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# IOT Enabled Patient Health Care Monitoring Using Esp32 Cam

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**ABSTRACT:** Health monitoring is the major problem in today's world. Due to lack of proper health monitoring, patient suffer from serious health issues. There are lots of IOT devices now days to monitor the health of patient over internet. Health experts are also taking advantage of these smart devices to keep an eye on their patients. With tons of new healthcare technology start-ups, IOT is rapidly revolutionizing the healthcare industry. Here in this project, we will make an **IOT based Health Monitoring System** which records the patient heart beat rate and body temperature and also send an email alert whenever those readings goes beyond critical values. Hence the lack of assistance for elderly people in home has been reduced now a days due to the social change. Also the regular health checkup has became difficult due to covid-19 situations. This project is focused upon giving an health care assistance from home for the people who are not able to give a regular visit to doctors and for those people who were bed ridden. Node MCU is a microcontroller unit that will get the data from all the input sensor and will transfer all the data in the cloud platform. Pulse rate and body temperature readings are recorded over Ubidots so that patient health can be monitored from anywhere in the world over internet. A panic will also be attached so that patient can press it on emergency to send EMAIL/SMS to their relatives.

**KEY WORD:** Telemedicine, Remote Patient Monitoring, ESP32 CAM Healthcare Monitoring, IoT Health Monitoring with ESP32 CAM"

## I.INTRODUCTION

Today's Internet has become a part of our life. It has changed the lives of people who use it. Internet serves as main purpose for educations, and etc... The Internet Of Things connects to the Internet and uses those connection for controlling the objects.. A pulse monitoring system is necessary to continuously monitor the patients pulse rate of that person. The main advantage of this pulse rate monitoring system is the data can be viewed at any time and any place. The doctors can get notification in phones as messages if patient health is not good. The health sensor uses the sensors like heartbeat sensor. . The health sensor can analyse the signal and detect whether it is normal or not in good condition conditions.  Heartbeat sensor measures the heartbeat which lies between 62-120bpm. Usually, patients with heart problems live in home .When they feel sick they to call the health care to look after their condition. In addition, The patients die before they get any good treatment. So, the solution is to improve the detection of heart problems and reduce the number of deaths. So, the doctor will decide when to give health service based on patients' status. The good part of this health monitoring system is the real time monitoring of the patients. In this paper, an Internet Of Things based monitoring system is done for finding heart problems. The Work is done in the monitoring system by using Internet, cloud services and Nodemcu. Internet Of Things means interconnecting of devices that reduce intervention of humans and making life in a better way.

## II. OBJECTIVE

In this chapter introduction of the **PATIENT MONITORING SYSTEM TO REMOTE DOCTORS USING GSM TECHNOLOGY** are discussed. It gives overall view of the project design and the related literature and the environment to be considered. Chapter wise organization of the thesis and the appendices is given at the end of this

chapter. At first we discuss the main processing done using 8051 microcontroller is and then what is the process that can be automated which is within the scope of the work. Then we discuss the implementation aspects.

## III. LITERATURE SURVEY

The technical brilliance and development in different fields has led to a drastic in our lives, one among them is embedded systems. The application of these devices is to monitor the patient health status. IOT is a wireless connection network that is used to connect different devices at a frequency of 2.4GHz. For medical applications also this IOT is widely used. The IOT can communicate with the devices of about 75 m. The other network is GSM network. This can be operated from any distance to any point of control. The communication is done with the help of local network support. This can get communicated to any part of the world which the network of the local system is applicable. Here we are using for the hospital communication for monitoring the patient.

