RESEARCH ARTICLE OPEN ACCESS

Modern Health Evaluating System

Kartik Joshi[1], Bhavishya Muralidharan[2], Shikha[3], Harsh Kumar Maurya[4], Dr. Surender Dhiman[5]

1(Department of Electronics and Communication, Dr. Akhilesh Das Gupta Institute of Technology and Management, Delhi Email: kartik62joshi@gmail.com)

2 (Department of Electronics and Communication, Dr. Akhilesh Das Gupta Institute of Technology and Management, Delhi Email: mbhavi98@gmail.com)

3(Department of Electronics and Communication, Dr. Akhilesh Das Gupta Institute of Technology and Management, Delhi Email: shikhanarain99@gmail.com)

4(Department of Electronics and Communication, Dr. Akhilesh Das Gupta Institute of Technology and Management, Delhi Email: harsh.maurya99@gmail.com)

5(Department of Electronics and Communication, Dr. Akhilesh Das Gupta Institute of Technology and Management, Delhi Email: surender.dhiman@adgitmdelhi.ac.in)

Abstract:

Life used to be a chase for perfection and top positions. In the course of accomplishing the same, we forgot the saying "Health is wealth" and just kept acing betterment in our careers. But the Covid-19 pandemic has taught all, the importance of life and living. Nowadays everyone is looking for ways to keep good health. The quality of human life can be improved with the advancing technology and miniaturization of sensors using Internet of Things (IoT). To enable check-up of the health parameters at home, this project has taken the assistance of Arduino UNO and ESP 8266 Wi-Fi Module as its main components to interface devices. The OLED Display has been used to display the readings obtained on the pulse rate sensor and LM35 temperature sensor. The pulse rate sensor is responsible for calculating the heart beats. While the LM35 serves the purpose of finding temperature. Along with this, the data from the two devices, pulse rate sensor and temperature sensor has been recorded in real time on the ThingSpeak platform, which will help in graphically determining the data so obtained. Designing a Remote Patient Health Monitoring System to diagnose the health condition of the patient is the aim. Thereby this prototype will aid in dedicated assistance to the healthcare sector, by allowing everyone to monitor their health parameters at home before queuing up in hospitals.

Keywords — **Internet of Things (IoT), Arduino UNO, ESP 8266 Wi-Fi Module, OLED, Pulse Rate Sensor, LM35 Temperature Sensor, ThingSpeak Platform**

I. INTRODUCTION

In the rural areas, the healthcare systems and facilities are very limited. People are least aware of the developments in technology as they hardly have any exposure to it. Even in the urban areas, despite of having facilities the waiting time is high, which causes a compromise with the working hours. In the developing country like India, we lack resources and management to reach out to the problems of individuals. A common man cannot afford the expensive health checkups [1]. India being a vast nation, it is surprising to know the fact that the doctor to patient ratio is 1:1456. For these reasons a system which provides proper and assured results has been the main motive.

The Internet of Things (IoT) platform is widely used to bring together different sensors, data and services, using the components in conjunction for the development of quality of social and environmental betterment acts as a key for accomplishment of the project [2]. Using the technology which is available, scope for building an efficient system is possible.

This paper illustrates a system which will serve dedicated assistance to individuals without human interference. Hence, the project deals with the detection of patient's vitals using the temperature and heart rate sensor, which will help the person to sit at home and check the parameters easily. Moreover the data obtained will be sent via ESP8266 Wi-Fi Module and then the observed readings will be remotely viewed on the

ThingSpeak platform. Thereby it will facilitate feedback actions to be given by the doctor without visiting hospitals. A constant check can be kept on the patient's health when they monitor themselves using this system. The doctor by seeing the trends in the parameters can suggest any medication if required [3]. Hence using this system health evaluation can be made easy.

II. COMPONENTS USED

A. Arduino UNO

Arduino is an open source programmable circuit board. This is a microcontroller board which is capable of being programmed to control objects in the physical world and provide input and output services. By responding to the sensors and inputs provided, the Arduino becomes useful for interacting and providing faithful outputs. Because of the flexibility, low cost and ease of use this device has become a popular choice among makers and is best suited board for all programmers ranging from beginner to intermediate levelers. It is possible to create interactive hardware projects using this board.

Fig. 1 Arduino UNO

B. OLED Display

OLED display is a flat light emitting technology, which has been designed by placing a series of organic thin films between two conductors. On application of electrical current, a bright light is emitted. It has the capability of working in the I2C mode as well as the SPI mode. It consumes lesser power hence better than the LCD.

