

Smart Health Monitoring System Using Iot For Assisted Living Of Senior And Challenged People

R.Nivetha, S.Preethi, P.Priyadharshini, B.Shunmugapriya, B.Paramasivan, J.Naskath

Abstract: Nowadays, a promising development in healthcare is to move routine medical checks and other health care services from the hospital to the home atmosphere. With that, patients get health care more quickly, particularly in case of urgent situations. Moreover, hospitals can diminish their load by shifting the possible and easy tasks to the home environment. One significant advantage is the reduction in expenditure. Patients could avoid the fees charged by the hospital each time they went to visit the doctor. Therefore, it is urgent that shortly, a trending technology needs to be executed in the health industry to expand advanced health care techniques and technologies and use them for the easy monitoring of patients from anywhere else. In this application, the kit inserts, which consists of microcontroller node MCU, glucose temperature sensor, heartbeat sensor. These sensors sense the data sent to the web application. This application can be created in a user-friendly manner using the PHP software. In this application, the patients can reach the doctor's advice even in his physical absences, i.e., the patients can report their issues to the doctor by this website. Then the doctor reads the message sent by the patient and gives his prescription through a message which reaches the patient through a mobile phone. Thus Patient monitoring includes the checking of physical conditions of the patient and their medication details and therefore preventing the occurrence of critical requirements of the patients and periodically control in nurturing the patient's health conditions. Some uses of healthcare IoT are mobile medical applications or wearable devices that allow patients to capture their health data.

Index Terms: Assisted living, Health Monitoring, IOT, sensors

1 INTRODUCTION

In current years, wireless technology has to amplify for the need to prolong various sectors. The Internet of Things (IoT) platform proposes a shows potential technology to accomplish the healthcare as mentioned earlier services, and can further improve the medical service systems. In most recent years, IoT grasped most of the industrial area, especially health care, automation, and control. Biomedical is one of the current trends to provide improved health care. The IoT technology opens not only in hospitals but also in private health care facilities. So encompass an automatic system; various stricture is observed that consume power, expenditure, and enhance efficiency. According to this intelligent system, this paper which helps to know the health details of the people. In the conventional method, doctors play an indispensable responsibility in health check-ups. This method requires to need more time for muster, appointment, and then check-up and also, reports will be generated later. Due to this prolonged process working people tend to ignore the check-up or postpone it. This contemporary approach condenses time consumption in the process. Medical scientists are trying in the field of innovation and research for many decades to get better health services and happiness in human lives. Their contribution to the therapeutic area is significant to us and cannot be neglect. Today's automotive organization has the original ideas coming from yesterday's basics. Also, Early recognition of chronic diseases can be easy with these technologies.

- R.Nivetha, S.Preethi, P.Priyadharshini is currently pursuing Bachelors degree program in Computer Science and Engineering in National Engineering College, Kovilpatti, India
- B.Shunmugapriya, J.Naskath is currently working as Assistant Professor in Computer Science and Engineering in National Engineering College, Kovilpatti, India E-Mail: priyakrishnan.me@gmail.com

The body temperature, blood pressure, heart rate, respiration rate are prime parameters to diagnose and detect the patient's condition. This paper helps to know the temperature and heart rate values using IoT. This wearable platforms which can be used to collect the needed information of the user and its ambient atmosphere and correspond such information wirelessly, where it is progression or stored for tracking the past of the user. Such connectivity with peripheral devices and services will allow for taking the precautionary measure or providing instant and immediate care.

1.1 PROBLEM STATEMENT:

In the absence of the doctors, the patient cannot consult the doctors due to which emergency situation may also be created. The personal health monitoring of each individual is considered very important because of the rise in health problems in today's world. The increasing stressful lifestyle is taking a maximum toll on public health. With the ever-increasing queues at hospitals and an increasing number of patients, the doctor fees have sky-rocketed which is affecting especially those patients who cannot afford the fee or who are not suffering from major ailments but get to know so only after paying a hefty fee to the doctor.

1.2 OBJECTIVES

- To make an automated system that will help to monitor host remotely is our primary objective.
- To create an alarm or reaction system which will react whenever there is an alarming situation.
- To provide a way to remotely control the temperature, pulse, counting the bowel discharge in a day, and also the amount of sleep of the patient via Node MCU.
- To analyze the collected data using the built-in Matlab of the Node MCU sever to detect future hazards.
- To Send alarming messages via e-mail and twitter to the concerning authority or people if any abnormality is detected.
- To contribute to the field of IoT to pave the way for a future project in technological development.

