ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

A Novel Artificial Intelligence (AI) And Iot Approach For Preventing The COVID-19 Pandemic During Emergency

Md Tabrez Nafis[1], Sumit Saini[2], N.V.S.Suryanarayana[3], Ankita chopra[4], S Padmakala[5], Dawa Jangbo Sherpa[6], Firos A[7]

[1]Department of Computer Science and Engineering, Jamia Hamdard(Deemed University), New Delhi, Delhi, India

[2]Department of Electrical Engineering, School of Engineering and Technology, Central University of Haryana, Mahendergarh, Haryana, India

[3]Administrative Officer, Central Tribal University of Andhra Pradesh Vizianagaram, Andhra Pradesh, India

[4]Department of Management Studies, Jagan institute of Managemnt studies, New Delhi, Delhi, India

[5]Department of Computer Science and Engineering, Saveetha School of Engineering, SIMATS, Chennai, Tamil Nadu, India

[6]Department of Mathematics, Siliguri College, Siliguri, West Bengl, India

[7]Department of computer Science and Engineering, Rajiv Gandhi University (A Central University), Rono-Hills, Doimukh, Arunachal Pradesh, India

Corresponding mail id: tabrez.nafis@gmail.com

ABSTRACT

COVID-19, virus causes respiratory dysfunction. Mild symptoms such as pain, reduced saturation, and fever may progress to more serious problems. A person suffering from modest respiratory difficulties may be unaware that they need oxygen or hospitalisation. As a result, individuals must get reliable information regarding their present situation. Despite seeming to be in excellent condition, many COVID-19 patients have low blood oxygen levels. Low oxygen saturation levels may indicate the need for rapid medical attention. The four major factors that medical practitioners often assess are blood pressure, respiration, pulse, and body temperature. As patient numbers have rapidly increased, it has become more challenging to offer care in hospitals, particularly in a third-world nation like India. As a result, in addition to treatment centres and outpatient settings, the focus of COVID-19 patient care should include remote monitoring technologies that track and advise patients from a distance. The proposed gadget has a variety of sensors for monitoring vibrant signs, and the instrument data will be uploaded to the cloud and made accessible to clinicians for further investigation. The

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

article presents a method for leveraging the Internet of Things (IoT) to monitor patient health in order to combat the lethal disease.

Keywords: IoT, COVID 19, Artificial Intelligence, pandemic

1. INTRODUCTION

A newly discovered corona virus causes COVID-19, a worldwide respiratory sickness pandemic. It started in early December 2019 in the Chinese city of Wuhan. On December 31, 2019, the China Health Authority notified the World Health Organization (WHO) of a number of pneumonia cases of unknown origin [1]. As of February 27, 2021, 113 million incidents have been reported worldwide, with 2.5 million deaths. Global death or fatality rates were estimated to be 2% in the primary stages of the epidemic, with a survivor rate of 41.8%. Because the total number of incidents varies on a daily basis, the numbers are quite volatile [2]. When the virus initially appeared, lockdowns were implemented almost everywhere in the world, together with institution, universities, shopping malls, temples, banks, international airports, and subway stations that required human interaction and communication. Consequently, it took more than two months to reduce the number of events from 20 to 40 million [3]. The global acceptance of the 'New Normal' policy has caused a transformation in the post-lockdown atmosphere. In only one month, the number of cases climbed from 80 million to 100 million. Internet service usage has grown from 40% to 100% as compared to pre-lockdown hours. Amazon, the world's largest technology business, proclaimed a 70% growth in incomes for the first ten months of 2020 [4]. Technologies should strive to increase their ability to respond quickly to crises while also enhancing their capability to cope with new challenges. Remote monitoring technology, regardless of COVID-19, has immense potential.

Several devices are existing on the shop to monitor crucial indications such as body thermal, heat beat rate, and ECG, as described in numerous research studies [5]. However, incorporating and building a specific nursing system for Covid-19 users would need a one-of-a-kind method [2].

They created a smartphone-based remote patient monitoring system for this investigation. A mobile software (app) is deployed inside this background [6]. People will arrange a computer-generated session with a doctor through supercomputer or mobile to get medical behavior. To safeguard patient video data, this device employs Skype's AES standard. The device wont allow for real-time operation. Vital signs and any abnormalities should be physically entered into the information [7].

