improved patient care.

METHODOLOGY

This project adopts an experimental and applied research approach to design, develop, and test a smart healthcare monitoring system capable of predicting early warning signs in patient health parameters. The study integrates hardware sensors, IoT-based data transmission, and AI-based analytics to achieve reliable real-time monitoring and decision support.

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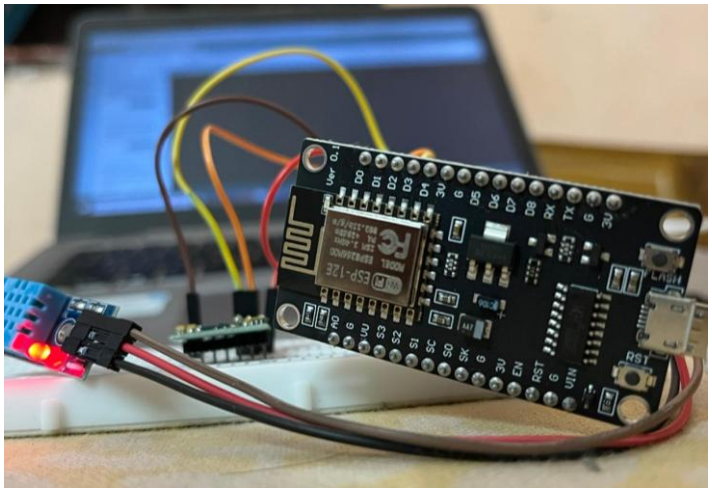

RESULTS AND DISCUSSION

The Secure Healthcare IoT Early Warning System was successfully developed using ESP8266 integrated with DHT11 and MAX30100 sensors. Real-time temperature, humidity, heart rate, and SpO_2 data were transmitted to a HiveMQ Cloud MQTT broker. The data was monitored via Arduino Serial Monitor and a Python-based MQTT subscriber. Threshold-based alerts were generated when abnormal values were detected, confirming reliable sensor interfacing, secure cloud communication, and real-time health monitoring capability.

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CONCLUSION

In this project, a Smart Healthcare Early Warning Systemwith IoT and AI was successfully designed and implemented using ESP8266, DHT11, and MAX30100 sensors integrated via MQTT protocol with real-time monitoring through Python. The system effectively collected temperature, humidity, heart rate, and SpO_2 data, transmitting it securely to the cloud and displaying it on both Serial Monitor and a Python-based interface. Threshold-based alerts provided an initial form of early health risk detection. This work demonstrates the feasibility of integrating IoT, cloud, and AI-driven analytics for proactive health monitoring, with potential for future enhancements such as AI-based predictive alerts and mobile dashboard integration.

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