**Smart Healthcare Monitoring using IOT Shubham Banka1 , Isha Madan2 and S.S. Saranya3 1Bachelor of Technology, Computer Science and Engineering, SRM University, Tamil Nadu, India. 2Bachelor of Technology, Computer Science and Engineering, SRM University, Tamil Nadu, India. 3Assistant Professor, Computer Science and Engineering, SRM University, Tamil Nadu, India.**

IOT in healthcare is the key player in providing better medical facilities to the patients and facilitates the doctors and hospitals as well. The proposed system here consists of various medical devices such as sensors and web based or mobile based applications which communicate via network connected devices and helps to monitor and record patients' health data and medical information. The proposed outcome of the paper is to build a system to provide world-class medical aid to the patients even in the remotest areas with no hospitals in their areas by connecting over the internet and grasping information through about their health status via the wearable devices provided in the kit using a raspberry pi microcontroller which would be able to record the patient's heart rate, blood pressure. The system would be smart to intimate the patient's family members and their doctor about the patient's current health status and full medical information in case any medical emergency arises. The collected information can be used to analyse and predict chronic disorders or other diseases such as heart attacks in preliminary stage itself using the data mining techniques that will also provide the approach advantageous for decision making.

The Internet of things is the inter-connection of devices, apps, sensors and network connectivity that enhances these entities to gather and exchange data. The distinguishing characteristic of Internet of Things in the healthcare system is the constant monitoring a patient through checking various parameters and also infers a good result from the history of such constant monitoring. Many such devices equipped with medical sensors are present in the ICUs now-a-days. There could be instances where the doctor couldn't be alerted in time when there is an emergency, despite of 24 hours of monitoring. Also there might be hurdles in sharing the data and information with the specialist doctors and the concerned family members and relatives. The technology that enhances these features is already available but is not accessible and affordable by most of the people in developing countries such as India. Hence these solutions to these problems can be just a simple extension to the current devices which don't have these facilities. This paper demonstrates a Remote Health Monitoring System controlled by Raspberry pi. Raspberry Pi is a small payment card-sized single-board microcontroller made to enhance the basic computer science education in colleges and developing nations. In this paper, a system is designed to continuously monitor the vital parameters such as heart rate, blood pressure and body temperature. The information is stored on a cloud server database and can be displayed through an online website or mobile application by authorized personnel only. The idea might not be very new, but we propose an absolute and cheap method for the system using Raspberry pi. The main objective of this system is to update the data online and send an alert to the doctors for any abnormality and also predict if the patient is having any disease. The former is accomplished by using MySQL DB module to link Raspberry pi to the database whereas the latter is achieved by the combination of Raspberry Pi and GSM module and the web interface. This system has much future scope as the data collected by monitoring is so valuable and can be used for any kind of research by the medical community. The major aim of the paper can be summarized as following: ● To obtain the real-time medical information about a patient via IoT. ● Processing and classification of information gathered about the patient. ● To interpret and predict any disease or disorder in preliminary stage itself using the data mining techniques that will also provide the approach advantageous for decision making. ● To provide Internet of Things based healthcare solutions at anytime and anywhere. Ahn et al. [1] implemented a system for measuring the physiological signals in sitting position such as ECG and BCG by using a smart chair that senses the non-constrained bio-signals and can be monitored using a monitoring system such as the one they had developed providing a classic example of the application of IOT in healthcare. Almotiri et al. [2] proposed a system of m-health that uses mobile devices to collect real-time data from patients in and store it on

network servers connected to internet enabling access only to a certain specific clients. This data can be used for the medical diagnosis of patients and is achieved by using a number of wearable devices and body sensor network. Barger et al. [3] made a smart house facility using a sensor network to monitor and track the movements of the patient in hoke and a prototype of the same is also being tested. The primary objective of their work is to check if their system is capable to outsmart the behavioral patterns and have discussed about the same in their work. Chiuchisan et al. [4] proposed a framework to prevent the threats to patient in smart ICUs. The proposed system intimates the patient's relatives and doctors about any inconsistency in their health status or their body movements and also about the atmosphere of the room so that the necessary precautionary measures can be taken. Dwivedi et al. [5] developed a framework in order to secure the clinical information that has to be transmitted over the internet for Electronic Patient Record (EPR) systems in which they propose a multi-layered healthcare information system framework which is a combination of Public Key Infrastructure, Smartcard and Biometrics technologies. Gupta et al. [6] proposed a model which measures and records ECG and other vital health parameters of the patient using Raspberry Pi and can be of a great use for the hospitals and patients as well as their family members. Gupta et al. [7] present an approach using Intel Galeleo development board that collects the various data and uploads it to the database from where it can be used by the doctors and also reduce the pain born by the patients to visit hospital each and every time to check their health arameters. Lopes et al. [8] proposed a framework based on IOT for the disabled people so as to study and find the IOT technologies in healthcare segment that can benefit them and their community. They took two use cases to study the latest IoT technologies and its application that can be used mainly for the disabled people. Nagavelli and Rao [9] proposed a novel method to predict the severity of the sickness from the patient's medical record using mining based statistical approach which they said as degree of disease probability threshold. And in order to meet their goal they have revamped an0 algorithm that is mostly needed to derive the hyperlink weight of the websites. Sahoo et al. [10] studied the healthcare management system and about the large amount of patient data that is generated from various reports. They further analysed the health parameters to predict the future health conditions of the patient or the said subject. They use a cloud based big data analytic platform to achieve the same using the means of probability. Tyagi et al.