Another research recommended a remote patient organization scheme based on Web Real-Time Contact (WebRTC) and the Edge Cloud. Edge Cloud is useful for more than just data storage; it may also be utilised for communication [8]. The framework contains two modes: push and pull. When employing far-off push-mode control, the expedient alerts the user if any dubious health data is identified.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

However, in pull mode, the user may utilise remote control to evaluate previously gathered data. Between the computer and the cloud server, there are several WebRTC connections available [9]. The system's analytical engine would scrutinise the video and data. Instead of transmitting essential signal data, this device focuses on transferring and optimising visual data.

In one study, a Raspberry Pi was used to create an IoT-based e-health system. Using Node.js server-side software, the user was provided a web interface for analysing and recording data from a certain chart. Sensors used in e-health include temperature, respiration, blood pressure, and pulse [10]. Using this boundary, the user may choose between a live session and a recorded mode. Data from a live session can only be preserved for a limited time; however, data from a recorded session may be saved indefinitely.

To begin, we developed a Zig-Bee-based wearable device to collect physiological data. This method can track the user's body temperature as well as physiological data like heart rate. The signal obtaining unit of the machine will build a graph to assess human biological parameters, and the system is centred on a mentally disturbed individual [11].

The essential elements of this study are organised as follows; Section II includes a study of the literature. Section III explains how to monitor blood bp, temperature, breathing, oxygen levels, and pulse. Section IV concentrates on system installation and provides a summary of the findings.

2. Methodology

Blood pressure measures the force exerted by our hearts in pumping blood throughout the body. During the operation, an computerized blood pressure (BP) metre (Model: KD 202F) is utilised. For health management reasons, the gadget includes a microcontroller interface via USB. When employing the E-Health Module, the KD 202F and the microcontroller are linked. The data from these sensors is sent to the cloud using the ESP8266, which is coupled to the Arduino microcontroller. The proposed scheme's operating method is shown in Fig. 1.

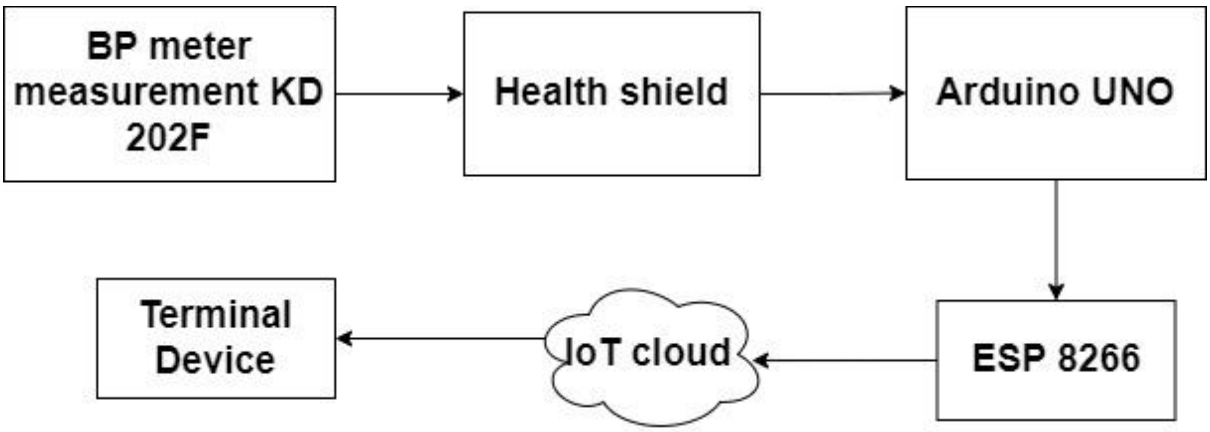

Fig. 1 Proposed architecture

ISSN PRINT 2319 1775 Online 2320 7876

Research paper © 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

The living design of COVID-19 differs from the breathing behaviour of the flu and common cold, based on the latest clinical investigation. People with COVID-19 begin to breathe more quickly. Respiratory rate is often one of the earliest signs of this condition, and atypical heart rate and fluctuations in heart rate are important predictors of substantial biological disfunction. It's also important to pay attention to the breath rate as a sign of the patient's condition. An early sign of hypoxemia may be provided by an air flow sensor. The airflow sensor is used to measure a patient's breathing rate in order to determine whether or not they need respiratory support. As shown in Fig. 2, this apparatus consists of a set of two prongs placed in the nostrils and an adaptable filament that turns behind the ears. These prongs are used to calculate breathing. The average adult human breathes between 15 and 30 times each minute.

