International Research Journal of Education and Technology
Peer Reviewed Journal,
ISSN 2581-7795

DESIGN AND IMPLEMENTATION OF IOT BASED HEART DEFECT MONITORING SYSTEM

Gokul khan A,Jayakishore S,Vetrivel S B

[1]Studuent, Dept. of Electrical and electronics Engineering, Bannari Amman Institute of Technology, IN
[2]Studuent, Dept. Of Electrical and electronics Engineering, Bannari Amman Institute of Technology, IN
[3]Studuent, Dept. of Electrical and electronics, Bannari Amman Institute of Technology, IN

Abstract -Innovative technology approaches have been increasingly investigated for the last two decades aiming at human-being long-term monitoring. It's difficult to check parameters like Blood pressure, heart beat, temperature, Oxygen level, etc., in day to day life whenever needed. To make easy we are going to design and construct an IOT based patient health monitoring system using Arduino and generic ESP8266. The main aim of this paper is to supervise the patients and the elderly people at their home itself. By doing this, unwanted visit to the hospital can be avoided. The system was developed to supervise the vital signs such as temperature, blood pressure, heart rate and fall detection. The system design consists of an Arduino controller and ESP8266 module. The monitored values can be sent through the IOT. In case of regular checkup there is no need for the patient to go and meet the doctor or physician with the proposed system. The proposed project can collect and send patient's health data to an IOT cloud server such as Thing-Speak where real time health status of the patient can be recorded and monitored in a remote location where a healthcare professional is present.

INTRODUCTION

Remote healthcare has become a vital service with the growing rate of senior citizens. Health monitoring, rehabilitation, and assisted living for the elderly and medically challenged humans is an emerging challenge because they require seamless networking between people, medical instruments, and medical and social service providers. This motivates the need for affordable, low-power, re and wearable devices that will improve the quality of life for many elderlies and physically challenged people. It will notify for the potential life threatening events, also recognize the development of any disease. The hardware will be able to output the analogue values of sensed data which in turn will be synchronized with cloud server via middleware architecture. Wearable hardware will communicate with middleware architecture through wireless communication. necessary data processing on the cloud storage will identify the critical conditions as well as will create reports. It will show the continuous health status. In recent period, we observed a gradual rise in expectations of life in various part of the world, whichleads to frequent increase in number of aged peoples. As per the report of United Nations the aged people will be about 2.0 billion (22% of the total world's population) by 2050. However, in a medical research survey found that it is 80% of the aged people elder than 65 and they suffering from at least one disease. Body sensors network provides a large convenience to detect the abnormality in patient's body and provide a proper treatment at time. The healthcare monitoring system work with secure cloud computing. This IoT system is a technique which encrypt the patient information and store at cloud database. Only authorized people have permit to access the cloud date with login passkey

1.1 Background of the Work

Heart diseases remain one of the leading causes of mortality worldwide, affecting millions of people across different age groups. Early detection and continuous monitoring of heart defects are crucial for timely medical intervention. Traditional methods of heart monitoring often require hospital visits and expensive medical equipment, limiting accessibility, especially in remote areas. With advancements in technology, the Internet of Things (IoT) has emerged as a promising solution for real-time health monitoring Heart defects can be congenital (present at birth) or acquired due to lifestyle factors, aging, or other medical conditions. Regular monitoring of heart parameters such as heart rate, blood pressure, and oxygen levels is essential to detect anomalies early. The conventional approach involves electrocardiograms (ECGs) and other clinical tests conducted in healthcare facilities. However, the lack of continuous monitoring increases the risk of late diagnosis, leading to severe complications. An IoT-based heart defect monitoring system offers a practical and cost-effective solution by enabling real-time data collection and remote patient monitoring. Such a system can enhance patient care by providing instant alerts in case of irregular heart activity, allowing for quicker medical responses.