Fig. 2 OLED Display

C. Pulse Rate Sensor

Pulse sensor is a heart rate sensor which is used to monitor the heart rate and capable of displaying on a suitable connected device as the number of beats per minute. It's a 3-pin device which is easy to use. The light from the sensor shines through the skin, and it measures the amount of light reflecting back. The light reflections vary as blood pulses underneath the skin vary. The variations in the light getting reflected are interpreted as the heartbeats.

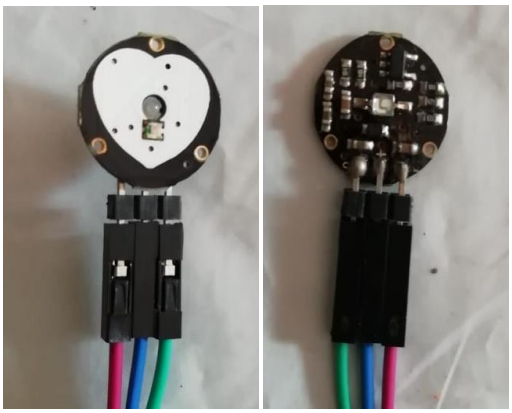

Fig. 3 Pulse Rate Sensor

D. LM35 Temperature Sensor

LM35 is a temperature measuring device which is competent for measuring temperature over the range of -55°C to 150°C. The black coating on the sensor protects it from self-heating. The device has an output voltage proportional to the temperature [4].

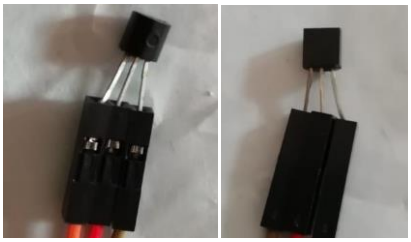

Fig. 4 LM35 Sensor

E. ESP8266 Wi-Fi Module

It is a self contained System On Chip (SOC) microcontroller with an operating voltage of 3.3V. This microcontroller is capable of accessing the Wi-Fi network available in its vicinity. It enables good connectivity with the network to allow devices so that they can send & receive data and they can be further accessed wirelessly.

Fig. 5 ESP8266 Wi- Fi Module

III. FRAMEWORK

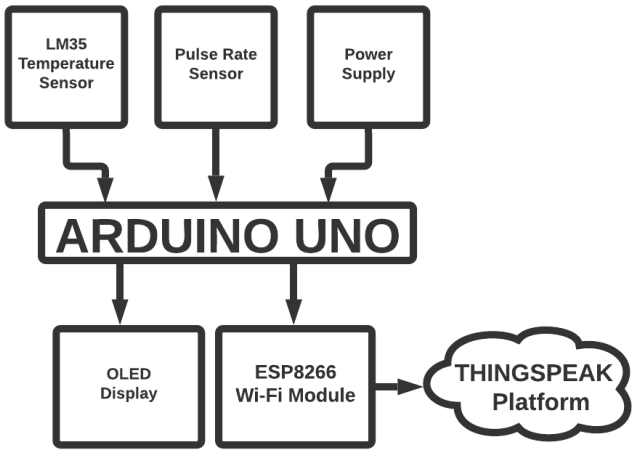

Fig. 6 Block Diagram

The above represents the integration of the components and their arrangement for a faithful output. The Arduino Uno serves as the heart of the project which is responsible for communication between the sensors and the display device. Furthermore, the Wi-Fi module is connected to the Arduino board for fetching the data which needs to be wirelessly transmitted to the ThingSpeak platform. This platform stores the data obtained.

IV. IMPLEMENTATION

On uploading the code on the Arduino UNO and after successful compilation, the system will begin functioning. For finding the temperature using the LM35 the person is supposed to place the finger on the sensor. The thumb finger should be avoided. On waiting for a couple of seconds the temperature of the person gets displayed on the OLED Display. At the same instant the user can use any other finger for finding out the heart rate through the pulse rate sensor. While trying to find out the health parameters it is advised to sit down and relax before taking the check. Both these values will be displayed on the OLED Display.

Once the results have been displayed on the OLED Display, then the Wi-Fi module begins its role. All the data that has been collected will be transmitted wirelessly and is viewed on the ThingSpeak Platform. This is a platform where the records so obtained are represented graphically in the real time. Therefore, it is capable of storing and showing all the variations in the health trend of an individual. The reset button of Arduino allows the user to take another reading, thereby allowing a new reading to be recorded.