1.3 INTERNET OF THINGS

Data capturing and sharing of the network-connected devices all the way through a safe and sound service layer is what defines IOT. Internet of Things (IOT) can be described as the wireless network in which the devices are linked to each and every other device and to share information and data to communicate with each other and produce new information for recording and analyzing it for further use. Internet of Things gets its full potential by utilizing the key role-playing objects, i.e., Smart objects which use a variety of sensors and actuators that are able to recognize their context, and via built-in networking facilities, they could communicate to each other, access the open-source Internet services and interact with the human world. This not only connects the world but also very comfortable and robust. The Internet of things in the healthcare field plays a significant role in providing ease to patients and doctors. It consists of a system that will be communicated between network connected systems, mobile applications, and devices that can help patients and doctors to check, follow, and maintain the record of the patients' vital data and medical information. Some of the devices include wearable health bands, smart meters, fitness shoes, smartwatches, and smart video cameras. Mobile phone applications also help in keeping a piece of medical information and data that should be dealt with efficiently by the contributors, and so is a big confront. Internet of Things Analytics will help to overcome this challenge of storing and analyzing large data. The raw data is transformed into valuable and medically-relevant data using techniques like data extraction and data analytics. Collection of real-time data from different sources, in this case, an unlimited number of patients for a significant period, has become very easy and fast using the prospective of IOT. The IOT mainly for health and medical services is attached by smart sensors that exactly measure, observe, and analyze a variety of health position indicators. Record with real-time alert and urgent situation services. IOT also facilitates the machine to machine contact, which allows devices being controlled by the Internet and by other strategies.

2 LITERATURE SURVEY

Kaleem Ullah, MunamAli Shah [1] They presented the model named as 'k-Healthcare' makes use of four different layers, sensor layer, network layer, internet layer, and service layer. There are various sensors used like RTX-4100, Arduino, Raspberry Pi, pulse oximetry, and smartphone sensors. Communication between the above said layers are done through different communication technologies like IEEE 802.15.6, IEEE 802.11/b/g/n, etc. For data storage management system used cloud storage. The proposed system supports various protocols and like HTTP, HTTPS, RESTful, and Javascript web services. Punit Gupta, Deepika Agrawal [2] They proposed system is intelligent enough to monitor the health parameters of the patient. In the hardware, they used 2nd generation Intel Galileo, a 32-bit Intel Pentium processor system on a chip. It is considered as the brain of the given model. As it provides Linux platform with high processing and computing power, it prefers over Arduino. It gathers the information from all sensors which are connected to the patient and upload the data on the web page through Ethernet. Here they used the XD-58C pulse sensor for measuring heartbeats, and it takes +3.5v to +5v at VCC, 50Hz to 60Hz frequency. For temperature calibration, they have used the LM-35

temperature sensor and Xampp based database server used for the patient's timely record. Prosanta Gope and Tzonelih Hwang [3] The system presents a BSN i.e., body sensor technology. It consists of wearable and implementable biosensors like EMG (Electromyography), ECG (Electrocardiogram), Blood pressure, etc. BSN care server used wireless communication using 3G/GPRS/CDMA. Here they mentioned essential security requirements like data integrity, data privacy, data freshness, etc. To achieve security requirements here, they proposed a lightweight anonymous authentication protocol and, to obtain data security necessities, used OCB, i.e., offset codebook authenticated encryption mode. Abhilasha Ingole, Shrikant Ambatkar [4] The paper is based on essential health parameter monitoring without using a powerful or colossal system. The credit card size minicomputer located at the side of the patient's bed with power and results be able to see on the computer screen, which is in the same area network. It endows with readings of body temperature and heartbeat. The temperature monitoring system used the DS18B20 sensor, and for a heartbeat, it works on the principle of modulation of light by blood flow through finger at each pulse. The detected values uploaded on the webpage. The web pages are created in HTML. By using of Python language to interface different measurement parameters with Raspberry Pi and anyone can see the actual status of the system on LX Terminal. Augustus E. Ibhaze, MNSE, Francis E. Idachaba [5] According to these Authors, it is essential to measure basic health parameters for older people frequently to decrease the risk of falling ill and becoming extinct. So the microcontroller-based system is designed to monitor both heart rate and temperature. It continuously sends the text message to the mobile phone. When the interpretations are not usual or augmented beyond the threshold level, the device builds used of the sim808 GPRS/GSM/GPS to send the reports of the patient's health and the location to a doctor's and custodian mobile phone. Arduino microcontroller sensors attached to the patient's finger for computing temperature and heart rate. In this paper, they noted the patient's location, and the system takes a 9v powered battery. Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-EINour [6] The system uses an Arduino shield to connect different sensors like blood glucose sensor, temperature LM-35 sensor, and blood pressure sensor. By using LabVIEW software, anyone can take the reading of various parameters from the patient's body.

