Elderly Health Care Using IOT

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Abstract—Remote health monitoring can provide useful physiological information in the home. This monitoring is useful for elderly or chronically ill patients who would like to avoid a long hospital stay. Wireless sensors are used to collect and transmit signals of interest and a processor is programmed to receive and automatically analyze the sensor signals. In this project, you are to choose appropriate sensors according to what you would like to detect and design algorithms to realize your detection. Examples are the detection of a fall, monitoring cardiac signals.

Keywords—*: *IoT, Healthcare, Agility in Healthcare, Flexibility in healthcare, Technology adoption

I. INTRODUCTION

Health is always a major concern in every growth the human race is advancing in terms of technology. Like the recent corona virus attack that has ruined the economy of China to an extent is an example how health care has become of major importance. In such areas where the epidemic is spread, it is always a better idea to monitor these patients using remote health monitoring technology. So Internet of Things (IoT) based health monitoring system is the current solution for it.Remote Patient Monitoring arrangement empowers observation of patients outside of customary clinical settings (e.g. at home), which expands access to human services offices at bring down expenses. Thecore objective of this project is the design and implementation of 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. The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure. Each of our bodies utilizes temperature and also pulse acknowledging to peruse understanding wellbeing. The sensors are linked to a microcontroller to track the statusIf framework finds any sudden changes in understanding heart beat or body temperature, the framework displays the client about the patients status over IOT and furthermore indicates subtle elements of pulse and temperature of patient live in the web. In this manner IOT set up tolerant wellbeing following framework viably utilizes web to screen quiet wellbeing measurements and spare persists time. Once the health issue has been increased to a critical stage and the life of the person is endangered, then they take medical assistance, which can cause an unnecessary waste of their earnings. This also comes into account especially when certain epidemic is spread in an area where the reach of doctors is impossible. So to avoid the spread of disease, if a smart sensor is given to patients, who can be monitored from a distance would be a practical solution to save many lives.

II. BACKGROUND AND MOTIVATION

There is also the issue of internet connectivity where some systems to operate, good quality internet for a real- time remote connection is required. Internet penetration is still a problem in developing countries. Many of the systems were introduced in the developed countries where the infrastructure is working perfectly. In most cases, the systems are adapted to work in developing countries. To reduce some of these problems there is need to approach the remote detection from a ground-up approach to suit the basic minimal conditions presently available in developing countries. A simple patient monitoring system design can be approached by the number of parameters it can detect. In some instances, by detecting one parameter several readings can be calculated.

Literature Review

Modern health care system introduces new technologies like wearable devices or cloud of things. It provides flexibility in termsof recording patients monitored data and send it remotely via IOT. For this connection, there is need of secure data transmission .To transmit the data with privacy is the Moto of this paper. The proposed system introduces security of health care and cloud of things .System works in two major parts viz. storage stage and data retrieving stage. In storage stage, data is stored, updated for future use. In data retrieving stage, retrieve data from cloud. The cloud server can share with authenticated user as per request. A patient with wearable devices continually updates his record every 5 or 10 min. In emergency mode, it updates for every 1min.The wearied device will send results to phone using Bluetooth connection or NFC technology. This can able to give to cloud server using GSM and 3G. At cloud server, each patient is defines with unique address. So data at cloud can