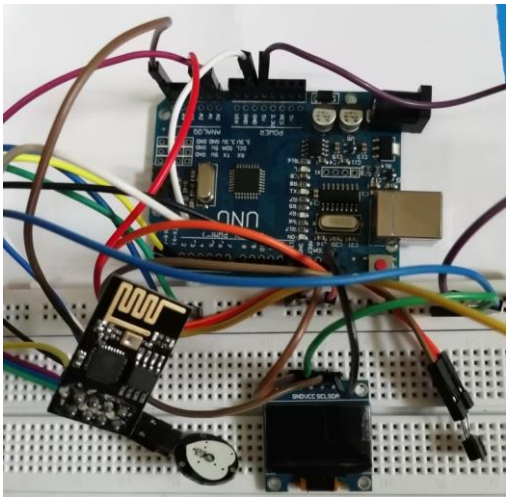

Fig. 7 Hardware Prototype

The above figure is a prototype which represents the connections established for the proper working of the system.

V. RESULT

On successful interfacing of the components, we get the desired results. The parameters measured by the temperature sensor and pulse rate sensor are displayed on the OLED display so that they could be analyzed by the patients as well as their caretakers [5]. The LM35 temperature sensor gives the results in centigrade and the pulse rate sensor gives the value as beats per minute, that is, bpm. These data are also getting stored on IoT platform known as ThingSpeak in the real-time so that they can be examined and analyzed by their medical practitioners who are away from them.

The following result was obtained on the OLED display. It showcases the temperature as the Body Temperature and the heart beat rate as BPM.

Fig. 8 Result on OLED Display

The graph below represents the real-time body temperature and heartbeats per minute as observed on the OLED Display which is plotted on the ThingSpeak IoT platform. The body temperature and heartbeat of the patient or the person using the device are getting stored on it for further analysis by them as well as by their doctors. The data is collected and represented in the graphical form with constant variation being reflected every time a new data enters.

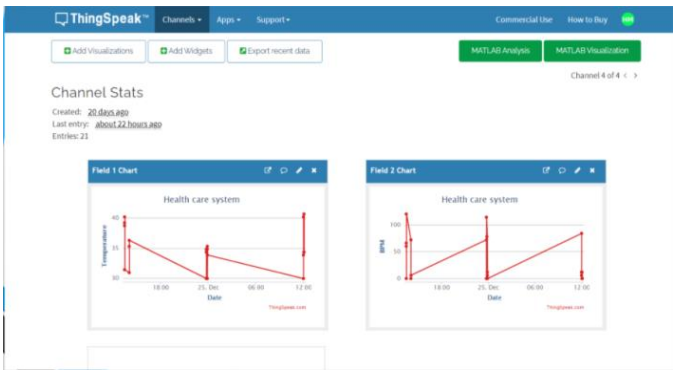

Fig.9 Graphs obtained in ThingSpeak Platform

VI. CONCLUSION

Based on the results, IoT Based Health Monitoring system works as expected. Using Arduino Uno, LM35 Temperature Sensor, Pulse Rate Sensor, OLED display, ESP8266 Wi-Fi Module the measured parameters and stored on the IoT platform. The unit of display used for displaying the temperature is degrees centigrade, while the pulse sensor uses a constant value for representing the beats per minute. The corresponding values are displayed on the OLED display and the corresponding values are also stored on the IoT platform of ThingSpeak via ESP 8266 Wi-Fi Module in real-time. The display parameters were recorded in graphical form for future references. This enabled the person to keep a check on the health parameter on their own and also eased the process of consultation by sitting at home and seeking any medical advice if required.

REFERENCES

1. *Shivleela Patil, Dr. Sanjay Pardeshi, "Health Monitoring system using IoT," International Research Journal of Engineering and Technology (IRJET),vol. 5()4,pp. 1678-1682, April 2018.*
2. *Massimo Ancona , Andrea Dellacasa , Giorgio Delzanno , Andrea La Camera and IvanoRellini, "An "Internet of Things" Vision of the Flood Monitoring Problem," AMBIENT 2015 : The Fifth InternationalConference on Ambient Computing, Applications, Services and Technologies, pp. 26 –29, July 2015.*
3. *C.Senthamilarasi, J.Jansi Rani, B.Vidhya, H.Aritha, "A SMART PATIENT HEALTH MONITORING SYSTEM USING IOT," International Journal of Pure and Applied Mathematics, vol. 119 (16), pp. 59-70, 2018*
4. *Shubham Banka, Isha Madan and S.S. Saranya, "Smart Healthcare Monitoring using IoT," International Journal of Applied Engineering Research,vol. 13(15), pp. 11984-11989, 2018.*
5. *Adelina Basholli, Thomas Lagkas, Peter A Bath, and George Eleftherakis, "Sensor-based platforms for remote management of chronic diseases in developing regions: A qualitative approach examining the perspectives of healthcare professionals,"Health Informatics Jounal, January 2021.*