To Identify Hypertensive Attack and Alert Healthcare Framework using IOT-FOG

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Abstract

This paper presents a wearable health sensor network system for Internet of Things (IoT) connected safety and health applications. Safety and health of icu patient are important in hospital workplace; therefore, an IoT network system which can monitor all health parameters and update through wireless. The proposed network system incorporates multiple wearable sensors to monitor environmental and physiological parameters. The wearable sensors on different subjects can communicate with each other and transmit the data to a gateway via IoT platform medical signal sensing network. In the proposed system having heart rate, temperature, vibration sensors all integrated to the parallel processing microprocessor. Health parameters re measured by sensors and give the RPI PICO module. This module analyses the data aand monitor in LCD, post the same in internet of things-based server. We continuously monitor, if any changes found like low heart rate, high heart rate, high temperature, patient movement iot alerts the authorized person regarding health A smart IoT gateway is implemented to provide data processing, local web server and cloud connection. After the gateway receives the data from wearable sensors, it will forward the data to an IoT cloud for further data storage, processing, and visualization.

Keywords: Internet of Things (IoT), IoT- FOG based healthcare, hypertensive attack.

1. Introduction

Specialists throughout the healthcare sector are increasingly leveraging the areas of concern that these developments carry in and can allow considerable improvement in and beyond the medical administrations. Similarly, the capabilities of Electronic Health apps and Health (therapeutic organizations managed by ICT) are utilized by countless regular consumers to develop, support, and strengthen their healthcare network. The SMS is submitted to the specialist or to any family member in some fundamental situation. Health analysts slowly misuse the points of value these developments add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) applicants and EHealth. Health analysts slowly misuse the points of value these developments add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) programs and EHealth. A dependable and rapidly persistent portion of this corresponding technique. Structure like look (PMS). One of the biggest issues for society is the lack of social security. As the World Health Organization (WHO) parliaments demonstrate, the most elevated feature of the medical system is a great best thing for a person. To persuade and render people look, it is important to have a flash like the new mending machine. The system for social insurance will include stronger remedial connections for people wherever they are, in a sustainable and careful manner. Provided that such contraptions support the Internet, they boost the environment and ensure that organizations and social security become continually safe and logically drawn. The whole idea of IOT remains on sensors, portion as well as remote systems

that allow customers to grant and access the application / information. No place, however, is the IOT across all zones more apparent than it was in the areas of prosperity treatment. As a cliché states, 'Prosperity is money,' the movement towards greater results is phenomenally important. Therefore, it is necessary to connect to an IOT framework that provides secure and prosperous analysis. At present, the contraction of human institutions, the conventional way of coping with a technologically advanced personally driven oriented system, is being traded. As the age profile of many societies continues to increase, in addition to the increasing population of people affected by chronic diseases, including diabetes, cardiovascular disease, obesity, and so on, supporting health, both mentally and physically, is of increasing importance if independent living is to be maintained. Sensing, remote health monitoring, and, ultimately, recognizing activities of daily living have been an promising solution. From a technical perspective, the Internet of Things (IoT) is gaining a rapidly growing attention in many disciplines, especially in personalised healthcare. Meanwhile, body area sensor network (BASN) under the IoT framework has been widely applied for ubiquitous health monitoring, for example. ECG monitoring has been commonly adopted as vital approach for diagnosing heart disease. The main contribution of this paper includes the following: firstly, this paper presents a novel system, the WISE (Wearable IoT-cloud-based health monitoring system), for real-time personal health monitoring. WISE adopts the BASN (body area sensor network) framework in the support of real-time health monitoring. Several wearable sensors have been embedded, including the heartbeat, body temperature, and the blood pressure sensors. Secondly, the majority of existing wearable health monitoring systems requisite a smart phone as data processing, visualization, and transmission gateway, which will indeed impact the normal daily use of the smart phone. Whilst in WISE, data gathered from the BASN are directly transmitted to the cloud, and a lightweight wearable LCD can be embedded as an alternative solution for quick view of the real-time data.