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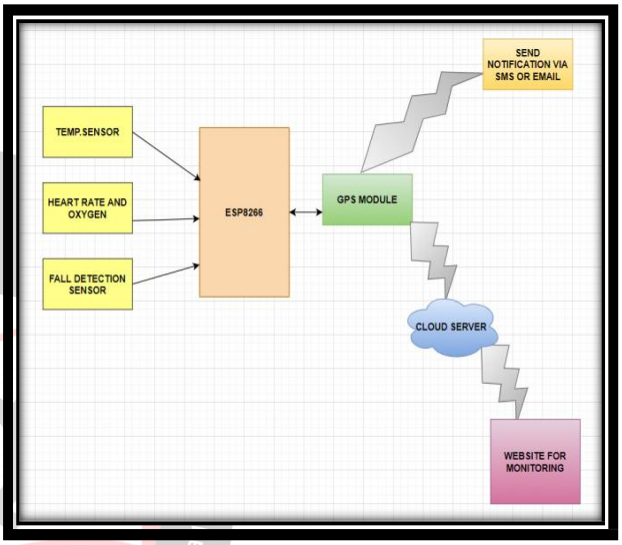
authenticate the right patient and provide the required request.[1] Telemonitoring system via WBAN is evolving for the need for home based mobile health and personalized medicine. WBAN can able to collect the data acquired from sensor and record the output. This output results sent to controller wirelessly to health monitoring system. In this paper, Zigbee is used to in WBAN technology due to its guaranteed delay requirement for health telemonitoring system. Zigbee used in the communication.[2] Afef Mdhaffar, Tarak Chaari, Kaouthar Larbi, Mohamed Jmaiel and Bernd Freisleben has explained low power WAN network to perform analysis of monitored data in health caring system. They have established WAN network for communication upto the range of 33m2 at around 12 maltitude. Also they have demonstrated that power consumed by LoRaWAN network is ten times less than the GPRS/3G/4G.The IOT architecture has been given for step wise working for understanding of IOT .The main purpose of LoRaWAN is the energy consumption. The power consumption in idle mode for LoRaWAN is 2.8mA while in GPRS is 20mA.Hardware cost in LoRaWAN is 10doller while in GPRS is 50 dollar. Maximum data rate in LoRaWAN is 50kbps (uplink), 50 kbps downlink while in GPRS is 86.5 kbps(uplink ,14kbps(downlink).These results gives the overall efficiency of LoRaWAN in the demonstration of IOT for health monitoring system. [5] Mohammad M. Masud, Mohamed Adel Serhani, and Alramzana Nujum Navaz had given the measurement of ECG signals at various intervals and at different situations. They have considered energy aware, limited computing resources and lose network continuity challenges .For these challenges; mathematical model has been developed to execute each task sequentially. There are three approaches designed to work out the process .One is mobile based monitoring approach, data mining and third is machine learning approach [6] Ayush Bansal , Sunil Kumar, Anurag Bajpai, Vijay N. Tiwari, Mithun Nayak, Shankar Venkatesan, Rangavittal Narayanan focuses on development of a system which is capable of detecting critical cardiac events. Using an advanced remote monitoring system to detect symptoms which lead to fatal cardiac events [7] Hamid Al-Hamadi and Ing-Ray Chen gives trust based health IOT protocol that considers risk classification, reliability trust, and loss of health probability as design dimensions for decision making. Comparative analysis of trust based protocol and baseline protocols te check feasibility.[8] Muthuraman Thangaraj Pichaiah Punitha Ponmalar Subramanian Anuradha ."Digital hospital" term is introduced for hospital management. It enables automatic electronic medical records in standard. Also discusses with the implemented real world scenario of smart autonomous hospital management with IOT.[9]

PROPOSED SYSTEM

The core objective of this project is the design and implementation of a smart patient health tracking system. The sensors are embedded on the patient body to sense the temperature and heartbeat of the patient. Two more sensors are place at home to sense the humidity and the temperature of the room where the patient is staying. These sensors are connected to a control unit, which calculates the values of all the four sensors. These calculated values are then transmitted through a IoT cloud to the base station. From the base station the values are then accessed by the doctor at any other location. Thus based on the temperature and heart beat values and the room sensor values, the doctor can decide the state of the patient and appropriate measures can be taken.

III. IMPLEMENTATION

A. *BLOCK DIAGRAM*



B *COMPONENTS USED*

Temperature sensors

Name of Sensor	Cost	Accuracy	Measurement	Voltage
LM35	199	0.5	-55 to 150	4V-30V
DS18	320	0.5	55 to 125	3V-5.5V
DHT11	279	2.5	0-50	3.5V-5.5V

Heart Rate and Oxygen Saturation Level Sensor

MAX30100 module

1. Optical sensor : IR and red LED combined with a photodetector
2. Measures absorbance of pulsing blood
3. 3.3v power supply
4. High performance analog front
5. Ultra low power operation increases battery life of wearable devices

A. *Software Requirement*

1) *Android Studio*

Android studio provides a unified environment where you can build apps for android phones, tablets, android TV, etc. In android studio you can design your app front end and as well as their backend functionalities using java

