Patient Health Monitoring System Using IOT Devices

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Abstract- **With an improvement in technology and miniaturization of sensors, there have been attempts to utilize the new technology in various areas to improve the quality of human life. One main area of research that has seen an adoption of the technology is the healthcare sector. The people in need of healthcare services find it very expensive this is particularly true in developing countries. As a result, this project is an attempt to solve a healthcare problem currently society is facing. The main objective of the project was to design a remote healthcare system. It's comprised of three main parts. The first part being, detection of patient's vitals using sensors, second for sending data to cloud storage and the last part was providing the detected data for remote viewing. Remote viewing of the data enables a doctor or guardian to monitor a patient's health progress away from hospital premises. The Internet of Things (IoT) concepts have been widely used to interconnect the available medical resources and offer smart, reliable, and effective healthcare service to the patients. Health monitoring for active and assisted living is one of the paradigms that can use the IoT advantages to improve the patient's lifestyle. In this project, I have presented an IoT architecture customized for healthcare applications. The aim of the project was to come up with a Remote Health Monitoring System that can be made with locally available sensors with a view to making it affordable if it were to be mass produced.Hence the proposed architecture collects the sensor data through ESP32 microcontroller it to the cloud where it is processed and analyzed for remote viewing. Feedback actions based on the analyzed data can be sent back to the doctor or guardian throug SMS alerts in case of any emergencies.**

I. INTRODUCTION

Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. Recently, the patient monitoring systems is one of the major advancements because of its improved technology. In recent years, health care sensors along with microcontroller play a vital role. Wearable sensors are in contact with the human body and monitor his or her physiological parameters. The Microcontroller which is a cheap, flexible, fully customizable and programmable small computer board brings the advantages of a PC to the domain of sensor network. In our system we are measuring patient's parameters (temperature, heart rate etc.) with different available sensors. These sensors collected data i.e., biometric information is given to microcontroller and then it is transferred to server IoT technology uses smart sensing devices and the Internet to provide an effective solution to the challenges faced by the networks, public and private sector industries, and government organizations worldwide. The IoT innovations have emerged a new paradigm in using smart systems and intelligent devices to analyze data for various applications.

II. PROBLEM STETMENT

1. In the absence of the doctors, the patient cannot consult the doctors due to which emergency situation may also be created. Using patient health monitoring system, patient's heartbeat, temperature can be measured by himself.
2. The reports of the diagnosis had to be saved in pc and then printed and delivered to the patient. Using patient health monitoring system direct message can be sent to the given phone number.
3. People living in remotes places had to travel far away for measuring heartbeat and temperature. Using patient health monitoring system they don't have to travel to remote place.

III. OBJECTIVES

Our system puts forward a smart patient health tracking system that uses Sensors to track patient health and uses internet to inform their loved ones in case of any issues. System uses temperature as well as heartbeat sensing to keep track of patient health.

The sensors are connected to a microcontroller to track the status which is in turn interfaced to a lcd display as well as wifi connection in order to transmit alerts. If system detects any abrupt changes in patient heartbeat or body temperature, the system automatically alerts the user about the patient's status Thus IOT based patient health tracking system effectively uses internet to monitor patient health stats and save lives on time.

IV. LITERATURE SURVEY

A.Authors: Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-El-Nour, and Mohammed Tarique.
Methodology: A smartphone base health monitoring system has been presented in this work. By using the system, the healthcare professionals can monitor, diagnose, and advice their patients all the time. The physiological data are stored and published online. Hence, the healthcare professional can monitor their patients from a remote location at any time. Our system is simple. It is just few wires connected to a small kit with a smartphone. The system is very power efficient. Only the smartphone or the tablet needs to be charged enough to do the test. It is easy to use, fast, accurate, high efficiency, and safe (without any danger of electric shocks). In contrast to other conventional medical equipment the system has the ability to save data for future reference. Finally, the reliability and validity of our system have been ensured via field tests. The field tests show that our system can produce medical data that are similar to those produced by the existing medical equipment.[1]

