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IOT BASED HEALTH MONITORING SYSTEM

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ABSTRACT

Many people in India are suffering because of heart attacks, and the reason for this is that they are not receiving timely and necessary medical attention. To provide patients with early and appropriate assistance, we would like to keep a close eye on their health. The fixed monitoring system is usually only employed when the patient is in bed, and it is only available in hospitals. The system was designed for patients who are not in critical condition but require regular monitoring by a clinician or family. A prototype of a wireless health monitoring system capable of monitoring the patient's health state is being developed throughout this project. The patient's temperature, pulse, and heart rate are all tracked during this project. IoT is used to send the captured data to the server. The pulse sensor, DHT11 sensor are the key sensor modules of this framework and Arduino UNO is used as the controlling unit of the project. Software development environments like Arduino IDE are used.The objective of this project is to create an architecture capable of monitoring patient health.

Keywords: Internet of things, Pulse sensor, DHT11, Arduino UNO, Arduino IDE

1. INTRODUCTION

According to numerous studies, human factors errors are the leading cause of critical incidents that endanger patient safety in medical settings where patient monitoring is used, accounting for more than 87 percent of all such incidents. According to studies, excellent cognitively ecological design of monitoring equipment for use in these situations should minimise human factor errors linked with the data it provides. The goal of the study is to examine the current state of knowledge in the field of human factors engineering and how it applies to patient monitoring. It focuses on the prevalence of human factors error, appropriate human factors design principles, the impact of specific design aspects, and the difficulty of measuring the success of designs in decreasing human factors error.

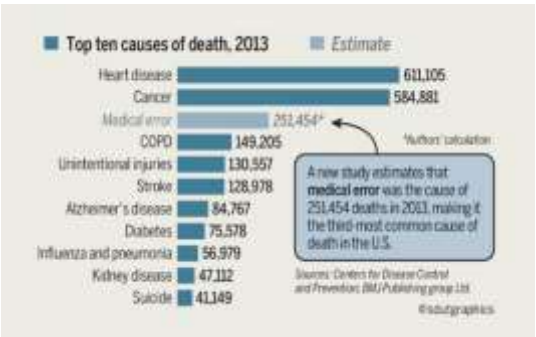

Fig 1.1: The statistics of deaths of different causes in medical field in the year 2013

In this project, we'll use the Arduino UNO to create an IoT-based patient health monitoring system. The pulse sensor can detect both heart rate and pulse (BPM). The DHT-11 temperature sensor is used to determine body temperature.

The notion for this project came from an idea named Patient-Monitoring Systems Year 2014, which was proposed by Reed M. Gardner and M. Michael Shabot. They started this project in response to the growing demand for more acute and intensive treatment of patients with complicated diseases, as well as the need for additional organisational units. Burn, coronary, general surgery, open-heart surgery, paediatric, neonatal, respiratory, and multifunctional medical-surgical units are among the units available. Later, In the year 2017, Ahmed Abdeljawad suggested an IoT-Based Health Monitoring System for Active and Assisted Living. The Internet of Things (IoT) platform is a promising technology for achieving the a fore mentioned healthcare services, and it has the potential to improve medical service systems further. IoT wearable platforms can be used to gather information about the user and their surroundings and transmit it remotely, where it can be processed or stored in order to follow the user's history.

2. EXISTING SYSTEM

We currently use active network technology to connect numerous sensors to a single PMS in the present system. Patients' different key metrics are continually monitored via a single PMS and communicated to the on-site doctors or nurses for prompt response in the event of an emergency.

The sensors are affixed to the patients' bodies without giving them any discomfort. Using readily available sensors, we monitor crucial physical factors like body temperature and heart rate in this PMS. As a result, the analogue values sensed by the various sensors are sent to a microcontroller attached to them. These analogue signal values of health parameters are processed independently by the microcontroller and converted to digital values using an ADC converter.

3. PROPOSED SYSTEM

One of the main reasons for the rise in patient deaths is a lack of appropriate patient monitoring. This results in a large number of deaths, which has been steadily increasing. Without having to contact the patients, IoT-based or automatic health monitoring can provide useful physiological information. This monitoring is beneficial for elderly or chronically unwell individuals who do not want to stay in the hospital for an extended period of time. Wireless sensors collect and transmit signals of interest, and a processor is configured to receive and analyse the sensor data automatically. In this project, we have selected relevant sensors based on what we want to detect and create algorithms to carry out your detection. Fall detection and cardiac signal monitoring are two examples i.e., we used pulse sensor and DHT11 temperature and humidity sensor.