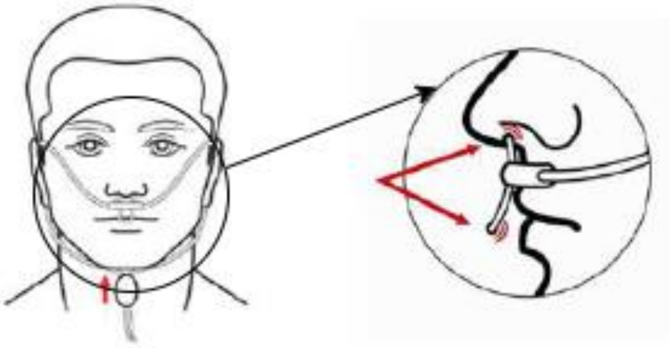

Fig. 2 Sensor position

The ESP8266 is linked to the Arduino microcontroller, that sends data from these instruments to the cloud. The operating mechanism of the proposed approach is shown in Figure 3.

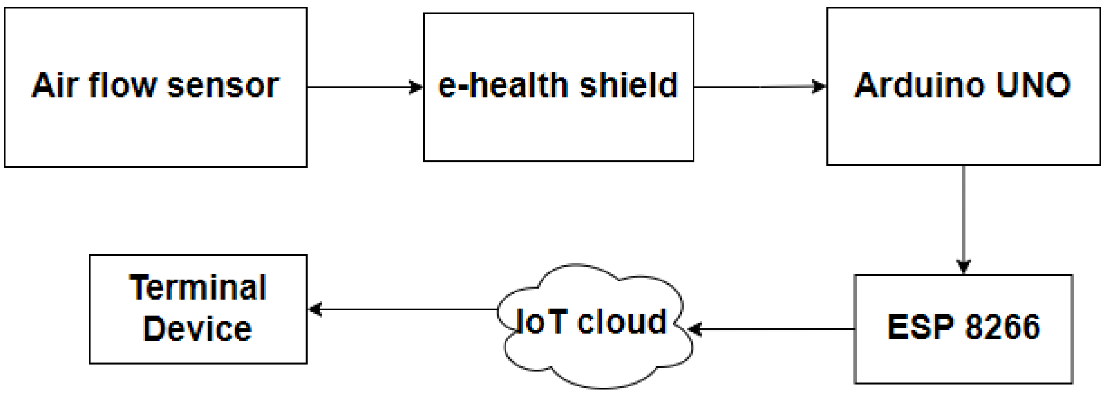

Fig. 3 Respiratory system monitoring

Using an LM35 IC, the patient's body temperature is determined. To ensure the greatest potential performance of the sensors, an Arduino Uno is linked to this sensor. All sensor data

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

is sent through the ESP 8266, which is connected to the Arduino microcontroller. In order to compute the heart rate, SpO2, and blood oxygen saturation, an optical sensor that detects PPG impulses from the finger is used. Both the ESP8266 and the Arduino microcontroller have access to the board. It has long been acknowledged that pulse oximetry, which determines the percentage of blood oxygen saturation, is a crucial health indicator. Calculations are used to determine the blood's oxygen content (oxygen saturation). It is a painless and accurate way to ascertain how well the heart pumps blood to the arms, legs, and other parts of the body. It may be used to check the blood's oxygenation level and look for conditions that affect a person's blood oxygen levels.

The term "beats per minute" (BPM) is an acronym, and a calm person has a BPM of 65 to 75. The average person's SpO2 (blood oxygen saturation level) is more than 95%. The suggested system's functionality is shown in Figure 4.

