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IOT Based Health Monitoring System Using Arduino

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Abstract: ***In this time of epidemic Healthcare is given extreme importance. IOT based health monitoring is the best solution. In our project a portable physiological checking framework is displayed, which can constantly screen the patients pulse rate, temperature and oxygen. The temperature sensor measures the body temperature and oximeter measures the oxygen level and pulse of the patient when the patient is in contact (fingertip) with the sensors. It is a non-stop measuring instrument which sends data of patient to the IOT server using the Wi-Fi Module. In this system the authorized personal can access these data stored using IoT server and based on these values received, the diseases are diagnosed by the doctors from a distance.***
Keywords: IOT based health monitoring, sensors, portable physiological checking framework, IOT server

I. INTRODUCTION

Health monitoring is a essential problem in today's world. Due to lack of proper health monitoring, patient suffer from serious health issues. There are lots of IoT devices that can monitor the health of patient over internet. Health experts are also taking advantage of these smart devices to keep an eye on their patients. With tons of new healthcare technology start-ups, IoT is rapidly revolutionizing the healthcare industry. IOT based patient health monitoring system is a generic term given to any medical equipment that has internet capability and can measure one or more health data of a patient who is connected to the device such as heartbeat, body temperature, blood pressure, ECG, Pulse rate etc. Our device measures temperature, blood oxygen and heart rate. The equipment can record, transmit and alert if there is any abrupt change in the patient's health.

II. LITERATURE REVIEW

1) In this report of health monitoring system they have used different sensors like pressure sensor, body movement sensor, Temperature sensor, Humidity Sensor, Toxic Gas sensor and Air Quality sensor. They have used GPRS / GSM module

2) In this proposed system the controller used is ATMEGA328. They have temperature sensor, ECG Driver circuit, Heartbeat driver circuit and RF encoder. They have used Things Speak as a IOT platform.

3) A pulse oximeter is a device that is usually placed on a fingertip. Oxygen saturation gives information about the amount of oxygen carried in the blood. The pulse oximeter can estimate the amount of oxygen in the blood without having to draw a blood sample. Most pulse oximeters show two or three numbers. The most important number, oxygen saturation level, is usually abbreviated SpO2, and is presented as a percentage. The pulse rate is abbreviated PR, and sometimes there is a third number for strength of the signal. Oxygen saturation values are between 95% and 100% for most healthy individuals, but sometimes can be lower in people with lung problems. Oxygen saturation levels are also generally slightly lower for those living at higher altitudes. Over-the-counter(OTC) oximeters are sold directly to consumers in stores or online and include smart phone apps developed for the purpose of estimating oxygen saturation.

4) The system developed for patient monitoring based on Internet of things, is an alternative that can be used to help patients with chronic diseases. Likewise with this set of solutions the aim is to improve the quality of life of patients, not just monitoring them, but also to enable direct them to improve their eating habits and workout routines. The context model developed for the system proved to be efficient when making inferences related to the context, such as recommendation for taking measures through sensors, as well as recommendations and workout routines tips to improve the eating habits of patients.

5) In this paper, the system monitored body temperature, pulse rate and room humidity and temperature using sensors, which are also displayed on LCD. These sensor values are then sent to a medical server using wireless communication. These data are then received in an authorized personals smart phone with IoT platform. With the values received the doctor then diagnose the disease and the state of health of the patient.

6) In the paper a low cost e-health monitoring system was proposed. The system offers remote capabilities that enhance the level of medical support the patient receives while enabling them to be monitored in the comfort of their home.

This is especially important for patients with chronic diseases and patients that require regular monitoring of vital parameters. Using web or mobile application, patients' data can be collected easily and efficiently, at the same time providing access to them from any location. Visualization of this data as well as tracking the progress and facilitating communication between patients and doctors, are considered as a great advantage of this solution. Taking the medicine on time is considered to be a high priority for patients. Failure to take the medicine on time cannot only delay recovery, but can worsen the symptoms of an existing illness or cause serious side effects. In this context the use smart TV application for showing reminders and notifications, is very important. Our next step will be conducting the evaluation study with the end users in order to get the feedbacks from them, which will be used for further system improvement.