B.Authors:Bhoomika.B.K, Dr. K N Muralidhara.
Methodology: With the wide use of internet this work is focused to implement the internet technology to establish a system which would communicate through internet for better health. Internet of things is expected to rule the world in various fields but more benefit would be in the field of healthcare. Hence present work is done to design an IOT based smart healthcare system using a PIC18F46K22 microcontroller. In this work the MCP6004 based Pulse oximeter is designed and DS1820B temperature sensor is used to read the temperature and heart rate of the patient and the microcontroller picks up the data and send it through ESP8266 Wi-Fi protocol. The data is also sent to the LCD for display so patient can know his health status.[2]

C. Authors: Sudha.V, Shaziya Banu. A.Poojitha.Nilofer Taj
Methodology: This PAPER is based on monitoring of patients. We have designed and developed a reliable, energy efficient patient monitoring system. It is able to send parameters of patient in real time. It enables the doctors to monitor patient's health parameters (temp, heartbeat, ECG, position) in real time.[3]

D. Authors: UjwalaLahamge, Priyanka Phatale, Dhananjay Shimpi , SwapnaliWalke,. Ayesha Butalia
Methodology: In this paper we are providing a monitoring system which has the capability to spontaneously monitor physiological parameter of adolescent and scholar and according to that generate analysis report. The sensors are attached on victims body in the form of wireless body sensor network(WBSN) this Wireless Body Sensor (WBS) are able to sense physiological parameter such as heartrate, temperature and pulses and send this information to server.[4]

E. Authors: RajvardhiniKatake, BhagyashreeKute, SharmiliRanjane, Shubham C. Jaiswa
Methodology: In our system is purely based on IOT and cloud computing We used cloud computing to store data, this data can be stored permanently and can be accessed anywhere. This system also keeps patient privacy at home as well as at hospital. This health monitoring system has been proved to be of great help for the health care of patient.[5]

V.METHODOLOGY

A. ELECTRONIC COMPONENT Our system consists of total 7 components in them there are total 3 sensor and 1 lcd screen and 1 GSM module, 1 ESP32. Each sensor has its accuracy up to 90% , So there is no chance of miscalculation .

1. As shown in circuit-diagram(fig 1) all the sensors are connected to the main body of the project that is ESP32.All the power supply is connected through esp32 to all the components and GSM is given power supply separately

2. On lcd screen its shows 3 indication on it like pulse rate, temperature,ECG. There is range for each value up to which the system will consider as an healthy

value and beyond that value it will consider it as an abnormality and will send an alert message to the patient doctor or to the close person.

3. The range for each value is specified in the program so as for temperature between 33 to 38°C beyond these values you get and alert message. Similar for all other sensory system there is fixed range for it.

4. It is an wireless system as it can send signal from any part of the world.

5. Pulse Acquisition Module. Generally speaking, the photoelectric pulse sensor is divided into two types: transmitted wave monitoring and reflected wave monitoring according to how to detect light . Their key components are the same (i.e., stable light source and lightreceiving sensor).

6. Here as the temperature increases, the voltage across a diode increases at a known rate by precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature

7. Use of the system is very easy as all of these sensor are touch based type so for temperature we need to just touch the tip of the sensor and for pulserate it's the same touch at the top of the led sensor .As it will take likely 5 sec to function the input and the it will show the output on the lcd screen. In a same pattern it will show the output on the website that is Thinkspeak as on this site we are getting the outputs in the form of Graphical form so in that we can see the (time , date , Output) of the person using device . On this desktop it has three windows theyare (pulserate, ECG,Temperature).

8. A kit for healthcare monitoring using the IoT platform to assess the parameters like a heartbeat, ECG, temperature, and respiration using various intelligent sensors. The major limitation of this system is that data visualization is ineffective due to the lack of interface. Accuracy of our system output is upto 90% so for sometimes there is fluctuation in the value.[3,4]

9. IoT's evolution has increased nowadays with smart devices' tremendous ability to share information between them. The reliance on IoT on various applications has widened its importance in the

healthcare sector for remote monitoring of patients' criticality levels This technological advent has come across various domains of safety, health, and human wellbeing.