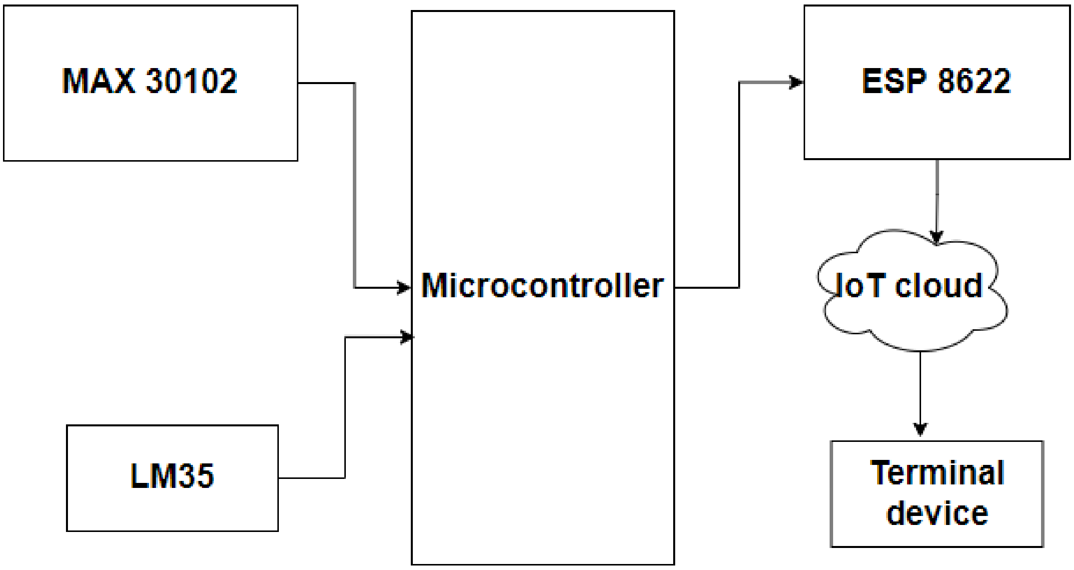

Fig. 4. layout of monitoring sensor

This study's model of a subjects health intensive care scheme covers numerous constraints, such as persons temperature, heart rate, oxygen level, and pressure. This information may be followed from anywhere on the planet using ThingSpeak. It's an open source platform for the IoT that supports both channel-based and API-based data collecting from other networks. To send information to ThingSpeakTM, Arduino® must be connected to the net.

Because ThingSpeak supports 8 information fields, all device data are obtainable at the similar time. When information is saved on ThingSpeak, it may be retrieved online and by means of the MATLAB. Figure 5 depicts an ternimal connection for continuous monitoring by means of the Arduino microcontroller and the ESP8266 Wi-Fi chip. The LM35 IC is castoff to assess human temperature, while the MAX30102 is used to calculate rate of heart

ISSN PRINT 2319 1775 Online 2320 7876

Research paper © 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

beat and supply of blood. These results are stored in the cloud. This statistics will be used to govern the patient's current situation. It is also conceivable to notify the patient's household and physicians about their illness.