**BLOCK DIAGRAM:**
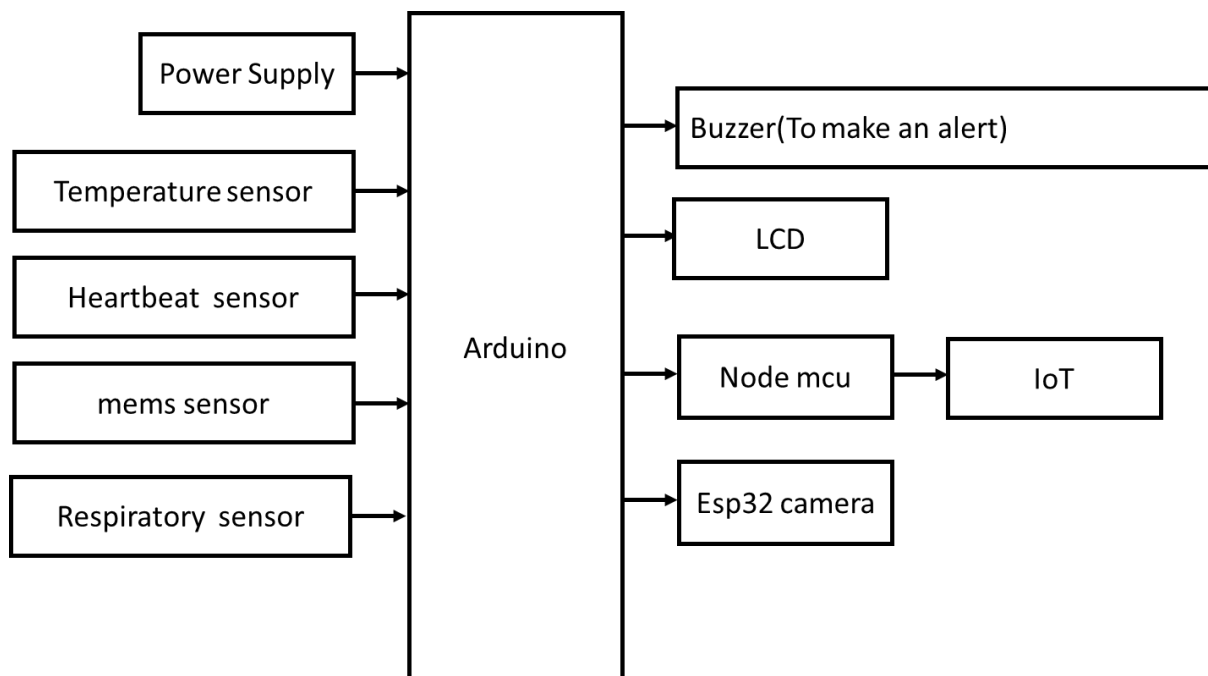


**Block Diagram Explanation:**

• Health sensors collect vital signs data.
• ESP32 CAM module processes sensor data and may capture visual information.
• Data processing and analysis can be done locally on the ESP32 CAM.
• The ESP32 CAM can connect to the internet via Wi-Fi or locally via Bluetooth.
• Processed data is transmitted to a cloud platform for storage and further analysis.

• Healthcare providers or caregivers access the data through a user interface.
• Security and privacy measures ensure the confidentiality and integrity of patient data throughout the system.