The size and composition of the world population has changed over the last couple of decades, and these trends are projected to continue. Such demographic trends have significant implications for almost all areas of the society, particularly in health and healthcare. Life expectancy has increased dramatically, especially in the more affluent nations, which is set to be celebrated and should be viewed as an opportunity for people to live longer and better. However, this requires substantial improvement in both the healthcare service and the living environment, as older people generally require more healthcare than their younger counterparts. Additionally, older people are more likely to suffer from chronic disease as part of the natural ageing process. In parallel to this demographic time bomb, the cost of healthcare provision is increasing rapidly in all the nations across the world.

2. Literature Survey

We have investigated the different examinations performed utilizing existing strategies that have been applied in the field of patient wellbeing checking. This study remembers current patterns for persistent checking frameworks and related work on the far-off patient observing framework. In [2], a structure of IoT based wellbeing checking framework utilizing Rasberry Pi is proposed. In this paper, they have used Internet of Things (IoT) and distributed computing advancements. The proposed model screens the Heart Rate, Oxygen level and Blood Temperature of a patient. Distributed computing empowers tenacious capacity of information. Thus, the information assembled by the wearable sensors put on a patient's body is spared in the cloud with the goal that it very well may be gotten to from anyplace over the g projection. The specialist can login to the site to get to the patient's information and produce a wellbeing report. Patients can get to the wellbeing report by signing into the site. A visit alternative is given in the site to

specialist and patient correspondence. The framework goes about as an extension among specialist and patient staying away from the separation obstruction. In country regions where satisfactory clinical offices are not accessible, it is useful and financially savvy arrangement. In [3], a wellbeing Monitoring framework utilizing RPI Pico is proposed thinking about the necessities of old individuals. In the maturing populace world, there is an expanded requirement for a specific wellbeing checking framework. In this unique situation, the proposed framework screens internal heat level, circulatory strain, and pulse and sends the information to specialists. These boundaries are commonly estimated during fundamental wellbeing exams as its qualities are significant indications of a patient's wellbeing condition. In the event of crisis, an alarm button is provisioned so the specialist will get a SMS when an alarm button is squeezed. Information is pushed to the web worker with the goal that the specialist and patient can see the qualities. The fundamental test watched was the delay of the older to utilize this innovation. They should be taught to utilize new mechanical gadgets like cell phones and PCs. In [4], Wireless Bluetooth innovation with Android is investigated for the far-off evaluation of wellbeing and fall identification. The framework screens the wellbeing boundaries like ECG, temperature, 'body pose', 'fall recognition' and present GPS area. Numerous synchronous Bluetooth associations are set up with an android telephone to move the gathered information. An android application investigations and procedures the information which is likewise sent to the worker utilizing the web. Information is sent to a crisis contact individual in the event of a crisis. Being a versatile, vitality productive, lightweight, and adaptable plan, it is generally appropriate for people that are at high hazard like officers guarding at high elevations, travelers, unskilled workers, and so forth.

In the recent years wireless technology has increasing for the need of upholding various sectors. In these recent years IoT graped the most of industrial area specially automation and control. Biomedical is one of recent trend to provide better health care. Not only in hospitals but also the personal health caring facilities are opened by the IoT technology. So having a smart system various parameters are observed that consumes power, cost and increase efficiency. In according to this smart system, this paper is reviewed. In traditional method, doctors play an important role in health checkup. For this process requires a lot of time for registration, appointment and then checkup. Also, reports are generated later. Due to this lengthy process working people tend to ignore the checkups or postpone it. This modern approach reduces time consumption in the process. In the recent years use of wireless technology is increasing for the need of upholding various sectors. In these recent years IoT groped the most of industrial area specially automation and control. Biomedical is one of recent trends to provide better health care. Not only in hospitals but also the personal health care facilities are opened by the IoT technology. So having a smart system, various parameters are observed that consume power, cost, and increase efficiency. In accordance with this smart system, this paper is reviewed.[5] Medical scientists are trying in the field of innovation and research since many decades to get better health services and happiness in human lives. Their contribution in medical area is very important to us and cannot be neglected. Today's automotive structures have the root ideas coming from yesterday's basics. Also, Early detection of chronic diseases can be easy with this technology.[6] The body temperature, heart rate, blood pressure, respiration rate are prime parameters to diagnose the disease. This project gives temperature and heart rate values using IoT. Modern health care system introduces new technologies like wearable devices or cloud of things. It provides flexibility in terms of 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 be able to give to cloud server using GSM and 3G. At cloud server, each patient is defined with unique address. So, data at cloud can authenticate the right patient and provide the required request. [7] Telemonitoring system via WBAN is evolving for the need for home based mobile health and personalized medicine. WBAN can be 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.[8] 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 m altitude. 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 give the overall efficiency of LoRaWAN in the demonstration of IOT for health monitoring system. [9] 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 [10] Ayush Bansal, Sunil Kumar, Anurag Bajpai, Vijay N. Tiwari, Mithun Nayak, Shankar Venkatesan, Rangavittal Narayanan focuses on development of a system which can detect critical cardiac events. Using an advanced remote monitoring system to detect symptoms which lead to fatal cardiac events [11] 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.[12] 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.[13]

