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IoT Based Medical Assessor and Predictor for HealthCare Solutions

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Abstract: ***The introduction of cutting-edge, intelligent medical equipment into the virtual doctor system is orchestrating a remarkable transformation within community healthcare. Research in the healthcare sector has unveiled promising developments in extending human lifespan. However, obtaining healthcare services in remote areas remains a formidable challenge as patients often have to endure long journeys for treatment. The incorporation of IoT technology offers a viable solution by allowing real-time monitoring of vital signs through sensors like heart rate, Spo2, temperature, B.P and ECG sensors, measuring pulse rate, blood oxygen levels, body temperature, and blood pressure, respectively and applying different machine learning algorithms to predict the condition of the patient and suggest some precautions & medications. The reliability of the collected data is assured, and ThingSpeak software transmits this data to the cloud, enabling the delivery of professional healthcare services to those in need. Notably, statistics reveal that in India, the doctor-to-patient ratio stands at 1:854, underscoring the crucial role of this technology in addressing healthcare requirements in rural communities.***
Keywords: HealthCare, IoT, Cloud, Machine Learning, Sensors.

I. INTRODUCTION

Unhealthy dietary practices and a lack of physical activity contribute to the rise in prevalent health conditions such as lung failure, coronary heart disease, and obesity. These conditions result in an annual death toll of 8.2 million people, underscoring the imperative to address shortcomings in the healthcare system. The objective of this initiative is to ease the burden on healthcare professionals in monitoring patients' well-being by leveraging Internet of Things (IoT) and embedded sensor technology along with machine learning algorithms. Electronic sensors, crucial for diagnosis and patient monitoring, represent an incredibly significant breakthrough in research.

This system utilizes E-sensors, including heartbeat and temperature sensors, for patient diagnosis. However, the expense of separate devices for varied diagnoses and the inefficiency of traditional thermal meters for temperature checks pose challenges. To address these issues, the proposed system introduces gloves as a diagnostic tool, offering a more convenient and cost-effective solution for healthcare providers. The incorporation of a high-performance Arduino microcontroller enhances the overall functionality of the health monitoring system.

Remote monitoring emerges as a viable solution to overcome barriers to healthcare services, extending professional medical support to both urban and rural areas through Information and Communication Technologies (ICT). This system enables doctors to remotely observe and diagnose patients' health conditions, facilitating early detection of preventable disorders.

II. LITERATURE SURVEY

A. A Smart HealthCare Monitor in IoT Based Human Activities of Daily Living

The writers Jose Reena K and R. Parameshwari proposed the system that employs a method that monitors people. For the data derived from various readings from digital meters, there are many data mining technologies in use. Two of the top algorithms for precise prediction and recognition of human behaviours connected to healthcare are the Support Vector Machine (SVM) and Random Forest algorithms. [1]

B. Health Monitoring System Using IoT

Authors A Divya Priya and S Sundar proposed the thing which involves the proper usage of the various sensors which helps to measure body temperature, pulse rate, oxygen saturation level. So that the person who is monitoring the patient can treat him right with immediate effect. If the condition of the patient is too worse than the matter will be escalated to the expert physician [2].

C. E-Health Monitoring System

Authors Aleksander Kotevski, Natasa Koceska and Saso Koceski offered framework for data pre-processing. The vital parameters are considered as a high priority in this model. Patients can look over the prescriptions to get cured at the earliest. They proposed it is best for those who need to track the vital parameters regularly [3].

D. Health Monitoring and Management Using Internet-of-Things (IoT) Sensing with Cloud-based Processing: Opportunities and Challenges

The Authors Challenges Moeen Hassanalieragh, Alex Page and Tolga Soyata audited the healthcare system and integrated the virtual observance of health mechanism and clinical practice of the medication. Well-equipped IoT intelligence-based sensors helps to get the values of vital parameters. The assembly of the data upon analysis are given to the physician for the effective treatment. Data Visualization needs to be contended which helps in the effective integration [4].

E. Use of Cloud Computing with Wireless Sensor Networks in an Internet of Things Environment for a Smart Hospital Network

Authors Nawaf Alharbe, Anthony S. Atkin and Justin Champion assess the consolidation of cloud computing, sensor technology and IoT. The involvement of sensor technology is coming out as a most important thing of future generation real-time health services. They proposed coordinator node to collect the sensor information on the layer called data collection layer [5].

F. Prediction IOT Virtual Doctor Robot for Online Doctor Consultation of Patient Healthcare & Telemedicine

Authors Anuradha M and Vaishnavi Sindhol proposed robot which ease with medical procedure, easily emergency coordinated clinic factors that increases the concentration upon patients. This will be obviously helpful as there is scarcity of physicians [6].

III.PROPOSED SYSTEM

A. Proposed System

1) Assessing a patient's health requires considering multiple health indicators. Instead of using multiple devices to collect data, a single IoT device can accurately gather real-time health data. The proposed solution involves an all-in-one device that combines multiple sensors to collect patients' biological data, which will then be transmitted to the cloud for further processing. Once the data is stored, it will be analysed and processed, and the proposed system will be able to identify significant changes in the patient's health status based on the resulting information.