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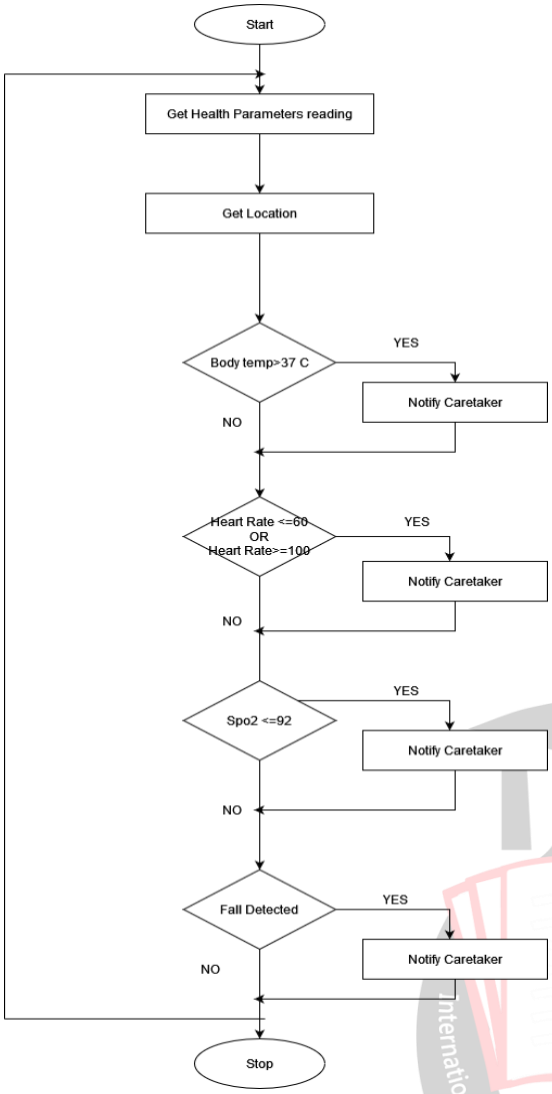
language.



B. Structure of website

1) Home screen

It shows the all information of healthcare company.

2) Various options

It shows the options such as services,appointment booking and contact details.

3) Booking appointment

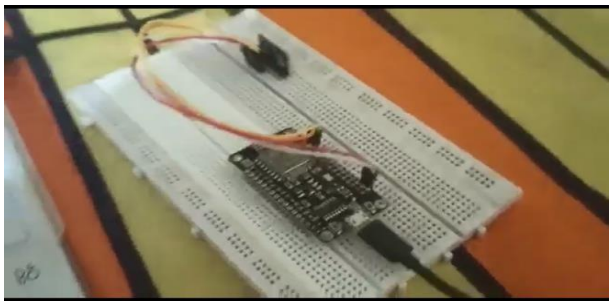
Form is provided to fill information and ack. Provided to userafter successful submission.

4) Whatsapp assistance

Whatsapp chatboat provided to solve queries.

Experimental setup

The body temperature, humidity and pulse rate sensors are monitored and initially displayed on browser as explained inthe flowchart.



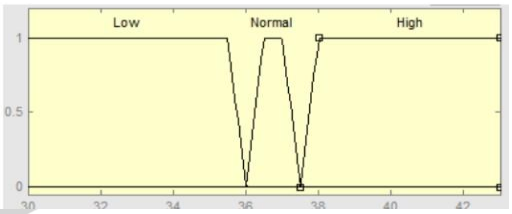
$$\text{Low} = \begin{cases} 1, & x < 36°C \\ 0, & x > 36°C \end{cases}$$

$$\text{Normal} = \begin{cases} 1, & 36.0°C \le x \le 37.5°C \\ 0, & x > 37.5°C \text{ and } x < 36°C \end{cases}$$

$$\text{High} = \begin{cases} 1, & x > 37.5°C \\ 0, & x < 37.5°C \end{cases}$$

Table II: Body Temperature

Body Temperature	State
36.0 –37.5 °C	Normal
>37.5 °C	High
<36.0 °C	Low

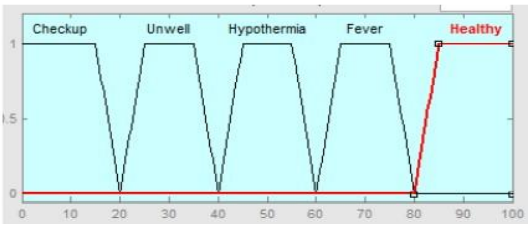


$$\text{Checkup} = \begin{cases} 1, & x < 20 \\ 0, & x > 20 \end{cases}$$

$$\text{Unwell} = \begin{cases} 1, & 20 \le x \le 40 \\ 0, & x > 40 \text{ and } x < 20 \end{cases}$$

$$\text{Hypothermia} = \begin{cases} 1, & 40 \le x \le 60 \\ 0, & x > 60 \text{ and } x < 40 \end{cases}$$

$$\text{Healthy} = \begin{cases} 1, & x > 80 \\ 0, & x < 80 \end{cases}$$



These rules for diagnosis can be summarized by considering all the combinations of membership functions of the body temperature and the pulserate as given below.