III. COMPONENTS SPECIFICATIONS

A. LM35 Temperature Sensor

LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

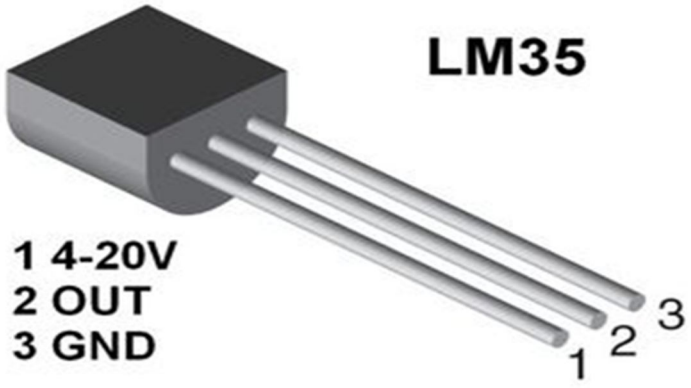

Fig1 LM35 temperature sensor

B. MAX30100 Oximeter

Pulse oximeter is a method for monitoring a person's oxygen saturation and heart rate. Basically Oximeter calculates the percentage oxygen saturation in the blood on basis of amount of different light absorb in it. In this approach, a sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or an infant's foot. Fingertips and earlobes have higher blood flow rates than other tissues, which facilitates heat transfer.

Fig2. MAX30100 Oximeter

C. ESP8266 WI-FI Module

The ESP8266 is a very user-friendly and low-cost device to provide internet connectivity to your projects. The module can work both as an Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making the Internet of Things as easy as possible. It can also fetch data from the internet using API's hence your project could access any information that is available on the internet, thus making it smarter. Another exciting feature of this module is that it can be programmed using the Arduino which makes it a lot more user friendly.

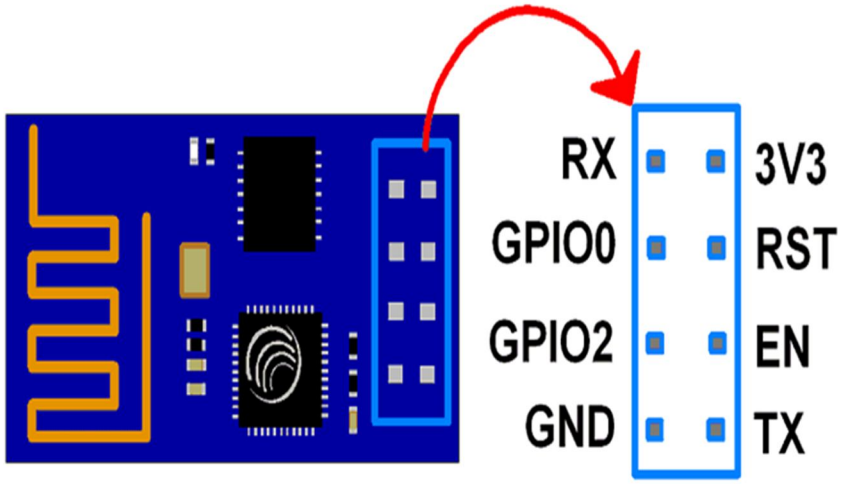

Fig3. ESP8266 Wi-fi module

D. Arduino UNO

Arduino is an open source physical computing platform based on a simple input/output (1/0) board and a development environment that implements the Processing language. Arduino can be used to develop standalone interactive objects or can be connected to software on your computer. Arduino hardware is an open-source circuit board with a microprocessor and input/output (1/0) pins for communication and controlling physical objects (LED, servos, buttons, etc.).The board will be powered via USB or an external power supply which in turn allows it to power other hardware and sensors.

Fig4. Arduino UNO

IV. BLOCK DIAGRAM

The temperature sensor, oximeter, power supply and ESP8266 are connected to the Arduino UNO. The temperature sensor measures the body temperature, the pulse sensor will measure the pulse and oximeter measures the oxygen level of the patient when the patient is in contact (wrist) with the sensors. The Arduino will process the code and display the data of the patient to LCD display. The Wi-fi module ESP8266 provides internet connectivity through which the data will be monitored on the IOT server. Thus, the doctors and relatives of the patient can access the data and monitor the health of the patient remotely and take necessary measures accordingly.