3. Proposed System

In the proposed system of health monitoring system, we used temperature sensor, heartbeat sensor and humidity sensor for monitoring the human body health parameters and display in LCD and IOT server. If the heart rate fluctuations mean if we got low BP or HIGH BP, then buzzer module automatically alerts and same thing will update in server.

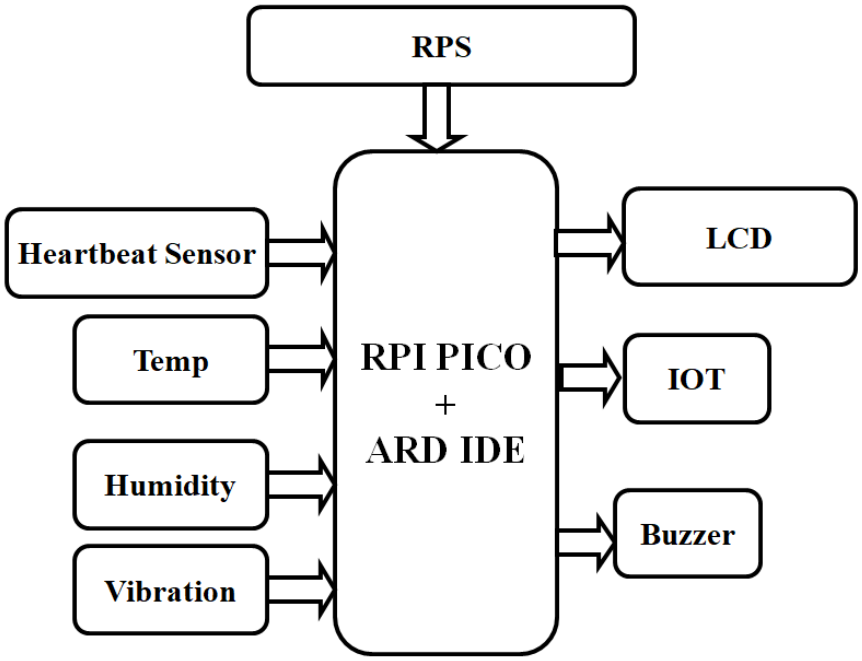


Fig. 1: Block diagram of proposed system.

This methodology is intended to build a structured remote observation system for wellbeing. The goal is to track the patient's body's temperature and heart rate that the NRF innovation specialist will be faced with. The care services in medical centers are consistent with the assessment of the wellbeing of the patients. The body of the patient is continuously monitored for temperature and pulse and registered. This interface is simple, illustrating the usage of ESP8266 and RPI Pico IoT Patient Safety Monitoring Program. Temperature sensors Pulse and LM35 monitor separately BPM and Ambient Temperature. The RPI Pico designs the application and shows an LCD panel with 16 * 2. Starts sending the data to the IoT application server via WLAN ESP8266 unit partners with both the Wi-Fi. Thing speaks is the IoT server used in this. Finally, data from anywhere in the world can only be verified by identifying the channel Thing speak. Hardware modules used in this proposed system is explained in below.