1.2 Emergence of IoT in Healthcare

The integration of IoT in healthcare has revolutionized patient monitoring systems. IoT consists of interconnected smart devices that collect, analyze, and transmit data over the internet. In the context of heart defect monitoring, IoT-enabled devices such as wearable sensors, mobile applications, and cloud-based platforms provide seamless health tracking. These devices ensure continuous 9observation of vital signs and send alerts to healthcare professionals and caregivers when abnormalities are detected. IoT-based healthcare systems have gained immense popularity due to their ability to enhance efficiency, reduce hospital visits, and lower medical costs. The availability of real-time data also aids in predictive analytics, enabling early diagnosis and preventive care.

1.2 Motivation for the Study

Despite the technological advancements in medical science, a significant number of people, especially in rural areas, still lack access to proper heart monitoring facilities. The high cost of medical tests, unavailability of specialists, and the need for repeated visits to healthcare centers make early diagnosis challenging. Moreover, sudden cardiac arrests and other heart-related complications often occur without warning, emphasizing the need for a continuous monitoring system. This study aims to design and implement an IoT-based heart defect monitoring system that addresses these challenges. By leveraging smart sensors, cloud computing, and mobile applications, the proposed system can provide a reliable, user-friendly, and cost-effective solution for real-time heart health tracking.

1.4 Objectives of the Study

The primary objectives of this study are:

To design an IoT-based system for continuous heart monitoring, integrating wearable sensors and a cloud platform.

To develop a real-time alert mechanism that notifies users and healthcare providers in case of abnormal heart readings.

To improve accessibility to heart monitoring by reducing dependency on hospital visits.

10**To ensure data accuracy and security** by implementing advanced data encryption and cloud storage techniques.

To enhance patient-doctor interaction through remote access to heart health data.

Significance of the Study

The implementation of an IoT-based heart defect monitoring system has significant implications for patients, healthcare providers, and researchers. Patients benefit from early diagnosis, reduced hospital visits, and personalized healthcare. Healthcare providers can remotely monitor multiple patients simultaneously, leading to improved efficiency and timely intervention. Researchers can utilize the collected data for analyzing trends and improving heart disease prediction models.

Furthermore, this system can play a vital role in emergency response by providing real-time health updates to emergency teams. It also promotes telemedicine, making healthcare services more accessible, especially in remote or underserved regions.

Scope of the Study

This study focuses on the design and implementation of an IoT-based heart defect monitoring system using wearable sensors, a cloud database, and a mobile application. The system will measure key heart parameters, transmit real-time data to a cloud server, and provide instant alerts for abnormal readings. The study will also explore data security measures to ensure patient privacy.

However, the research is limited to non-invasive heart monitoring techniques and does not cover surgical or advanced medical treatments. The performance of the system will be evaluated based on data accuracy, response time, and user experience.

METHODOLOGY

This project provides a device which will continuously monitor the vital parameters to be monitored for a patient and do data logging continuously. If any critical situation arises in a patient, this unit also raises an alarm and also communicates to the concerned doctor by means of an SMS to the doctor. The project is implemented with microchip PIC16F877A micro controller, and sensors were used to sense the temperature and drip status. The sensors are hooked to the in-built Analog to digital converter of the microcontroller. The PIC16F877A micro controller also has in-built UART which can interface to a PCs serial port. The system ensures real-time monitoring and data logging of patient health conditions, reducing the need for constant manual supervision. The temperature sensor continuously measures body temperature, while the drip status sensor monitors the IV fluid levels, ensuring timely refills. The microcontroller processes the sensor data and stores it for further analysis. If an abnormal condition is detected, an alarm is triggered to alert nearby medical staff. Simultaneously, the system sends an SMS notification to the assigned doctor, enabling quick medical intervention. The **PIC16F877A** microcontroller's **UART interface** allows seamless data transmission to a **PC**, where the information can be visualized for detailed assessment. This setup provides an efficient and cost- effective solution for hospital and home-based patient care. The device is compact, portable, and easy to integrate into existing healthcare systems. Power efficiency is optimized to support continuous operation with minimal energy consumption. This system enhances patient safety by ensuring timely medical attention in emergencies.