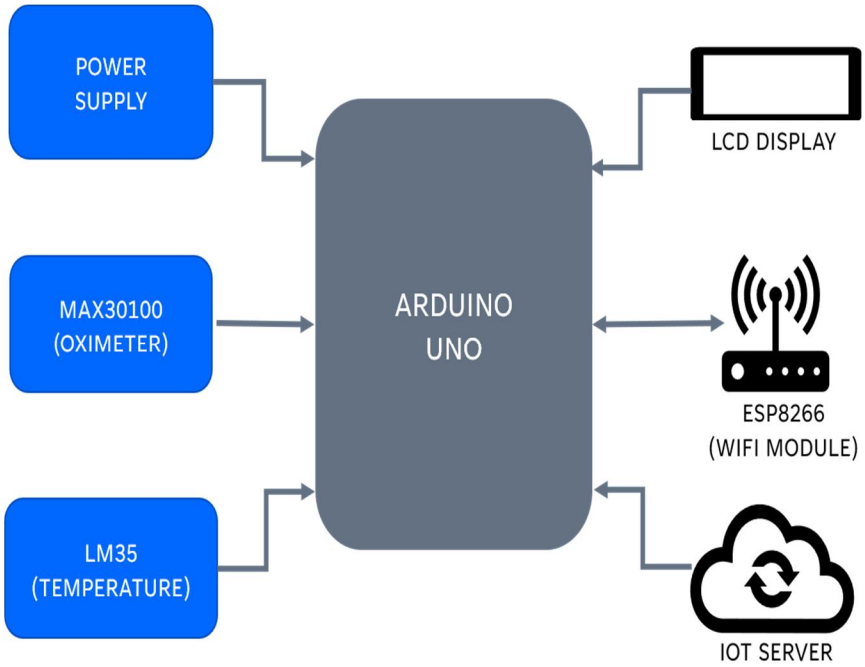

Fig 5. Block diagram

V. HARDWARE DESIGN

A remote health monitoring system using IOT is proposed where the authorized personal can access these data stored using any IoT platform and based on these values received, the diseases are diagnosed by the doctors from a distance. The LM35 Temperature sensor are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature, has an advantage over linear temperature sensors calibrated in Kelvin. The ESP8266 is a very user-friendly and low-cost device to provide internet connectivity to your projects. It can also fetch data from the internet using API's hence your project could access any information that is available on the internet, thus making it smarter. Arduino hardware is an open-source circuit board with a microprocessor and input/output (1/0) pins for communication and controlling physical objects (LED, servos, buttons, etc.). The board will be powered via USB or an external power supply which in turn allows it to power other hardware and sensors. The temperature sensor, blood pressure sensor, oximeter, power supply and ESP8266 are connected to the Arduino UNO. The sensor measures the parameters of the patient when the patient is in contact with the sensors. The Arduino will process the code and display the data of the patient to LCD display. The Wi-fi module ESP8266 provides internet connectivity through which the data will be monitored on the IOT server.

Limitations: It is not accessible for everyone. It requires good broadband connectivity, which is hard to achieve for small healthcare institutions and rural hospitals.

VI. METHODOLOGY

The temperature sensor measures the body temperature, the heart beat sensor will measure the heart rate and oximeter measures the oxygen level when the patient is in contact with the sensors. The Arduino will process the code and display the data of the patient to LCD display. The Wi-fi module ESP8266 provides internet connectivity through which the data will be monitored on the IOT server. Thus, the doctors and relatives of the patient can access the data and monitor the health of the patient remotely and take necessary measures accordingly.

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VII. EXPERIMENTAL RESULTS

1) *On the Hardware:* The below images display the values of blood oxygen, heartbeat and temperature measured by the respective sensors on the LCD display when the fingertip is placed on it.