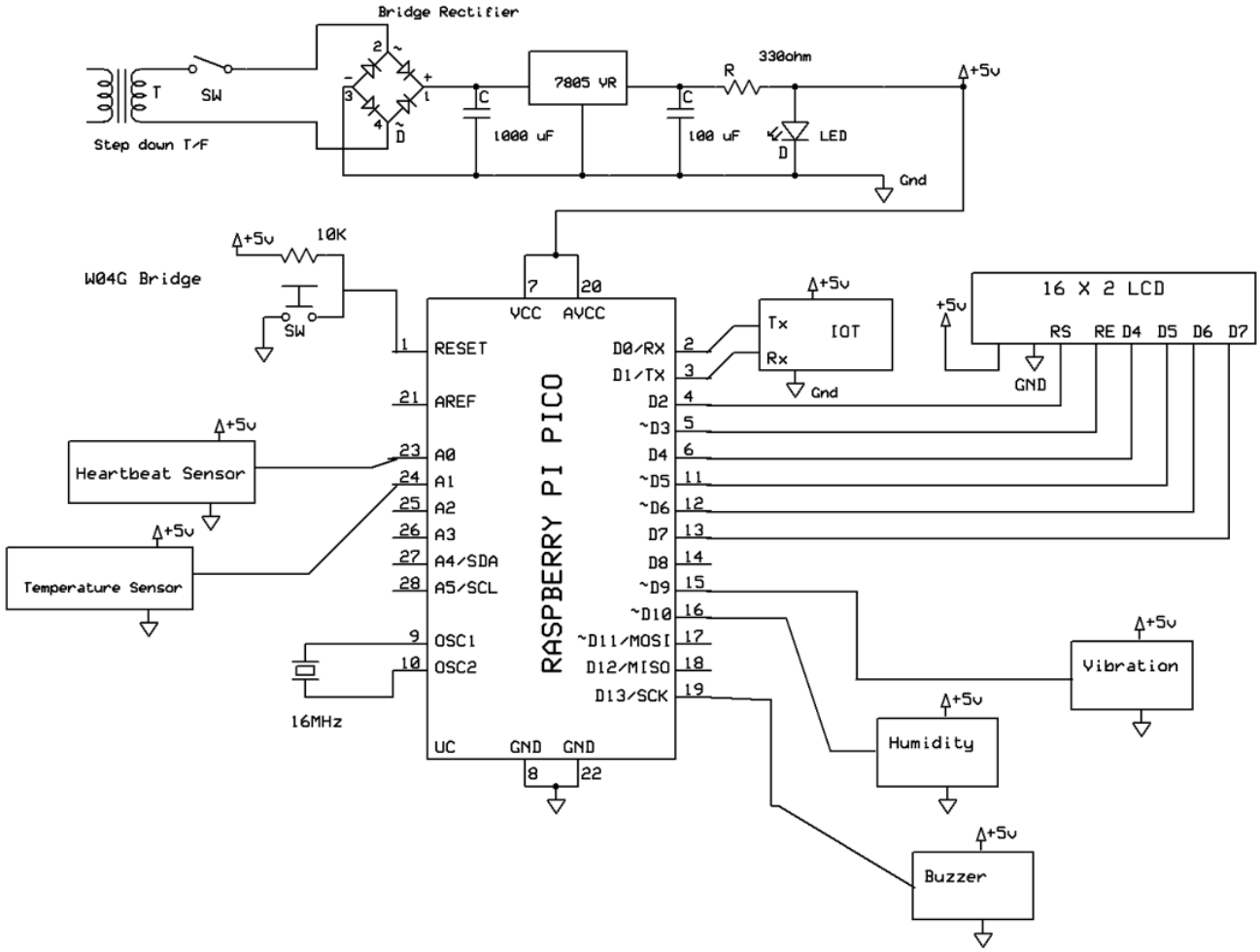


Fig. 2: Schematic block diagram.