10. A human health monitoring system based on the Internet of Things is designed in this work. The system can uninterruptedly and accurately monitor the human body's heart rate, blood pressure, pulse, body temperature, physiological information, and other vital sign parameters. This work uses wireless sensors to retain the information for health monitoring. The data is integrated using the Internet of Things for processing, connecting, and computing to achieve real-time monitoring. The proposed system demonstrated relatively accurate and stable test ability improving deficiencies in the existing health monitoring platform [5]. This article contributes in daily health management using the human health monitoring system based on the Internet of Things which is instrumental in heightening health service quality and level.

11. The experimentation outcomes are analyzed in this section discussing various compliances and assessing outcomes obtained from their implementation. the system's test results are relatively accurate Although there is deviation sometimes, it is within the acceptable range. This is because the sensor of the pulse acquisition module is associated with the circuit design. It can be further improved in the future to acquire more accurate results.
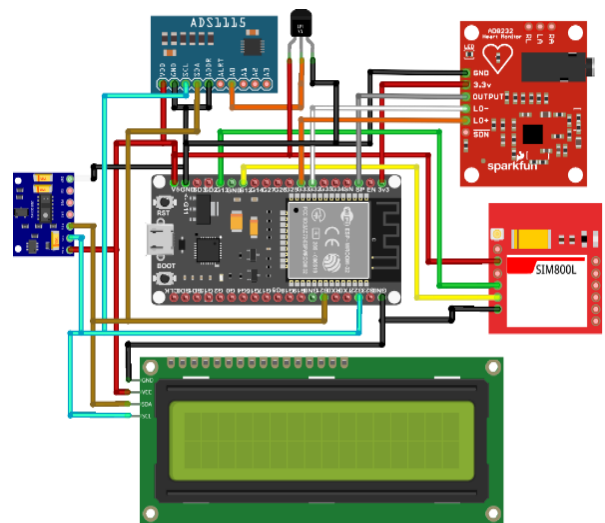
Fig1 Circuit Diagram

VI.RESULTSAND DISCUSSION

1. Compliance Test of Body Temperature Acquisition Module. Two people were selected as test subjects to conduct temperature measurements to make reasonable judgments on the temperature monitoring module's performance to evaluate the system's accuracy more rigorously

2. Two persons' temperature using a thermometer is 36.4° C and 36.7° C respectively. The temperature test was carried out three times for each person, and the average of each person acquired by the system is 36.5° C, 36.4°C, respectively. It is evident that this system's measurements are very close to those of a thermometer and can monitor body temperature. It also indicates that the temperature test of this system is relatively stable.

3. Test of ECG Information Acquisition Module. In monitoring the ECG information collection module, the first step is to update or load the user's latest ECG measurement record information. Simultaneously, the corresponding detailed operation page will be displayed so that the real-time ECG frequency is acquired. Considering that the ECG data points are complicated, slight adjustments can be performed in the functional area to achieve the best results to view a particular segment's frequency curve.

VII. ADVANTAGES

Remote monitoring: Real-time remote monitoring via connected IoT devices and smart alerts can diagnose illnesses, treat diseases and save lives in case of a medical emergency.

❖ Prevention: Smart sensors analyze health conditions, lifestyle choices and the environment and recommend preventative measures, which will reduce the occurrence of diseases and acute states.

❖ Improved treatment management: IoT devices help track the administration of drugs and the response to the treatment and reduce medical error.

❖ Improved healthcare management: Using IoT devices, healthcare authorities can get valuable information about equipment and staff effectiveness and use it to suggest innovations.

VII. CONCLUSION

In this proposed system a mobile physiological monitoring system is presented, which is able to continuously monitor the patient's heart beat, blood pressure and other critical parameters in the hospital. We proposed a continuous monitoring and control mechanism to monitor the patient condition and store the patient data in server using Wi-Fi Module based wireless communication, we also proposed remote health care data acquisition and smart storage system. The Future work of the project is very essential in order to make the design system more advanced. In the designed system the enhancement would be connecting more sensors to internet which measures various other health parameters and would be beneficial for patient monitoring i.e. connecting all the objects to internet for quick and easy access. Establishing a Wi-Fi mesh type network to increase in the communication range.

IX. AKNOWLEDGEMENT

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Volume -6, Issue-1_2, 2018Patient Health Monitoring System Using IOT & Arduino

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