

IOT BASED HEALTHCARE MONITORING SYSTEM

Prathama Bhave¹ Pallavi Jagare ²Pallavi Patil³

Department of Information Technology. Bharati Vidyapeeth College of Engineering.

Navi Mumbai, India.^{1,2,3}

Pratha0606@gmail.com, pallujar14@gmail.com, pallavip580@gmail.com

Abstract: Monitoring and Recording of various medical parameters of patient outside hospitals has become Wide spread phenomenon. The Reason behind this project is to design a system for monitoring the patient's body at any time using internet connectivity. The function of this system is to measuring some biological parameter of the patient's body like Temperature and heart rate , by using sensors and the sensors will sense the body temperature and heartbeat of the patient and sends the values to the server through WIFI-Module. All information about the patient health will be stored on the server, it enables the doctors to monitor patient's health, where the doctor can continuously monitor the patient's condition on his Smart phone or to the patient's love ones in case of home healthcare In any critical condition the notification will be send to patient's doctor or relative on their android device having health care application installed in it .In this project we can monitor patient's condition remotely and we can secure their lives by giving emergency alert in real-time.

Keywords-Internet, IoT , Health Monitoring , Sensors , Health Care , Data , User .

I INTRODUCTION

Technology has always been there to simplify and makes the human life much easier. It affected the various areas of life; the medical field is one of them. It benefits from the technology in different ways; now it is easier to diagnose internal diseases using some digital devices. The healthcare sector is going through a huge change, with digital capabilities changing the way doctors interact with their patients. Nowadays, patients have the tools to view their key vitals themselves and help doctors to have immediate access to patient data on-the-go. In a form of wearable devices e.g. Apple watches. However, we note that these devices are quite expensive and it is difficult to find these devices used by poor people, who are facing the biggest part of diseases burden. Moreover, most of the existing medical devices are still need some investigations once it comes to the concept of the Internet of Things The concept of the IOT entails the use of electronic devices that capture or monitor data and are connected to a private or public cloud, enabling them to automatically trigger certain events. Medical data such as temperature and heart rate are collected by sensors on peripheral devices; these data are send in the form of notification on the android device with the health care application via wireless telecommunication devices. As a result,

timely intervention ensures positive patient outcomes. Bluetooth, ZigBee, and Wi-Fi are the common wireless technologies for remote patient monitoring systems. However, their suitability and usability for this task are widely varying. Therefore, there are significant considerations while selecting a technology for IoT medical devices; you need to be aware of what their characteristics for specific requirements. The proposed system will help patients in remote places (e.g. home healthcare) and that is not just about monitoring the parameters, but about helping prevent patients from getting to that state. By implementing this project, it will offer an inexpensive system for remotely patient's health monitoring, which can save their lives by giving emergency alert in real-time..

II LITERATURE SURVEY

Many home-care systems are available but majority of this system are specially designed for the aged people and patients. These systems can monitor their health status, automatically send out emergency signals, and have other functions. However, the caring methods for infants are not the same. Children and adults require different type of care because they are totally dependent for their normal functions on someone else. Infants cannot give any feedback about their discomfort or health complaints. Infants cannot

express themselves like old people, e. g when an infant has a fever, he/she can only express his/her discomfort by crying. Hence, a home-care system specially designed for infants is today's need which would substantially lighten parents' especially mother's burden. In support of this requirement many research papers and patents for healthcare application are studied with the intention of possible solutions to take care of the infant. Author had developed a system which is based on commercial GSM network. Vital parameters such as body temperature measurement using LM 35[1,6], Heart rate using IR Transmitter and Receiver, respiratory rate by using Piezo film sensor located on Patient's Chest and blood Pressure are sensed, amplified with variable gain, filtered and given to microcontroller. Remote subsystem with GSM module receives data which is then send to a server by a USB port. Data are stored on the server and remotely displayed in a web site. In SMS based telemedicine system, patients temperature measured by Infrared temperature sensor MLX 90614 and ECG signals acquired with electrodes interfaced with the microcontroller PIC16F877 [3].A wearable hardware gadget is developed which captures the biological status of the baby such as motion, temperature and heart rate sensors (both optical and pressure) which are controlled by the microcontroller and connected to the Bluetooth module to provide wireless communication [5]. In paper [14], the temperature and humidity parameters are monitored. A skin-temperature probe, the air temperature-probe was used to monitor the temperature around the baby and humidity of incubator was monitored using the humidity sensor from SYHS2XX series. This signal is interfaced to PIC microcontroller 18F4550 and GSM modem is used for communication. Patents are also searched to find novelty in baby care monitoring system.