4. Hardware Description

4.1 Raspberry Pi Pico

Pico provides minimal (yet flexible) external circuitry to support the RP2040 chip: flash (Winbond W25Q16JV), crystal, power supplies and decoupling, and USB connector. The majority of the RP2040 microcontroller pins are brought to the user IO pins on the left and right edge of the board. Four RP2040 IO are used for internal functions - driving an LED, onboard Switched Mode Power Supply (SMPS) power control and sensing the system voltages. Pico has been designed to use either soldered 0.1" pin-headers (it is one 0.1" pitch wider than a standard 40-pin DIP package) or can be used as a surface mountable 'module', as the user IO pins are also castellated. There are SMT pads underneath the USB connector and BOOTSEL button, which allow these signals to be accessed if used as a reflow soldered SMT module.

Fig. 3: RASPBERRY PI PICO development board.

4.2 Regulated Power Supply

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

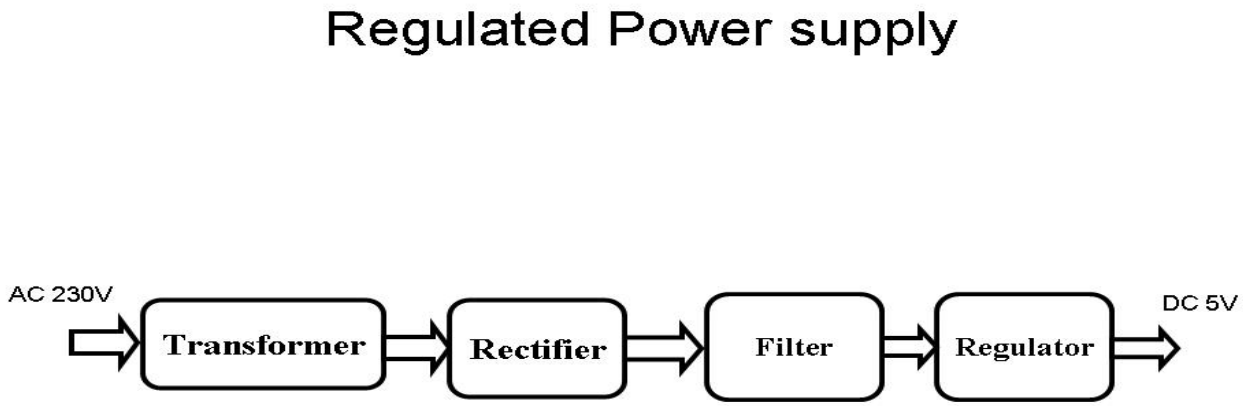


Fig. 4: Regulated power supply.

4.3 LED

A light-emitting diode (LED) is a semiconductor light source. LED's are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component in 1962, early LED's emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness. The internal structure and parts of a led are shown in Fig. 5 and 6 respectively.

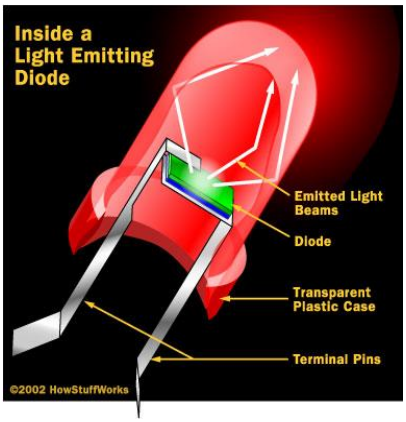


Fig. 5: Inside a LED.

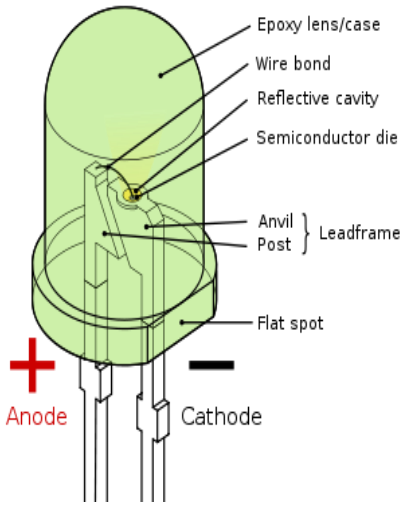


Fig. 6: Parts of a LED.