3 PROPOSED SYSTEM

We have anticipated a robust health monitoring system that is smart enough to watch the patient automatically using IoT that gathers the information status through these systems which would comprise patient's heart rate, blood pressure, and ECG and sends an urgent situation alert to patient's physician with his recent status and full medical information. This would facilitate the doctor to monitor his patient from anyplace and also to the patient to send his health status directly without an appointment to the hospital. The system uses smart sensors that produce raw data information collected from every sensor and send it to a database server where the data can be further evaluated and statistically maintained to be used by the medical specialists. Preserving a database server is obliged to so that there is even track of earlier medical record of the patient provided that a better and improved examination detail. The system can be wide-ranging by adding up some features

like location access, connecting the ambulance services, most important doctor's catalog and experts, hospitals and their special amenities, etc., Doctors can create consciousness about diseases and their indications through the mobile phone application. From the estimation and the outcome obtained from the analysis, the system is better for patients and the doctor to get better their patients' medical assessment.

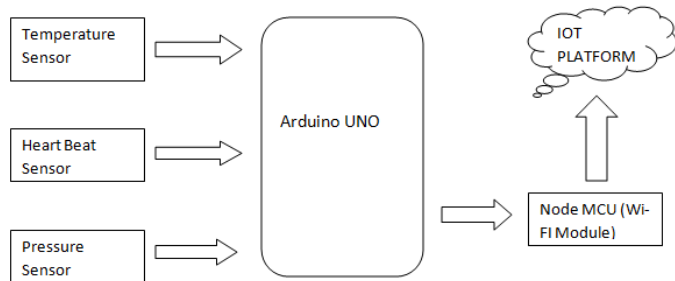


Fig 1 system design for IOT based health monitoring system

Fig 1 shows the system design for the IoT based health monitoring system. The health monitoring sensors help collect health connected data i.e., for data acquisition. Communication can be done by Microcontroller for sending data on the internet wirelessly. Data processing has been done at the server. All data composed and aggregated at server. Finally, we get health-related information in the understandable format it can be shown on the web page i.e., data management.

4 WORKING OF SYSTEM

The following snapshot shows the working flow of the system. The results collected from the sensor are investigated i.e. if abnormal behavior has been detected, then an urgent situation plan activated to inform the doctor about the patient's health. So it reduces dangerous conditions in hospitals.