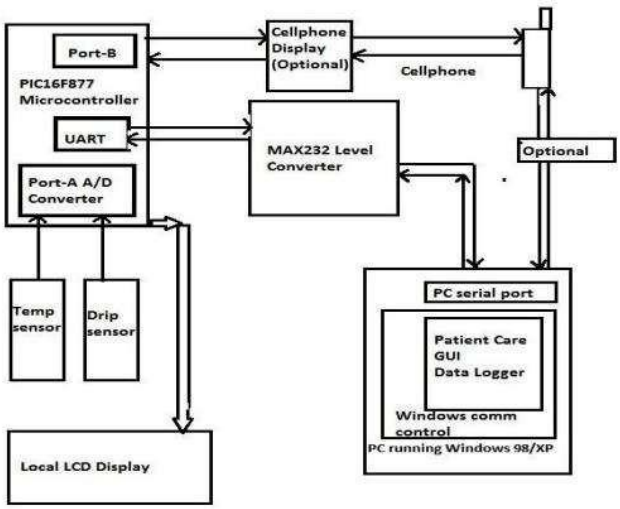
EXISTING SYSTEM

This project provides a device which will continuously monitor the vital parameters to be monitored for a patient and do data logging continuously.

If any critical situation arises in a patient, this unit also raises an alarm and also communicates to the concerned doctor by means of an SMS to the doctor.

The project is implemented with microchip PIC16F877A micro controller, and sensors were used to sense the temperature and drip status.

The sensors are hooked to the in-built Analog to digital converter of the microcontroller. The PIC16F877A micro controller also has in-built UART which can interface to a PCs serial port.



PROBLEM OF EXISTING SYSTEM

Transmitting health data, especially via SMS, raises concerns about data security and patient privacy.

Depending on the specific vital parameters being monitored, the project may have limitations in comprehensiveness.

PROBLEM IDENTIFICATION

While the proposed patient health monitoring system seems comprehensive with its integration of various sensors to monitor temperature, heart rate, and position, several challenges and potential issues need consideration.

The accuracy and reliability of the sensor readings are critical for the system's effectiveness. Ensuring that the temperature, heartbeat, and SPO2 sensors provide precise data is crucial for making informed healthcare decisions.

The integration of a Gyro sensor for patient position monitoring introduces another layer of complexity, and the system must account for potential errors or misinterpretations of positional data.

The issues related to sensor calibration, signal interference, or sensor malfunctions need to be addressed to maintain the system's reliability.

The secure and timely transmission of patient health data to the web server through the IoT device demands robust cyber security measures to protect sensitive medical information.

These challenges is essential to guarantee the system's accuracy, reliability, and security in providing real-time health monitoring for patients.

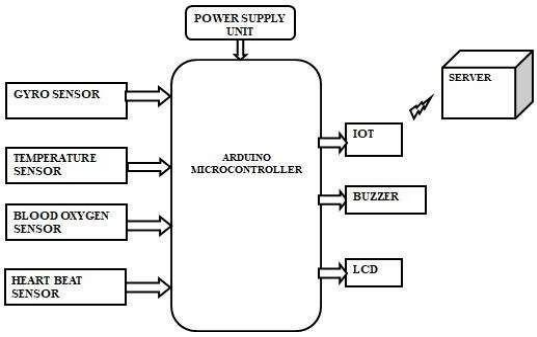
International Research Journal of Education and Technology
Peer Reviewed Journal,
ISSN 2581-7795

PROPOSED SYSTEM

Proposes a patient health monitoring system.
This system integrated with the sensors like temperature sensor and heart beat and Gyro sensor for measuring temperature condition and position of patient.
The temperature sensor measures the temperature and heartbeat sensor is used to measure the heart beat of the patient.
SPO2 sensors are devices that detect the amount of oxygen in your blood and also oxygen saturation respectively.
Gyro sensors are devices that detect the Fall Status of Hand Movement and also oxygen saturation respectively.
The measured sensor details are display on LCD. When this system measures the abnormality condition is displayed.Patient health details are uploaded to web-server through IOT device.