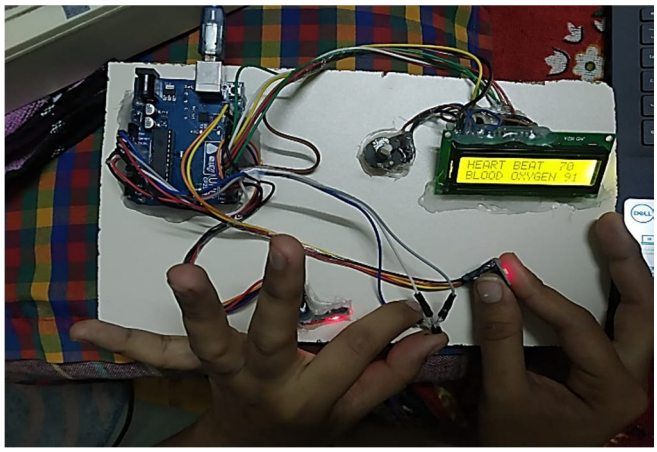


Fig 6. Hardware display of heartbeat and blood oxygen

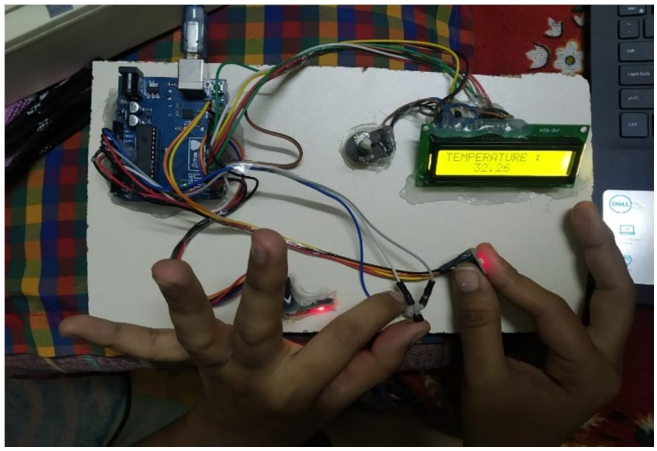


Fig7. Hardware display of temperature

2) *On the IOT server:* The below images display the values of blood oxygen, heartbeat and temperature readings measured by the sensors uploaded on the IOT server THINGSPEAK by the Wi-fi module ESP8266.