4.1 SCREENSHOTS

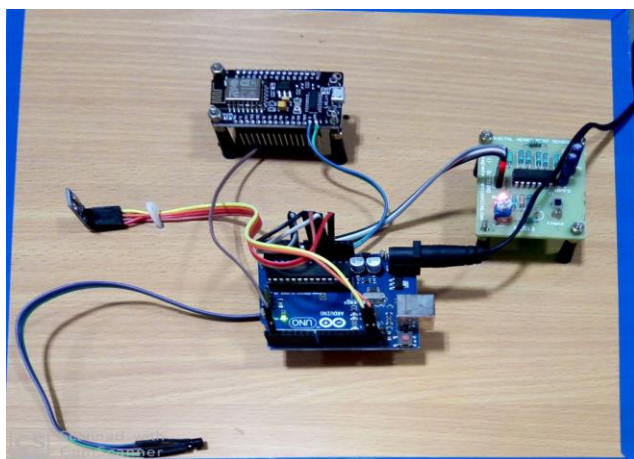


Fig 2 connecting the components

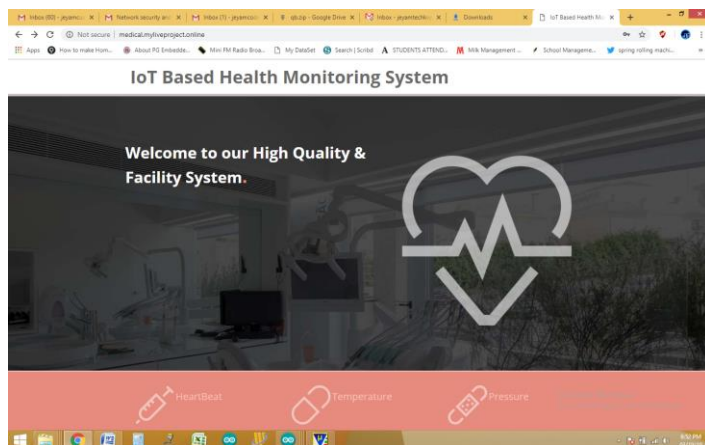


Fig 3 website homepage

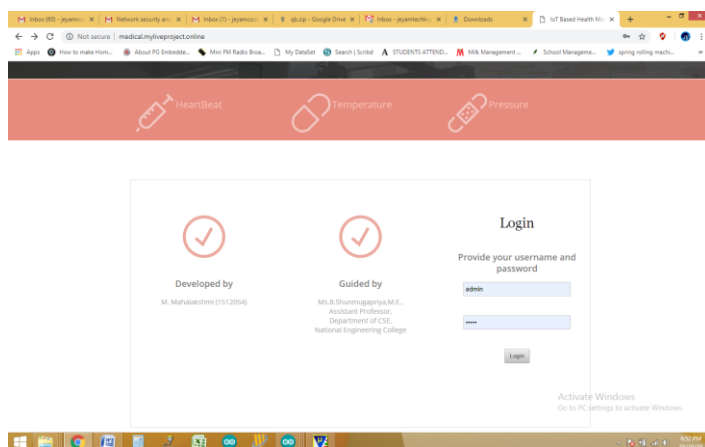


Fig 4 website login page

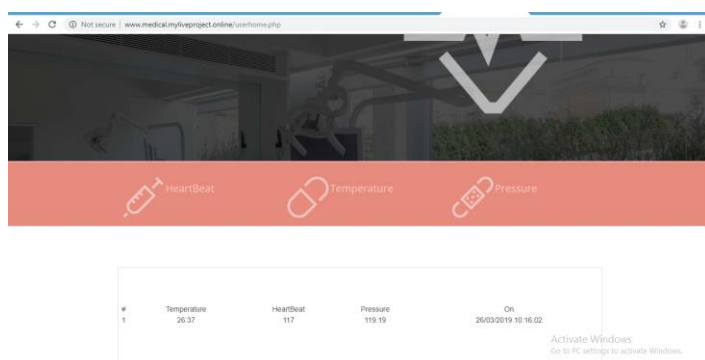


Fig 5 final output

6 CONCLUSION

In this paper, we have presented a low-power wearable IoT system for active and assisted living healthcare applications. We have outline the main components of the proposed system and explained their implementation details. We have built a prototype to illustrate the different performance aspects of the proposed system. The preliminary performance evaluation results have demonstrated the efficiency of the proposed system despite being a low-cost one. This makes the proposed system a good candidate for implementing a wide set of wearable healthcare systems. Our future work will include how to secure the access of the data and will develop

a mobile application that allows access of the data on handheld devices.

7 REFERENCES

- [1] Yin, Y., Zeng, Y., Chen, X., Fan, Y.: The Internet of Things in healthcare: an overview. *J. Ind. Inf. Integr.* 1, 3–13 (2016)
- [2] Wang, X., Wang, J.T., Zhang, X., Song, J.: A multiple communication standards compatible IoT system for medical usage. In: *IEEE Faible Tension Faible Consommation (FTFC)*, Paris, pp. 1–4 (2013)
- [3] 4. Xu, B., Xu, L.D., Cai, H., Xie, C., Hu, J., Bu, F.: Ubiquitous data accessing method in IoT-based information system for emergency medical services. *IEEE Trans. Ind. Inf.* 10(2), 1578–1586 (2014)
- [4] 5. Kolici, V., Spaho, E., Matsuo, K., Caballe, S., Barolli, L., Xhafa, F.: Implementation of a medical support system considering P2P and IoT technologies. In: *Eighth International Conference on Complex, Intelligent and Software Intensive Systems*, Birmingham, pp. 101–106 (2014)
- [5] Sullivan, H.T., Sahasrabudhe, S.: Envisioning inclusive futures: technology-based assistive sensory and action substitution. *Futur. J.* 87, 140–148 (2017)
- [6] Sandholm, T., Magnusson, B., Johnsson, B.A.: An on-demand WebRTC and IoT device tunneling service for hospitals. In: *International Conference on Future Internet of Things and Cloud*, Barcelona, pp. 53–60 (2014)
- [7] Mohan, A.: Cyber security for personal medical devices Internet of Things. In: *IEEE International Conference on Distributed Computing in Sensor Systems*, Marina Del Rey, CA, pp. 372–374 (2014)
- [8] Antonovici, D.A., Chiuchisan, I., Geman, O., Tomegea, A.: Acquisition and management of biomedical data using Internet of Things concepts. In: *International Symposium on Fundamentals of Electrical Engineering*, Bucharest, pp. 1–4 (2014)
- [9] Azariadi, D., Tsoutsouras, V., Xydis, S., Soudris, D.: ECG signal analysis and arrhythmia detection on IoT wearable medical devices. In: *5th International Conference on Modern Circuits and Systems Technologies*, Thessaloniki, pp. 1–4 (2016)
- [10] Krishnan, B., Sai, S.S., Mohanthy, S.B.: Real time internet application with distributed flow environment for medical IoT. In: *International Conference on Green Computing and Internet of Things*, Noida, pp. 832–837 (2015)