2) Data Analysis: After collecting the data, it will be transmitted to the cloud for storage, and any changes in the data will be visually represented over time. By examining these graphs, doctors will be able to evaluate patients' response to medication. To access their estimated data via a mobile app, users will need to log in using their credentials. Once they are logged in, they will be redirected to a page that displays their comprehensive estimated data, including limited data, predicted recovery rate, and medication information. The app also provides the option to have a video consultation with a medical professional.

3) Estimating the Recovery rate: The proposed model employs machine learning algorithms to predict patients' recovery rate in real-time based on their health data. The machine learning algorithms are developed using the PYTHON programming language in the Anaconda Jupyter Notebook. The estimated recovery rate is then retrieved and displayed in a BLYNK mobile application. To ensure effective communication between the BLYNK mobile application and the Esp8266 wifi module, an ID selector is generated and included in the code. The ID selector generates a hotspot region that facilitates the communication process.

B. Methodology

1) Describes the methodology employed for catching patient’s health data.
2) Discusses the choice of machine learning algorithms and techniques used for real-time analysis.
3) Vital parameters of the patient will be updated to the cloud along with symptoms.
4) Machine will process the data and predicts the disease and gives the prescription.
5) It monitors the patient till their recovery.
6) If machine fails to predict the disease it will escalate the matter to doctor.
7) At the end of the day, it will generate the report in which it categorizes the patient into severe and mild so that it helps doctor to concentrate on patients whose condition is severe.

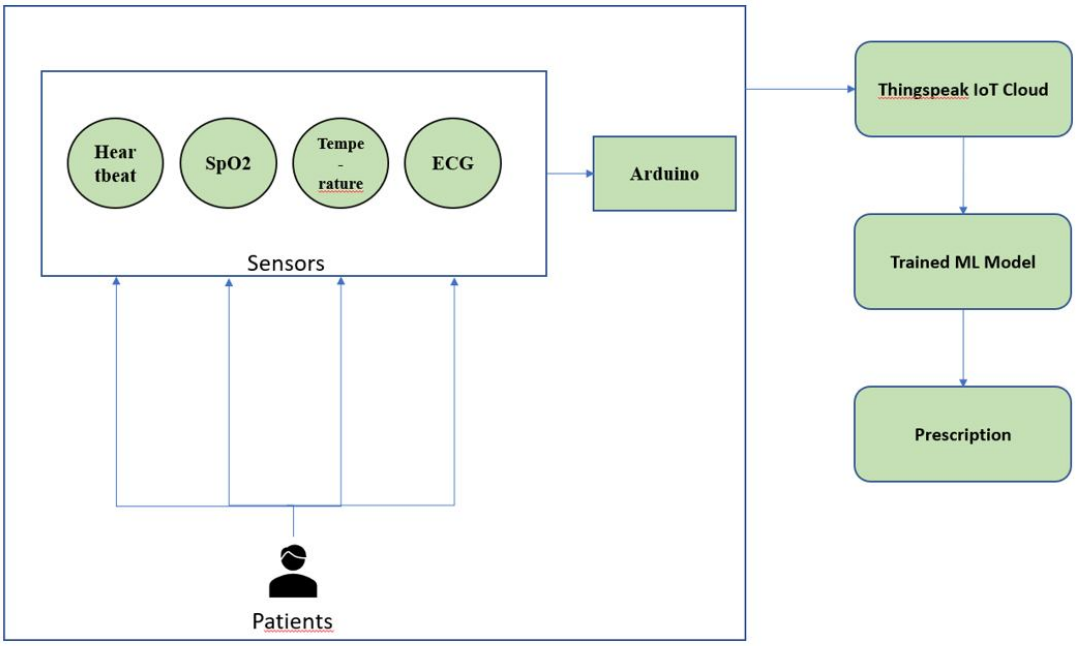

Fig. 2.1 Flowchart of Proposed System

C. Advantages Of Proposed System

1) It is more reliable and accurate.

2) It reduces the time complexity.

3) Prescription will be given immediately after diagnosis.

IV. CONCLUSIONS

The adoption of IoT based Medical Assessor and Predictor for Healthcare Solutions is contingent on addressing numerous challenges, such as patient confidentiality and data security, dependable and precise health monitoring devices, and the requirement for qualified healthcare experts to interpret the data acquired by these systems. The integration of IoT along with machine learning algorithms has the potential to revolutionize the healthcare sector by providing patients with greater access to healthcare services and enhancing the quality of care they receive. However, to ensure successful adoption, it is vital to address the challenges associated with these systems and constantly innovate and improve the technologies supporting their use.