III PROBLEM STATEMENT

In order to avoid emergency in house healthcare or in hospitals, where patient's status needs to be regularly monitored, is usually done by a doctor or other paramedical staff by constantly observing some important parameters, such as body temperature and heart rate thus, this task becomes tedious after sometime. Hence it can cause problems. However, there are many researchers have attempted before to solve it in many different ways, but the earlier methods in

several cases either SMS will be sent using GSM or RF module will be used to send patient's data from sender device to receiver device. Moreover, in the earlier cases the history of the patient cannot be displayed, only current data is displayed

IV PROPOSED SYSTEM

. The sensors temperature and heart rate is connected to the Arduino board. The values from the microcontroller is given to the Web Server using Wi-Fi-Connectivity. The parameter values can be viewed by the android application installed in doctors and patients or their relatives smart phone. The microcontroller is connected with all hardware units in the module.

Below Figure 4.1 Block diagram of proposed system



Figure 4.1 Block Diagram

4.1: Temperature sensor

The most widely measured physical parameter is body temperature; it can be calculated by putting the sensor in contact with human body. The sensor used in this project is an LM35 temperature sensor. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The LM35 sensor has more features that attracted us to choose it, such as Calibrated directly in Celsius (Centigrade), Linear + 10-mV/°C scale factor; it measures temperatures from -55°C to +150°C range, the accuracy ±0.5°C

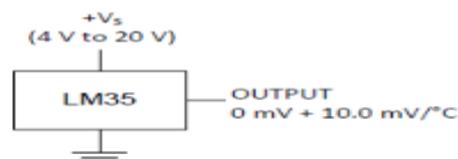


Figure 4.2 The LM35 sensor and its interfacing with microcontroller

4.2 Heartbeat sensor

Easy Pulse sensor is designed for hobby and educational purposes to illustrate the principle of photoplethysmography. The Easy Pulse sensor allows you to measure the pulse rate from fingertip using the transmission mode PPG. The Easy Pulse Version 1.1 uses the HRM-2511-Esensor that fits comfortably onto fingertip. Inside the sensor there is an IR LED that illuminates the finger from one side. A photo detector placed on the opposite side and facing towards the IR LED detects the transmitted light through the finger. The little variations in the transmitted light intensity are synchronous with blood volume changes and hence with the pumping action of the heart. The on-board electronics filters out the noise from the PPG signal and amplifies the signal so that it is readable by a microcontroller.



Figure 4.3 Heartbeat sensor

V IMPLEMENTATION DETAILS

We are going to calculate the data of various parameters using the ATMEGA 328. The Easy Pulse sensor allows you to measure the pulse rate from fingertip using the transmission mode PPG. This LCD will be used to show the operations performed by the microcontroller and the readings of the sensors. We have interfaced the microcontroller with the 18X2 LCD and the purpose of it will be show all the operations on the user so that user will get aware what is the current process going on. ATMEGA 238 will be interfaced with all the sensors. It will get readings from all he sensors and then those readings are concatenated in the single string. So that we can use that string to send the data to the server. Clubbing all the readings from the sensor calculated in one cycle and are send to the Wi-Fi module. Wi-Fi module used is the Node MCU .Node MCU is already has created connection with the nearest Wi-Fi hotspot. And using that hotspot data will be sent to the server. The data from the server is send to the

android device with the heath care alert application installed in it .This app is specially developed for this purpose. The server sends the data in the form of notification in the application on the android device. The data record is stored in the application and can be reset when required.

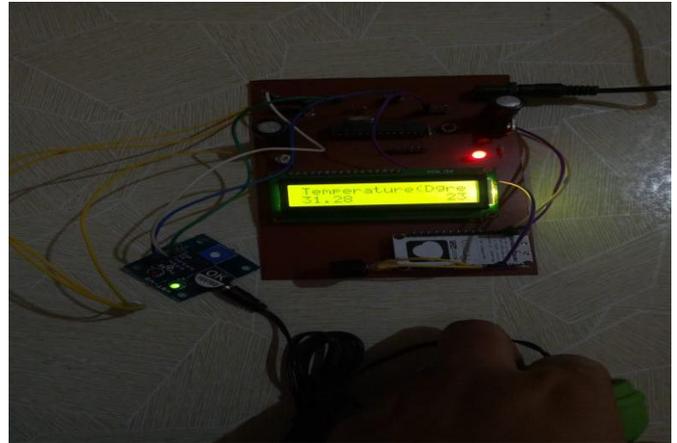


Figure 5.1 LCD displaying temperature.

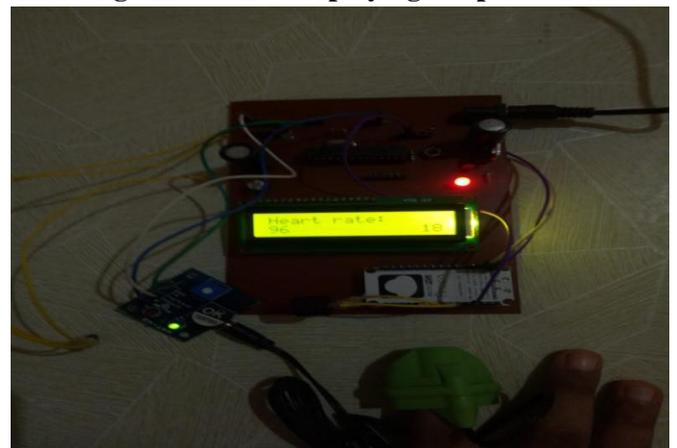


Figure 5.2 LCD displaying heart rate.