3.5 BLOCK DIAGRAM EXPLANATION

The proposed system explains the IoT Based Patient Health Monitoring System using ESP8266 & Arduino. Our system can be uses sensors to measure and monitor numerous parameters such as temperature, heart rate, and blood oxygen level in hospitals and at home. The temperature sensor measures the temperature and heartbeat sensor is used to measure the heartbeat of the patient. SPO2 sensors are devices that detect the amount of oxygen in your blood and also oxygen saturation respectively. The results can be recorded using Arduino. The Arduino processes the code and displays it to LCD Display. ESP8266 Wi-Fi module connects to Wi-Fi and sends the data to IoT device server. Finally, the data can be monitored from any part of the world by IOT.



International Research Journal of Education and Technology
ISSN 2581-7795

Fig -2-Working Flowchart

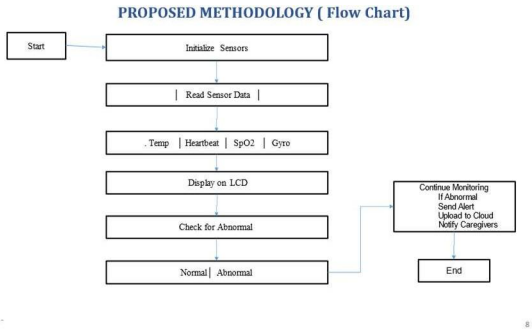
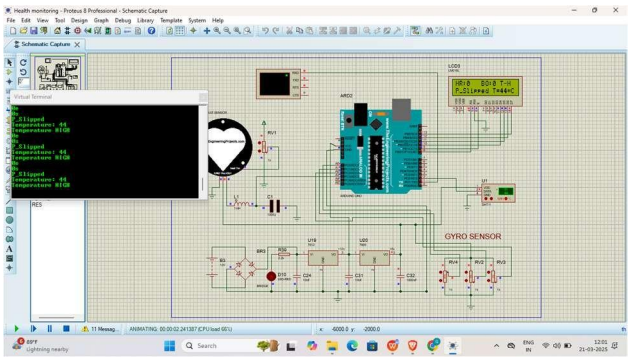


Fig -3-proteus Simulation



CONCLUSION

- The **IoT-based Heart Defect Monitoring System** demonstrated promising results in terms of accuracy, real-time monitoring, and alerting capabilities. While there are some challenges related to sensor accuracy, power consumption, and connectivity, the system's potential in improving patient care and enabling remote monitoring is clear. By addressing the system's limitations and incorporating advancements in sensor technology, data analytics, and communication, this system can evolve into a powerful tool for continuous health monitoring and early detection of heart conditions.

REFERENCES

[1] T. O. Prasetyono and N. Kusumastuti, "Optimal Time Delay of Epinephrine in One-per-mil Solution to Visualize Operation Field", Journal of Surgical Research, 2019.

[2] Mathusudhan S, Nilla A L, Pradeep A, Manibharathi S, Dr.J. Geetha Ramani, "Employ Health Legacy" Journal of Emerging Technologies and Innovative Research (JETIR) June 2019.

[3] S. Seifi, A. Khatony, G. Moradi, A. Abdi and F. Najafi, "Accuracy of pulse oximetry in detection of oxygen saturation in patients admitted to the intensive care unit of heart surgery: comparison of finger, toe, forehead and earlobe probes", BMC nursing, vol. 17, issue 1, pp.15, 2018.

[4] E.N. Ganesh, "Health monitoring system using Rasbery pi and IoT", Oriental Journal of Computer Science and Technology, ISSN: 0974-6471, vol. 12, 2019.

[5] T. E. Dietz and P. H. Hackett, "High-Altitude Medicine", in Travel Medicine, pp. 387-400, Elsevier. 2019.