Industrial Engineering Journal
ISSN: 0970-2555
Volume : 53, Issue 12, December : 2024

IOT BASED HEALTH MONITORING SYSTEM

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ABSTRACT

"IoT Based Health Monitoring System" explores using Nowadays healthcare monitoring system is more crucial to constantly monitor patient's physiological parameters from sensors on the patient's body. This system has the ability to monitor physiological parameters periodically every 10 seconds. Sensor nodes are capable to sense the heart rate, temperature of body, ECG signals, blood pressure etc. After capturing the sensor data, we perform some pre-processing techniques to resolve duplication, errors (outliers) and missing values in sensors data. This healthcare monitoring system mostly detects the abnormality conditions in patient's body and if any abnormality condition happens then this system immediately send a message to the doctor or emergency center within one minute. The major advantages of this healthcare system in comparison with the previous system is to reduce the power consumptions, a long lifetime, Increase the speed and enhance the communication coverage area and also provide security and privacy to patient's data. This healthcare monitoring system has provided a secure IoT based communication with the help of advanced encryption standard (AES) Techniques.

Key Words: IoT, Health Monitoring, ECG, sensors.

1.INTRODUCTION:

In recent period, we observed a gradual rise in expectations of life in various part of the world, which leads 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 [4]. In a research found that nearly 89% of the aged peoples are living individually. 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 and older people have very difficult to caring of themselves. By WHO 2015 report 400 million peoples do not have necessary Health facility. Numbers of patients have increased nearly double in every four decades, and it is difficult for hospitals to care all patients. According to the United States report, we can avoid about 41 million deaths yearly if we provide Healthcare facility at time. To provide a gracious quality of life to patient is a big social challenge. Body sensor network provides a large convenience to detect the abnormality in patient's body and provide a proper treatment at time. Sensors sense the physiological data (Body's Temperature, Heart Rate, Blood Pressure, ECG Signal etc.) periodically in every 10 seconds from the patient's body. In capturing the physiological data from sensor at patient's body, we need to process data pre-processing techniques on sensor data to resolve duplication, errors (Outliers) and missing values in data. After correcting the errors from sensors data, these data are passes through Raspberry Pi to do Algorithmic Process and compare this data with normal range of data. If there is any abnormality will occurs, it gives an alarm and simultaneously sends a message to doctor. And it will be continuous store the new data and delete the previous old data from the database. The healthcare system work with secure cloud computing. This IoT system has 128-bits advanced encryption standard (AES) technique which encrypt the patient information and store at cloud database. Only authorized people have permit to access the cloud data

with login passkey, this login passkey has ability to decrypt the cloud data in original form. This make it a secure IoT based healthcare monitoring system. Secret passkey must be similar length in both ends.

2.LITERATURE REVIEW:

Nowadays in healthcare monitoring system it is necessary to constantly monitor the patient's physiological parameters. This system presents a monitoring system that has the capability to monitor physiological parameters from patient body at every 10 seconds. A sensor node has attached on patient body to collect all the signals from the wireless sensors and sends them to the BSN care node. The attached sensors on patient's body form a wireless body sensor network (WBSN) and they are able to sense the heart rate, Temperature of surrounding. This system is mainly to detect abnormal conditions in human body and abnormal physiological parameters. The main advantage of this system in comparison to previous systems is to reduce the energy consumption to prolong the network lifetime, speed up and extend the communication coverage to increase patient quality of life. Now a day's aged people are suffering from at least one deceases and health conscious and increasing. And in hospital difficulty occurs in taking care of that patients. Body Sensor network provides very large portability to patients to detect abnormalities in patient and used to avoid critical situations and gives proper treatment on time. Hence, IoT concept used and sensor are connected to human body with well managed wireless network. For measurement heart bit rate, Temperature etc. can be monitored by sensors. BSN care node server also maintained to store data collects data from sensor and its processing in LPU that is local processing unit and send it to database server. And Internet connection and power supply continuous required to work proper functioning and periodically monitoring physiological parameter of body to avoid the risk. Because sensor is sensing or collecting information after every 10 secs and sends it to database server. Continuous health monitoring with wearable sensor and implantable body sensor networks will increase detection of emergency conditions in at risk patients. Also, this system is useful to operate remotely because of in built WiFi in raspberry pi that we are using in system, hence sensors and software system can remotely work because of integration of all component. In this system, we are using sensor to detect biological parameters and it processes along with raspberry pi and that all hardware component is integrated with software system to display data to user and user can able control system.