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- If the pulse rate and body temperature are (Low & Low) OR (Low & High) OR (High & Low) OR (High & High)
- Then the patient has to immediately go for a detailed Health Checkup.
- If the pulse rate and body temperature are (Low & normal) OR (High & Normal), then the patient is considered to be unwell.
- If the pulse rate and body temperature are (Normal & Low) then the patient is considered tobe in a hypothermia state

. • If the pulse rate and body temperature are (Normal & High) then the patient is considered to behaving fever.

- If the pulse rate and body temperature are (Normal & Normal) then the patient is consideredto be healthy.

IV. RESULT AND ANALYSIS

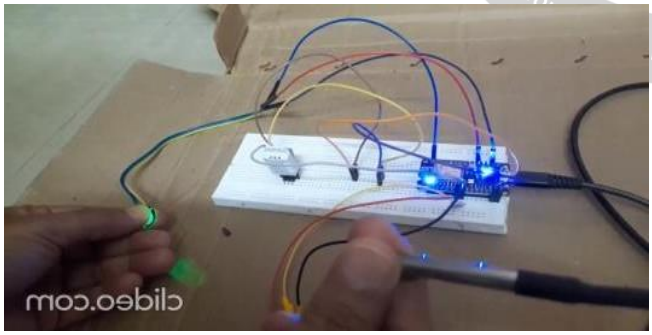
A. The temperature of a patient's body can be measured with just contact of the skin with thesensor.

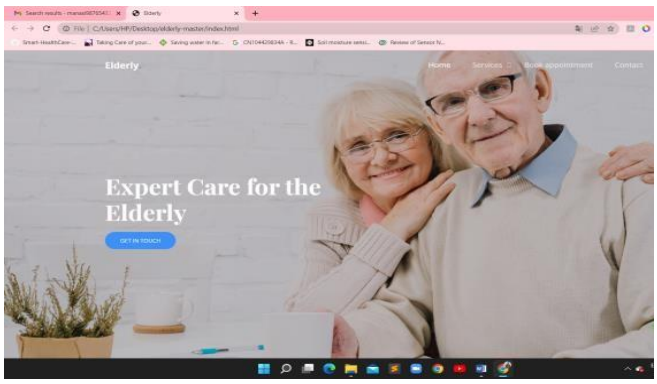
B. Detection of a fall possibly leading to injury in timely manner is crucial for providing adequate medical response and care

C. When a fall occurs the phone can alert a family member smart phone running a fall detection program text message using a built in Global Positioning System

D. Sensors used for this project are low power consumption. Also, this system can be installed easily.

E. Website developed is very simple and easy tooperate.





V. CONCLUSION

Heart is one of the main organs of the human body. For a sound and healthy person normal functioning of the heart is mandatory. Death rate due to cardio vascular disease is increasing day by day. So monitoring of the heart and body temperature is necessary for a healthy body. Biomedical engineering (BME) combines the design and problem solving skill of engineering with medical and biological sciences to improve patient's health care and the quality of life of individuals. This project gives an ultimate solution bymonitoring the heart condition of the patients and passing the information to the concerned authorities. Based on the patient's health condition, primary medication is provided.

REFERENCES

[1] S.H. Almotiri, M. A. Khan, and M. A. Alghamdi. Mobile health (m-health) system in the context of iot. In 2016 IEEE 4th International Conference on Future Internet of Things and Cloud Workshops (FiCloudW), pages 39–42, Aug 2016.

[2] Gulraiz J. Joyia, Rao M. Liaqat, Aftab Farooq, and Saad Rehman, Internet of Medical Things (IOMT): Applications, Benefits and Future Challenges in Healthcare Domain, Journal of Communications Vol. 12, No. 4, April 2017.

[3] Shubham Banka, Isha Madan and S.S. Saranya, Smart Healthcare Monitoring using IoT. International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 15, pp. 11984-11989, 2018.

[4] K. Perumal, M. Manohar, A Survey on Internet of Things: Case Studies, Applications, and Future Directions, In Internet of Things: Novel Advances and Envisioned Applications, Springer International Publishing, (2017) 281-297.

[5] S.M. Riazulislam, Daehankwak, M.H.K.M.H., Kwak, K.S.: The Internet of Things for Health Care: A Comprehensive Survey. In: IEEE Access (2015).

 DOI : 10.35291/2454-9150.2022.0202