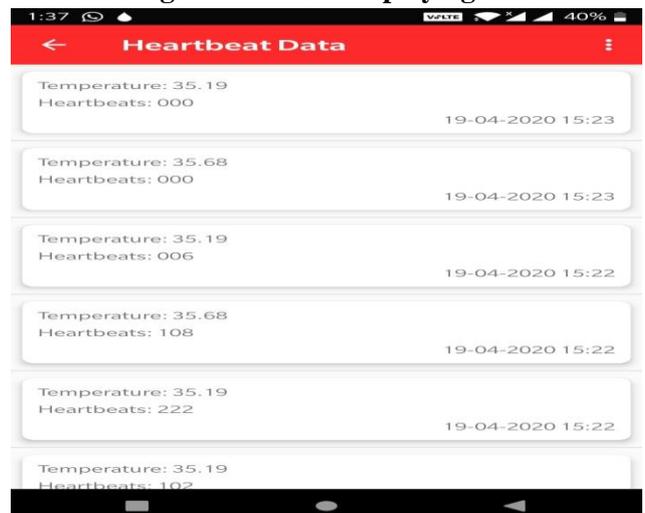


Figure 5.3 Application displaying received data.

VI CONCLUSION AND FUTURE WORK

In this proposed system a mobile physiological monitoring system is presented, which is able to continuously monitor the patient's heart beat and temperature. 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.

REFERENCES

- [1]. J.E. Garcia, R.A. Torres, "Telehealth mobile system ", IEEE Conference publication on Pan American Health Care Exchanges, May 4,2013.
- [2]. Nitin P. Jain, Preeti N. Jain, and Trupti P. Agarkar, "An Embedded, GSM based, Multi parameter,Real-time Patient Monitoring System and Control", IEEE Conference publication in World Congress on Information and Communication Technologies, Nov 2, 2013.
- [3]. Ashraf A Tahat, "Body Temperature and Electrocardiogram Monitoring Using SMS-Based Telemedicine System", IEEE international conference on Wireless pervasive computing (ISWPC), 13 Feb 2009.
- [4]. Jia-Ren Chang Chien, "Design of a Home Care Instrument Based on Embedded System",IEEE international conference on industrial technology(ICIT), 24 April 2008.
- [5]. ElhamSaadatian, ShrutiPriyaIyer, Chen Lihui, Owen Noel Newton Fernando, Nii Hideaki, Adrian David Cheok, AjithPerakumMadurapperuma, GopalakrishnakonePonnampalam, and Zubair Amin, "Low Cost Infant Monitoring and Communication System",IEEE international conference publication ,Science and Engineering Research , 5-6 Dec. 2011.
- [6]. Baker Mohammad, HazemElgabra, ReemAshour, and Hani Saleh, "Portable Wireless Biomedical Temperature Monitoring System", IEEE international conference publication on innovations in information technology (IIT), 19 March 2013.
- [7]. N. M. Z. Hashim, "Development of Optimal Photosensors Based Heart Pulse Detector",International Journal of Engineering and Technology (IJET) Aug-Sep2013.s
- [8]. NurIlyaniRamli, Mansour Youseffi, and Peter Widdop, "Design and Fabrication of a low cost heart monitor using reflectance Photoplethysmogram", World Academy of science, Engineering and Technology 08 2011,pages 417 to 418.
- [9]. CarstenLinti, HansjurgenHorter, Peter Osterreicher,and Heinrich Planck, "Sensory baby vest for the monitoring of infant", International workshop on Wearable and Implantable Body Sensor Networks, BSN 2006,3-5 April 2006.
- [10]. Sharief F. Babiker, LienaElrayah Abdel-Khair, and Samah M. Elbasheer, "Microcontroller Based Heart Rate Monitor using Fingertip Sensors", UofKEJ Vol. 1 Issue 2 pp. 47-51 (October 2011).
- [11]. Prof. K. Padmanabhan, "Microcontroller-Based Heart-Rate Meter", electronics for you, www.efymag.com.
- [12]. S.Deepika, V.Saravanan, "An Implementation of Embedded Multi Parameter Monitoring System for Biomedical Engineering", International Journal of Scientific & Engineering Research, Volume 4, Issue 5,May-2013.
- [13]. Sowmyasudhan S, Manjunath S, "A Wireless Based Real-time Patient Monitoring System", International Journal of Scientific & Engineering Research, Volume 2, Issue 11, November-2011.
- [14]. N.S. Joshi, R.K. Kamat, and P.K. Gaikwad, "Development of Wireless Monitoring System for Neonatal Intensive Care Unit", International Journal of Advanced Computer Research, Volume-3 Number-3 Issue-11 September-2013.
- [15]. V.S. Kharote-Chavan, Prof. Satyanarayana Ramchandra Rao, "Multiparameter Measurement of ICU patient using GSM and Embedded Technology", International Journal of Science and Engineering Volume1, Number 2, 2013.