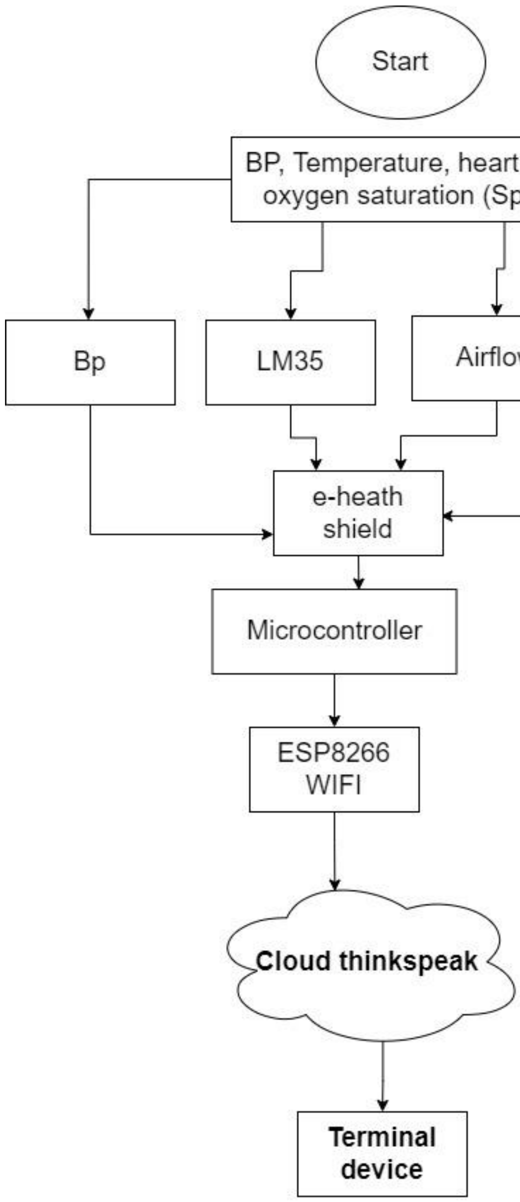

Fig. 5 Terminal to Terminal communiqué monitoring

3. Result and Discussion

The infection is displayed on the LED monitor every 3s, while the rate of heart beat and oxygen capacity in the blood are displayed every fifteen seconds. Based on the user's preferences, the values will subsequently be communicated to the ThingSpeak. A graphical

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

representation of the sensor values supplied to the ThingSpeak channel is provided for ease of viewing. derived from the MAX30102. These findings are stored in the cloud.