4.4 Heartbeat Sensor

This heartbeat sensor is designed to give digital output of heat beat when a finger is placed inside it. When the heart detector is working, the top-most LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

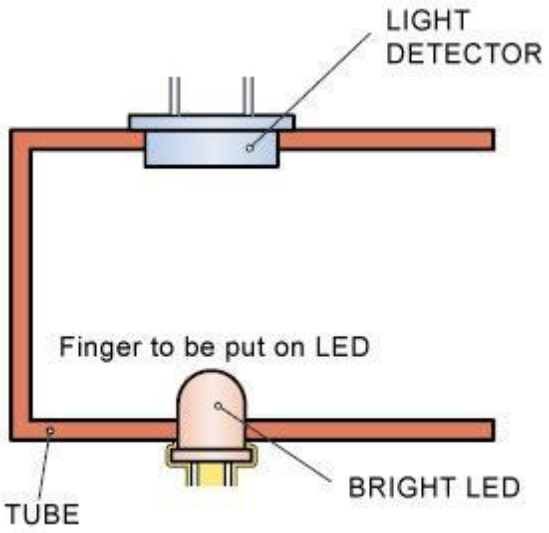


Fig. 7: Sensor construction.

4.5 DHT11

We have two versions of the DHT sensor, they look a bit similar and have the same pinout but have different characteristics. Here are the specs:

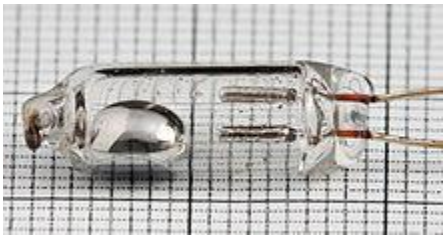
- Ultra-low cost

- 3 to 5V power and I/O
- 2.5mA max current use during conversion (while requesting data)
- Good for 20-80% humidity readings with 5% accuracy
- Good for 0-50°C temperature readings ±2°C accuracy
- No more than 1 Hz sampling rate (once every second)
- Body size 15.5mm x 12mm x 5.5mm
- 4 pins with 0.1" spacing

4.6 Mercury switch

Vibration TILT sensor

A mercury switch is an electrical switch that opens and closes a circuit when a small amount of the liquid metal mercury connects metal electrodes to close the circuit. There are several different basic designs (tilt, displacement, radial, etc.) but they all share the common design strength of non-eroding switch contacts.



4.7 LCD Display

LCD Background: One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

Basic 16x 2 Characters LCD

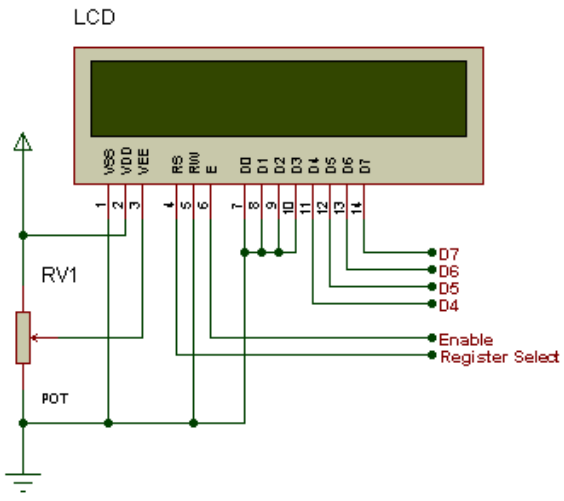


Fig. 8: LCD Pin diagram.