Advantages of the IOT enabled patient health care monitoring using ESP32 CAM:
• Real-time Monitoring: IoT-enabled systems allow for real-time monitoring of patient health data. This means healthcare providers can receive immediate alerts in case of any abnormalities or emergencies, enabling timely intervention.

• Remote Accessibility: With data stored in the cloud, healthcare providers can access patient information from anywhere with an internet connection. This is particularly useful for monitoring patients who are not physically present in a healthcare facility, such as those in remote areas or recovering at home.

• Continuous Monitoring: Traditional healthcare monitoring often involves periodic visits to healthcare facilities. IoT-enabled systems can provide continuous monitoring of vital signs, offering a more comprehensive view of the patient's health status over time.

• arly Detection of Health Issues**: By continuously monitoring vital signs, IoT-enabled systems can help detect health issues at an early stage. This allows for proactive interventions to prevent the progression of diseases or complications.

• mproved Efficiency: Automating the collection and transmission of patient data reduces the need for manual record-keeping and data entry. This can improve the efficiency of healthcare providers, allowing them to focus more on patient care.

**Applications of the Project:**
1. Home Healthcare Monitoring:
Patients with chronic conditions or those recovering from surgery can benefit from continuous monitoring of vital signs at home. IoT-enabled systems allow healthcare providers to remotely monitor patients' health status and provide timely interventions if necessary, reducing the need for frequent hospital visits.

2. Elderly Care:
IoT-enabled monitoring systems can be used to monitor the health of elderly individuals living alone or in assisted living facilities. Caregivers can remotely monitor vital signs, activity levels, and overall well-being, ensuring timely assistance and intervention in case of emergencies.

3. Remote Patient Monitoring:
Patients living in remote or underserved areas may have limited access to healthcare facilities. IoT-enabled monitoring systems can bridge this gap by providing remote patient monitoring services, allowing healthcare providers to monitor patients' health status and provide necessary interventions from a distance.

4. Post-operative Monitoring:
After surgery, patients require close monitoring to detect any post-operative complications early. IoT-enabled monitoring systems can continuously monitor vital signs such as heart rate, blood pressure, and oxygen saturation, allowing healthcare providers to detect and address complications promptly.

5. Telemedicine:
Telemedicine platforms can integrate IoT-enabled monitoring systems to provide remote consultations and virtual visits with healthcare providers. Patients can transmit their health data in real-time during virtual appointments, allowing healthcare providers to assess their health status and provide recommendations or prescriptions as needed.

6. Clinical Trials and Research:
IoT-enabled monitoring systems can be used in clinical trials and research studies to collect real-time data on patients' health status and response to treatment. This data can help researchers better understand diseases, evaluate the efficacy of treatments, and identify potential biomarkers for future studies.

7. Hospital Monitoring:
In hospital settings, IoT-enabled monitoring systems can be used to monitor patients' vital signs continuously, allowing healthcare providers to detect changes in health status and respond promptly to emergencies. This can help improve patient safety and reduce the risk of adverse events.

8. Sports and Fitness Monitoring:
 IoT-enabled monitoring systems can also be used in sports and fitness applications to monitor athletes' performance and health status during training and competitions. Coaches and trainers can remotely monitor athletes' vital signs and activity levels, allowing them to adjust training regimens and prevent injuries.

## IV. RESULT

The monitoring system can monitor, the patients all the time. The health parameters data are stored in cloud(Ubidots). Internet of things (IoT) is expected in various fields but more benefited in the field of healthcare. Health monitoring for ICU (Intensive Care Unit) patients need to monitor vital signs from time to time. By using the system, it reduces time and hence the patient monitoring system is designed. As a result, the doctor can examine his patient from anywhere and anytime. It can be allowed the doctors or nurses easily to use the computer for checking and to save in the database. Based on the work, doctors have been able to use mobile devices and can be implemented in a global network with the help of the Arduino.

## V. CONCLUSION

This proposed work focuses mainly on the point of medical safety for the patients who have blood pressure problem. The doctor anywhere can monitor the data of the patient even when he is not in the hospital, or the patient is not in the hospital. This will be a very useful device for the people who have high or low blood pressure.

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