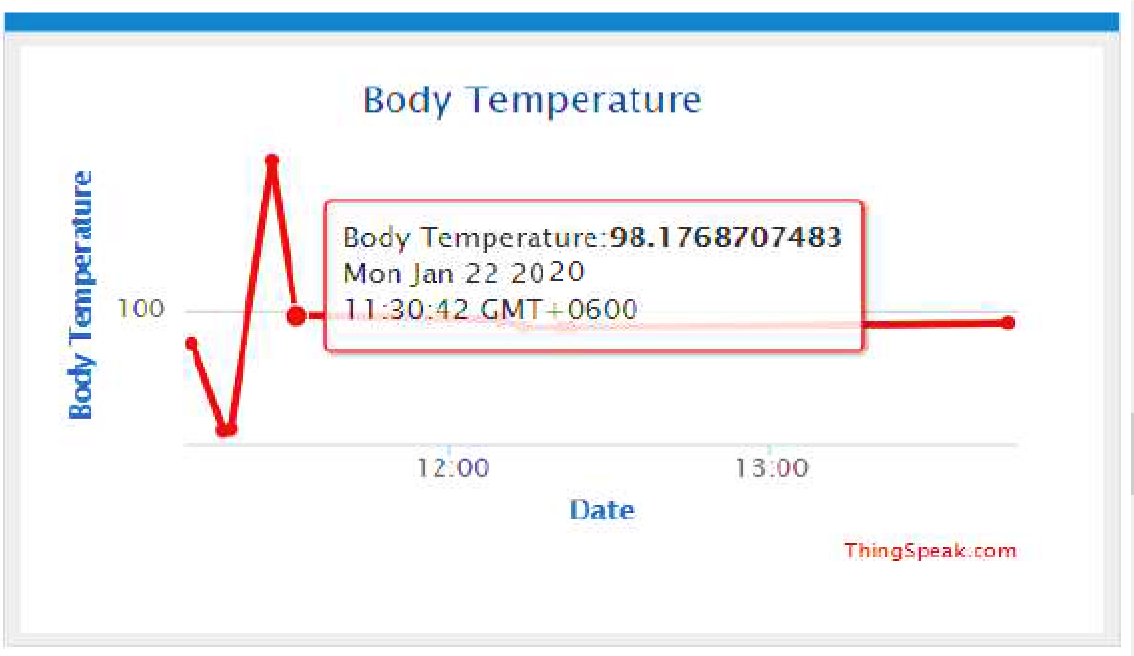

Fig. 6 Temperature of the person monitored from cloud

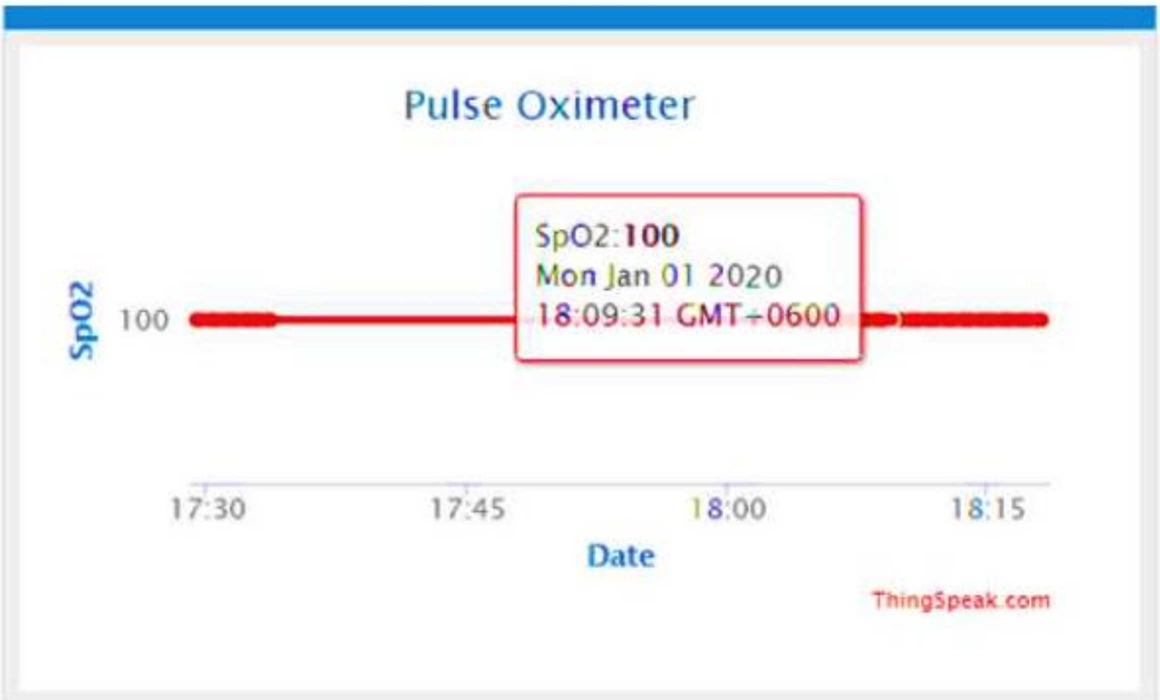

Fig. 7 Oxygen level of the person monitored from cloud

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

Fig. 8 Pressure of the blood level of the person monitored from cloud

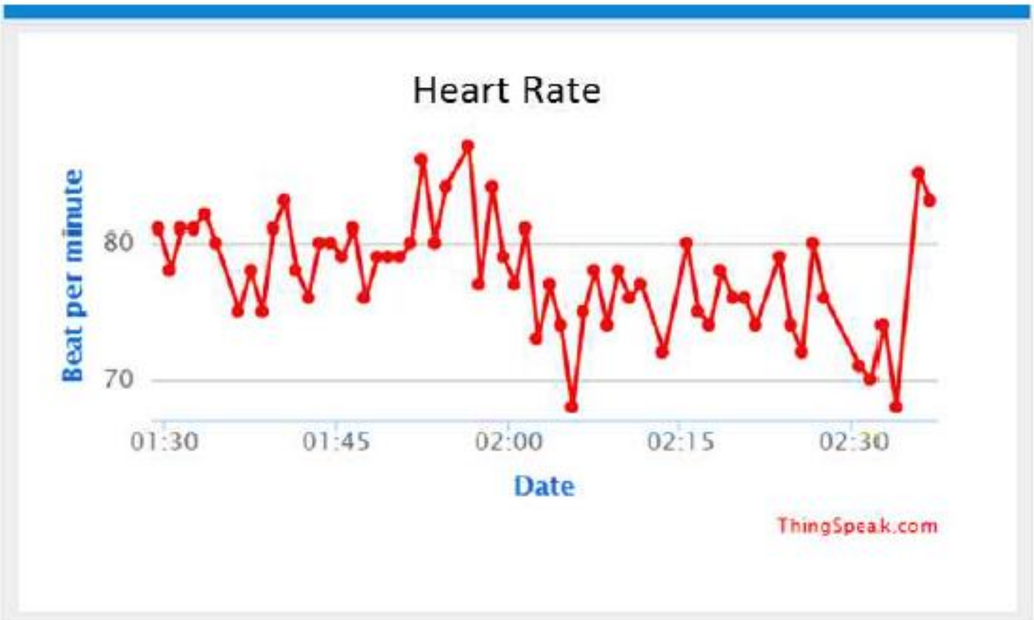

Fig. 9 Pulse rate of the person monitored from cloud

The Fig. 6 show how the body's infection has changed over time (in Fahrenheit). The interval at which the measurements are delivered may be adjusted using the selection unit; it is initially set to thirty minutes. The blood oxygen level (in percentage) and blood pressure graphs in Figures 7 and 8 demonstrate comparable changes over time. Figure 9 demonstrates the variation in heart rate. (in terms of beats per minute) The data for the health parameters may be checked here for correctness. As a consequence, we can state with confidence that the data transfer component of the suggested system is quite dependable and that anybody may use it to keep track of their health.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper © 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022