5.Advantages Disadvantages

5.1 Advantages

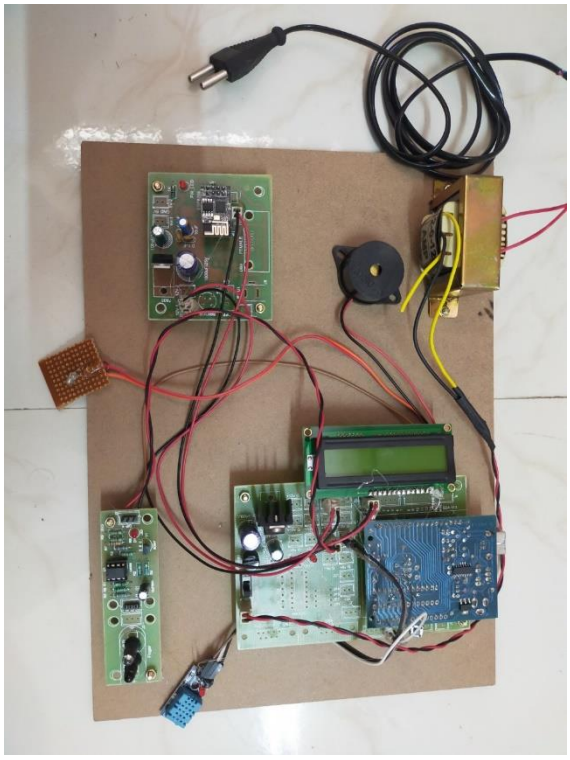
1. Auto alerting system
2. Wireless data access through IOT
3. Efficient and low-cost design.
4. Low power consumption.

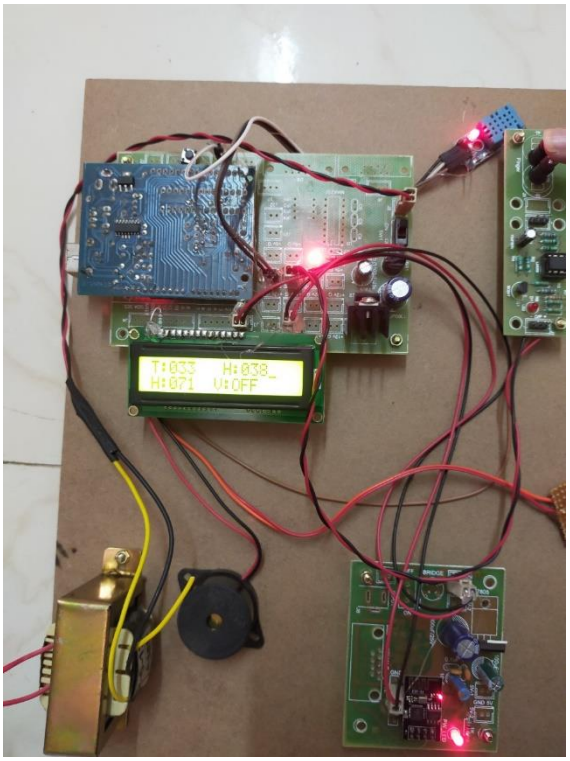
5.2 Applications

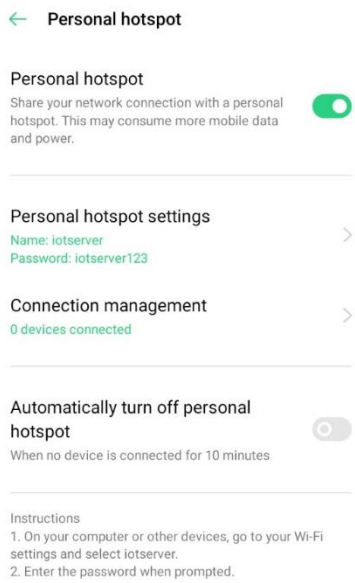
1. Hospitals
2. Home

6. Results

We designed the electronic health monitoring system hardware using Arduino. We integrate the input modules heartbeat sensor, temperature sensor, humidity, vibration sensor. The output data of the all the sensors will displayed in LCD and internet of things. The buzzer module here will alerts the low heart beat, high heart beat and high temperature alerts in internet of things using thing speak database.







7. Conclusion

We designed and implemented Arduino Based E – Health System over Internet of Things with integrating of all input modules like temperature, humidity, position motions, heart rate monitoring sensors, output modules LCD, buzzer and wireless communication system called internet of things through RPI Pico processor. In this proposed system, the various health parameters such as pulse rate, temperature, angle movement of fingers and eye blink were monitored and recorded in the ThingSpeak platform. The values of these parameters were analyzed and alerted in this the proposed system. In future we will add some other sensors which enhance the health monitoring system like gluecometer and body fat device measurement we can add

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