We presented the design and implementation of a Patient Remote Monitoring System based on IoT, wireless automation using a system. As the existing system requires many separate components, we had overcome it by integrating the components into a single unit and even we had overcome with monitoring the patient remotely for 24 hours, in turn it had affected the staff limit. Continuous health parameter monitoring by transferring collected data to the cloud and employing real-time analysis and Machine Learning algorithms will help identify critical health conditions and predict patient recovery rates. The inclusion of a mobile application facilitates seamless data visualization for both doctors and patients, enabling prompt alerts to physicians in case of critical patient conditions. Overall, this system presents a promising solution to improve healthcare monitoring, ensuring timely interventions and proactive healthcare management.

V. RESULTS

IoT Bases Medical Assessor and Predictor for HealthCare Solutions has the ability to transform the healthcare industry by providing remote monitoring and management of chronic health conditions. Through the integration of advanced medical equipment and IoT technology, patients can access healthcare services anytime and anywhere, leading to improved quality of care. This research paper presents a comprehensive review of the literature on IoT and M.L based health monitoring systems, outlining their benefits and drawbacks. The cutting-edge technologies employed in these systems, such as heartbeat sensors, Spo2 sensors, temperature sensors, and sweat sensors, are also discussed, emphasizing their role in facilitating real-time monitoring of patients' health conditions.

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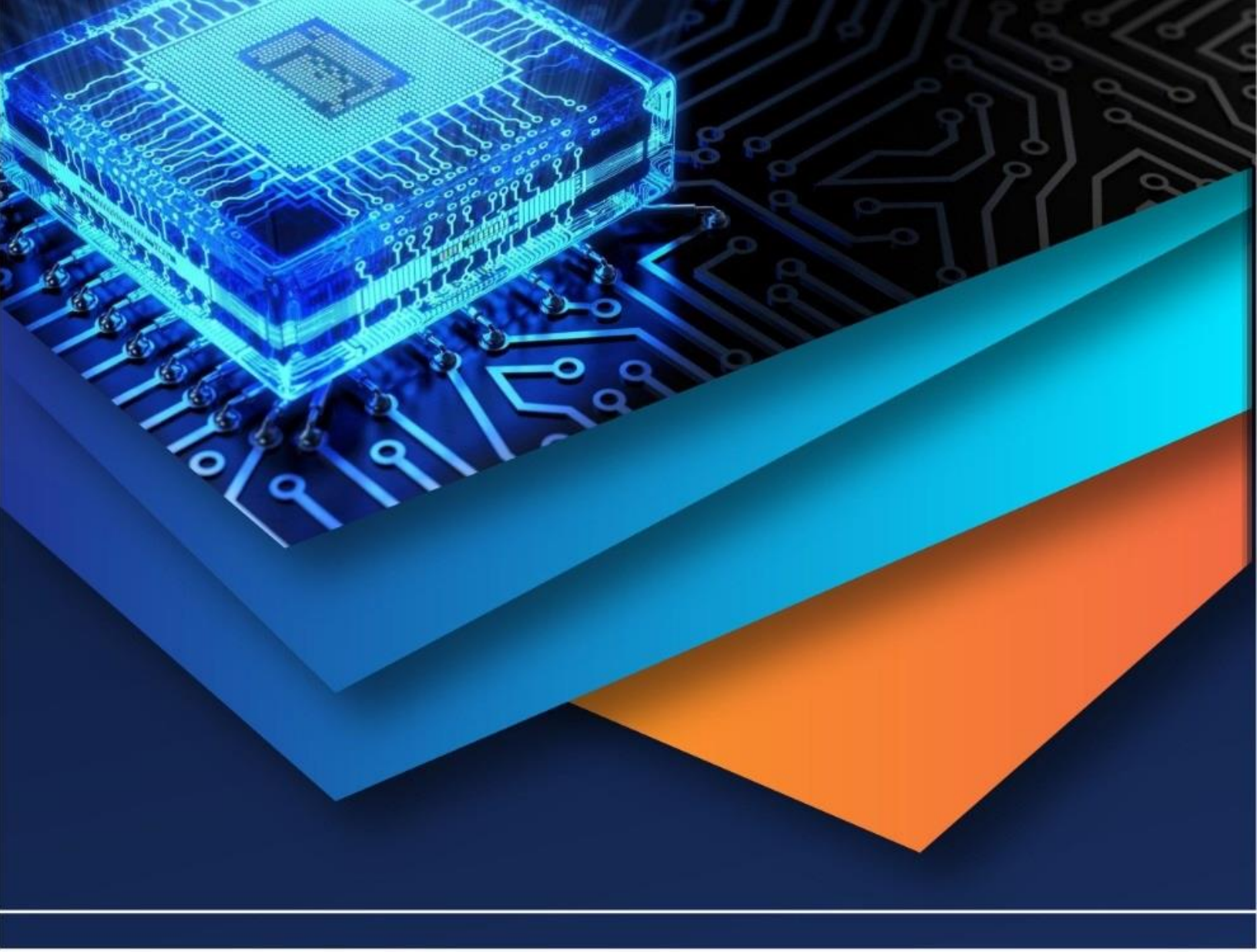

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