An approach to a remote health monitoring system was devised using a single parameter monitoring system, which extends healthcare beyond the traditional clinic or hospital setting to the patient's home. Data from a heartbeat detection system, temperature data, and a few other characteristics were to be collected by the system.

This system is a close-control system in which the patient's conditions or parameters are analysed, and the patient's temperature and cardiac rate may be seen in the IP address. We can access or visualise the patient's state without having to interact with them, and appropriate measures can be taken without having to interact with them directly. The Arduino UNO receives data from all the sensors, including the pulse sensor, DHT11 sensor. When the Arduino UNO is programmed and connected to the internet, it creates an IP address. We use ESP-01 ESP 8266 Serial Wi-Fi Transceiver module to connect to internet. Each of these results is available in the Thingspeak app.

4. BLOCK DIAGRAM

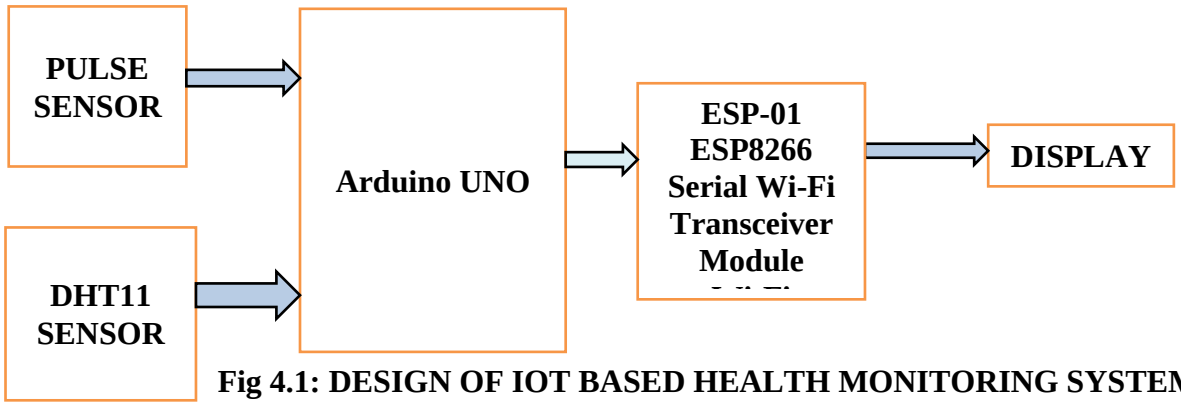

Fig 4.1: DESIGN OF IOT BASED HEALTH MONITORING SYSTEM

5. WORKING OF THE PROJECT

By connecting sensors to the patient's body, we can continuously monitor the patient's health in this project. The patient's heart rate and pulse were measured using a pulse sensor. The DHT11 humidity and temperature sensor is used to monitor the patient's temperature and can also be used to monitor the room temperature and humidity. The Arduino UNO is a microcontroller unit that accepts code via a connection. The Arduino IDE is a software platform that is utilised to meet the project's software requirements. We connect the pulse sensor and the DHT11 sensor to the Arduino UNO after inputting the code, and we can see the results in the Thingspeak app.

An IP address is created after the Arduino UNO is programmed and connected to internet. We can connect to Wi-Fi by using ESP-01 ESP 8266 Serial Wi-Fi Transceiver Module. As the doctor can visualise and analyse the results in the application, it is easy to detect the patient's who need immediate treatment.

6. RESULTS

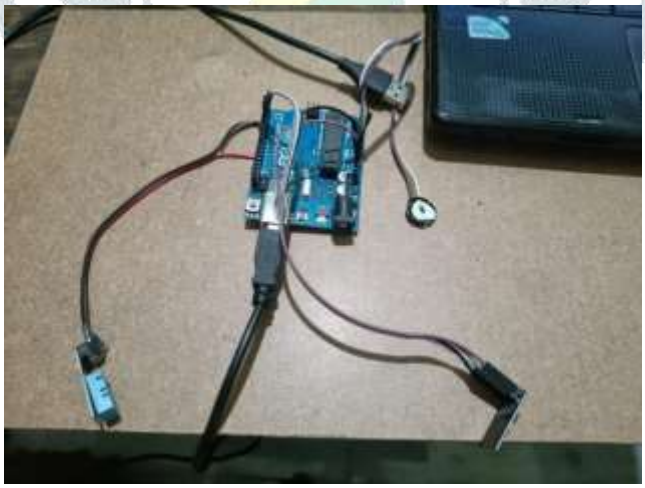

Fig 6.1: Initial Stage of project (without Power supply)

A power supply of 5v is given to the input and the results of the project after giving power supply is shown in the below image.