CONCLUSION

For remote patient monitoring, the preferred solution employs an embedded IoT-based system that is small, trustworthy, low-cost, and low-power. Because of its affordability, low cost, and sufficient processing capability, an Arduino UNO acts as the system's processing component. By allowing medical practitioners to screen Covid-19 patients, elderly residents, and those who live in distant places, the gadget improves their excellence of life. Additional e-health sensors might be linked to this scheme to collect various healthiness metrics. More study on noise signal reduction is regarded essential to improve the efficacy of the given approach.

REFERENCES

[1] M. T. Ahemad, M. A. Hameed, and R. Vankdothu, "COVID-19 detection and classification for machine learning methods using human genomic data," *Measurement: Sensors*, vol. 24, no. October, p. 100537, 2022, doi: 10.1016/j.measen.2022.100537.

[2] Y. V. Kistenev, D. A. Vrazhnov, E. E. Shnaider, and H. Zuhayri, "Predictive models for COVID-19 detection using routine blood tests and machine learning," *Heliyon*, vol. 8, no. 10, p. e11185, 2022, doi: 10.1016/j.heliyon.2022.e11185.

[3] M. E. Elkin and X. Zhu, "A machine learning study of COVID-19 serology and molecular tests and predictions," *Smart Health*, vol. 26, no. October, p. 100331, 2022, doi: 10.1016/j.smhl.2022.100331.

[4] H. Passarelli-Araujo, H. Passarelli-Araujo, M. R. Urbano, and R. R. Pescim, "Machine learning and comorbidity network analysis for hospitalized patients with COVID-19 in a city in Southern Brazil," *Smart Health*, vol. 26, no. April, p. 100323, 2022, doi: 10.1016/j.smhl.2022.100323.

[5] S. I. Busari and T. K. Samson, "Modelling and forecasting new cases of Covid-19 in Nigeria: Comparison of regression, ARIMA and machine learning models," *Scientific African*, vol. 18, p. e01404, 2022, doi: 10.1016/j.sciaf.2022.e01404.

[6] G. Taheri and M. Habibi, "Comprehensive analysis of pathways in Coronavirus 2019 (COVID-19) using an unsupervised machine learning method," *Applied Soft Computing*, vol. 128, p. 109510, 2022, doi: 10.1016/j.asoc.2022.109510.

[7] Z. Wang, "Use of supervised machine learning to detect abuse of COVID-19 related domain names," *Computers and Electrical Engineering*, vol. 100, no. March, p. 107864, 2022, doi: 10.1016/j.compeleceng.2022.107864.

[8] Z. Liu, R. N. Bashir, S. Iqbal, M. M. A. Shahid, M. Tausif, and Q. Umer, "Internet of Things (IoT) and Machine Learning Model of Plant Disease Prediction-Blister Blight for Tea Plant," *IEEE Access*, vol. 10, pp. 44934–44944, 2022, doi:

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, Iss 8,Dec 2022**

10.1109/ACCESS.2022.3169147.

[9] M. I. Pavel, S. M. Kamruzzaman, S. S. Hasan, and S. R. Sabuj, "An IoT based plant health monitoring system implementing image processing," *2019 IEEE 4th International Conference on Computer and Communication Systems, ICCCS 2019*, pp. 299–303, 2019, doi: 10.1109/CCOMS.2019.8821783.

[10] S. K. Smmarwar, G. P. Gupta, and S. Kumar, "Deep malware detection framework for IoT-based smart agriculture," *Computers and Electrical Engineering*, vol. 104, no. June, 2022, doi: 10.1016/j.compeleceng.2022.108410.

[11] S. Mehra, A. Khatri, P. Tanwar, and V. Khatri, "Intelligent Embedded Security control system for Maternity ward based on IoT and Face recognition," *Proceedings - IEEE 2018 International Conference on Advances in Computing, Communication Control and Networking, ICACCCN 2018*, pp. 49–53, 2018, doi: 10.1109/ICACCCN.2018.8748516.