This paper explains a Raspberry pi controlled remote monitoring system. Raspberry Pi is a credit card sized single board computer with ARMll microprocessor. In this study, a system is designed to continuously monitor the Electrocardiogram (EeG) and other vital parameters. This data is stored in a database and can be displayed in a website that can be accessed only by authorized personnel. This idea is familiar however; this paper presents a substantive and inexpensive method using Raspberry pi. The primary task of this system is to update the data to the database and alert the doctors for any aberrancy. The former is accomplished by using My SQLdb module to link Raspberry pi to the database whereas the latter is achieved by the combination of Raspberry Pi and GSM module.

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3.BLOCK DIAGRAM:

The Block Diagram of our prototype is as shown below

Fig 1. Block Diagram

3.1 COMPONENTS:

- Arduino: The Arduino board serves as the central controller for the system. The Arduino Uno can be connected to various sensors that monitor health metrics, such as heart rate sensors, temperature sensors, or oxygen saturation sensors.

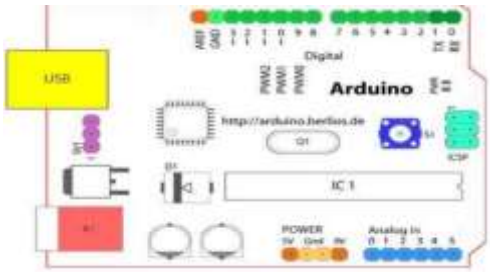

Fig 2: represents arduino layout

- Power Supply:
- LCD (Liquid Crystal Display): The LCD can provide real-time visual feedback of the health metrics being monitored. The LCD can display status messages, alerts, & notifications directly on the device.

Fig 3: represents lcd display

- Buzzer: The buzzer can sound alarms or notifications to alert users or caregivers if any health parameters fall outside of the acceptable range.

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Fig 4: represents buzzer

- Heart Rate: The heart sensor measures pulse rate, which is the changes in the volume of a blood vessel that occurs when the heart pumps the blood. The heart rate sensor is reliable.

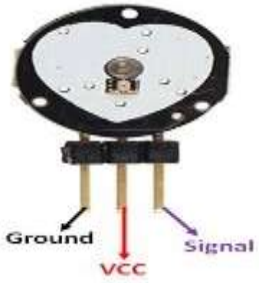

Fig 5: heart rate

- DTH-11: A temperature sensor is used to detect the body temperature. It can measure the temperature in the range of -55 degrees centigrate to 150-degree centigrade. The accuracy range of the temperature sensor is high when operated at optimal temperature and humidity level.

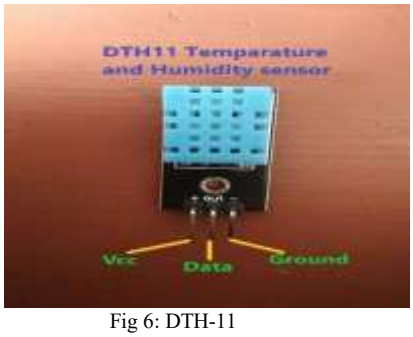

Fig 6: DTH-11

- Switch: The switch is used to turn the Laser Guardian system on and off.

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4.DESIGN FLOW:

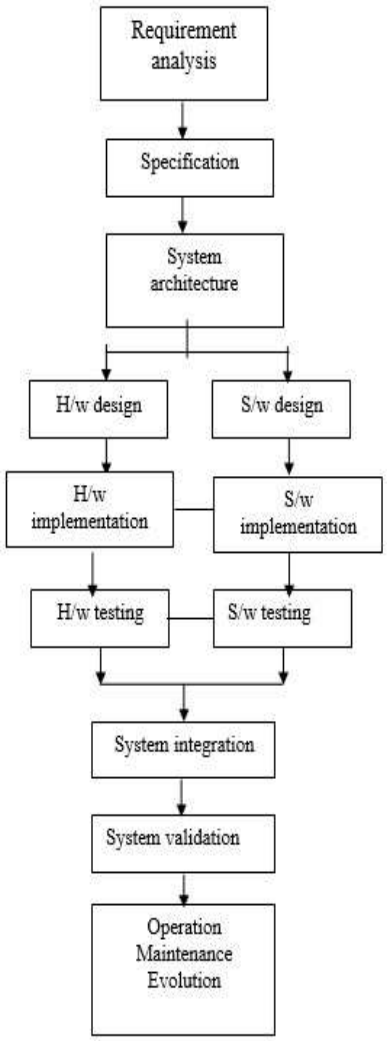

Fig 7: design flow of the project

- Aerospace and defence electronics: Fire control, radar, robotics/sensors, sonar.
- Automotive: Autobody electronics, auto power train, auto safety, car information systems.
- Broadcast & entertainment: Analog and digital sound products, camaras, DVDs, Set top boxes, virtual reality systems, graphic products.
- Consumer/internet appliances: Business handheld computers, business network computers/terminals, electronic books, internet smart handheld devices, PDAs.
- Data communications: Analog modems, ATM switches, cable modems, XDSL modems, Ethernet switches, concentrators.
- Digital imaging: Copiers, digital still cameras, Fax machines, printers, scanners.
- Industrial measurement and control: Hydro electric utility research & management traffic management systems, train marine vessel management systems.
- Medical electronics: Diagnostic devices, real time medical imaging systems, surgical devices, critical care systems.
- Server I/O: Embedded servers, enterprise PC servers, PCI LAN/NIC controllers, RAID devices, SCSI devices.
- Telecommunications: ATM communication products, base stations, networking switches, SONET/SDH cross connect, multiplexer.

5.WORKING:

An IoT-based health monitoring system uses sensors to continuously collect data on vital health parameters such as heart rate, blood pressure, and oxygen levels from patients. This data is processed by a microcontroller and transmitted via an IoT gateway to a cloud platform over the internet. The cloud stores and analyzes the data, identifying abnormalities and triggering alerts or notifications for healthcare providers and patients through mobile or web applications. This system enables real-time remote monitoring, early detection of health issues, and improved patient care, while addressing challenges like data privacy, connectivity, and implementation costs.

6.RESULT:

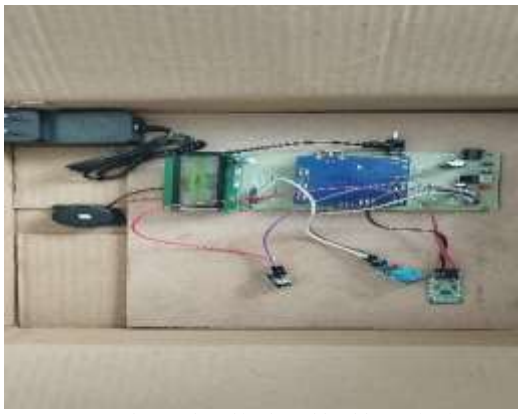

Fig 8: represents the results of iot based health monitoring system.

The Health Monitoring System successfully monitors and records vital health parameters, such as heart rate, body temperature, and blood oxygen levels, and transmits this data to a centralized cloud platform for real-time monitoring. The system generates notifications or alerts when parameters exceed predefined thresholds, helping caregivers respond quickly to potential health risks.

Accuracy: The sensors accurately capture vital data with minimal error rates, providing reliable measurements suitable for continuous monitoring.

Real-Time Alerts: Alerts are generated instantly if any vital parameter crosses safe limits, effectively supporting quick decision-making.

Data Storage: All health data is stored securely in the cloud, ensuring easy access for long-term tracking and analysis.

User Interface: A user-friendly dashboard displays data in graphs and charts, making it easy for users to interpret health trends over time.

Reliability: Testing showed that the system maintains stable performance over extended periods with consistent data accuracy, making it dependable for continuous health monitoring.

Scalability: The system can be scaled to accommodate multiple patients, as the IoT network and cloud setup allow adding more devices with minimal changes.

Practical Impact: The system has the potential to reduce hospital visits by enabling remote monitoring, which is beneficial for elderly patients or those in remote locations**.**

CONCLUSION:

In conclusion, The numbers of patients are nearly doubled in every four decades, and it is difficult for hospital to taking care of all these patients. This healthcare system works on real time and if any abnormality occurs, then it immediately put an alarm and simultaneously sends a message to doctor within a minute. Hence, we can avoid a critical situations and able to provide a treatment at time. The main purpose to develop such a system is to diminished health care overheads and also offers a system which detects abnormalities in seconds. The major advantage of this system, compare to earlier system is to reduce the electricity consumptions, a long lifetime, Increase the speed and

enhance the communication coverage area. This healthcare monitoring system can be easily introduced in hospitals, clinics, houses. With the help of IoT huge data can be stored at cloud database. This system is decreases the patients visit to hospital for consistent routine check-ups. Accordingly, this system provides a quality of life to patients.

It revolutionizes healthcare by enabling real-time, continuous monitoring of vital health parameters, ensuring timely detection of abnormalities and swift medical interventions. By leveraging sensors, cloud computing, and connectivity, it enhances patient care, reduces hospital visits, and supports remote health management. Despite challenges like data security and connectivity, its benefits in improving healthcare accessibility and outcomes make it a transformative solution in modern medicine.

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