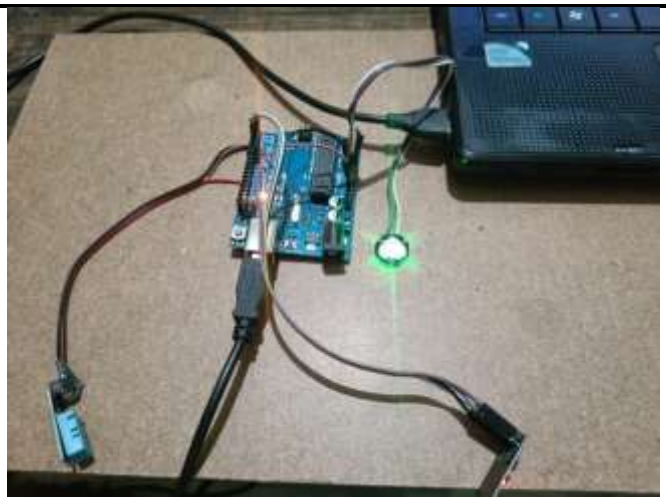

Fig 6.2: Project after giving power supply

Once the ESP8266 is programmed through the cable from Arduino IDE, the connected sensors can be used to detect the patient's health condition when the power supply is given.

Fig 6.3: Connection of ESP8266 with sensors

Once the patient keeps his finger on the pulse sensor or the temperature sensor, the body temperature, pulse or heart rate of the patient is recorded and can be visualised by the doctor in the thingspeak app.

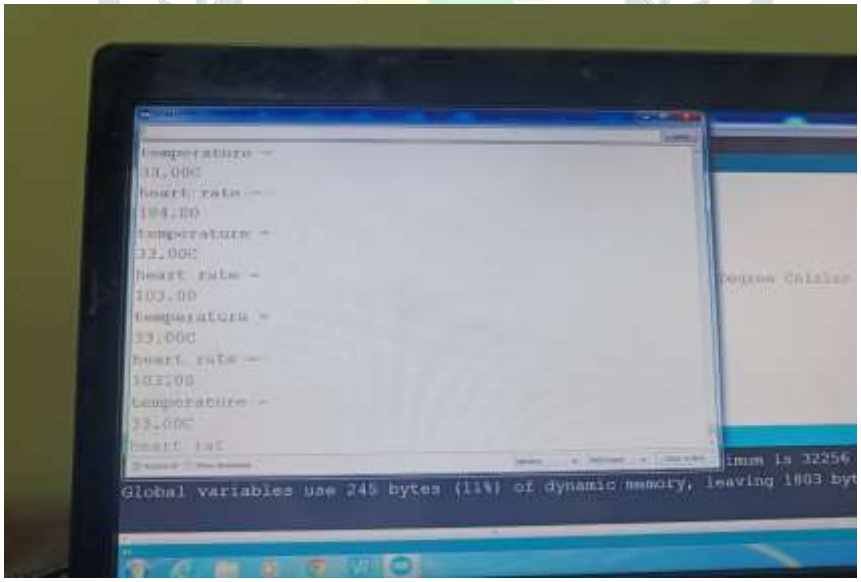

Fig 6.4: Patient's health recordings

Fig 6.5: Channel Stats of patient health condition

7. Conclusion

Automatic patient monitoring system has been presented in this work. By referring the system, the healthcare professionals can monitor, diagnose, and guide their patients all the time. The physiological data are stored and published online. Hence, the healthcare professional can monitor their patients from a foreign location at any time. Our system is simple. This system is just few wires connected to a small kit with a smartphone. The system is very power efficient. It is reliable to use, fast, accurate, and high efficiency. Finally, the reliability and validity of our system are ensured via field tests. During field test it show that our system can produce medical data that readings are same as values produced by the existing medical equipment.

By introducing Automatic patient monitoring system, we achieve following objectives:

1. To reduce the medical errors
2. To improve medical technology
3. To decrease the direct contact with patients
4. To enhance safety during patient monitoring

This project will be completely accepted and widely introduced in near future.

Future Scope

As we see, in these few years as technology of IoT develop than many other systems develop by referring it. So, as we develop system of Automatic health monitoring system using IoT. This project focuses on a real-time pervasive healthcare monitoring system using IoT and cloud computing service which is more beneficial for elders and chronic disease patients. The system can be further improved by a) adding artificial intelligence system components to facilitate the doctors and the patients and b) adding a GPS Module in IOT Patient Monitoring using the Wi-Fi Module, which will find out the position of the patient using the latitude and longitude received, then it will send through the IOT using the Wi-Fi Module.

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