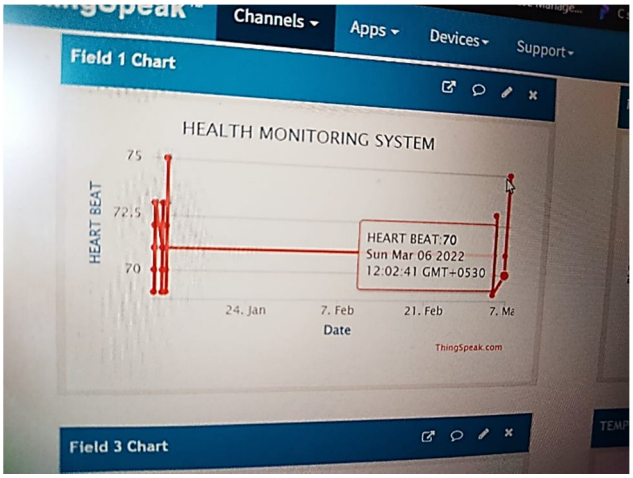


Fig8. Display of heartbeat reading on the IOT server

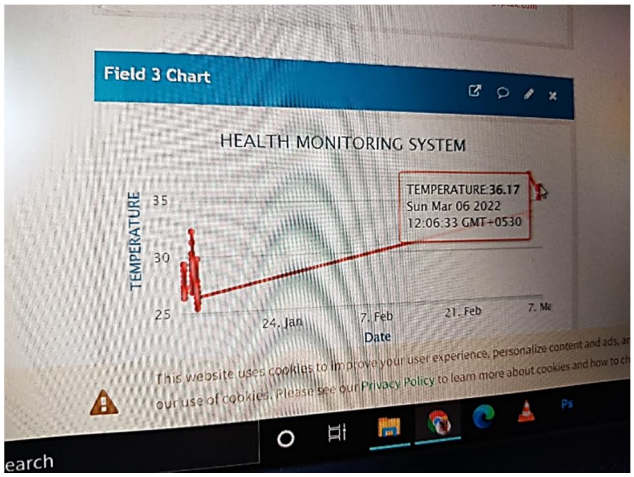


Fig9. Display of temperature reading on the IOT server

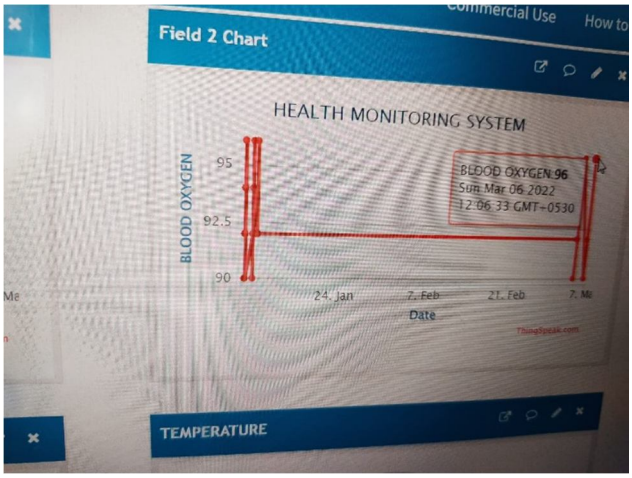


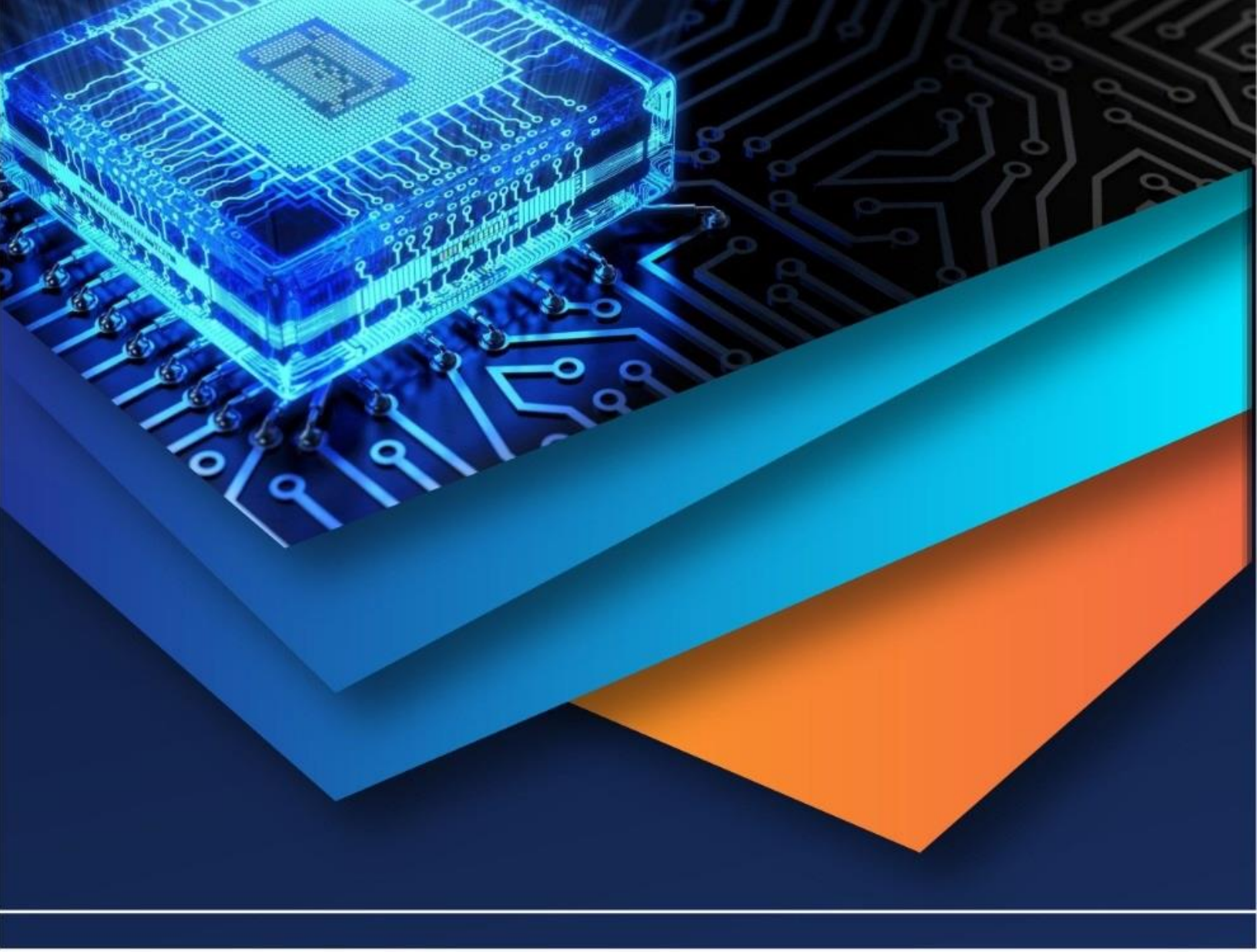
Fig10. Display of blood oxygen reading on the IOT server

VIII. CONCLUSION

In the above mentioned system we have proposed a health monitoring system which is IOT based. User friendly and bridges gap between doctor and patients. The system is simple, Power efficient. Practical application of the system is superfine in rural areas as there would be no need for the patients to get their continuous follow-ups.

REFERENCES

[1] IOT based remote health monitoring by Narsimha rao Jasti Madhu B.E., DR AIT, India, 2010.
[2] IoT Based Multi-Node Health Monitoring System by Rupali Bhandwaldar.
[3] Pulse Oximeter by FDA Safety Communication, Feb 19, 2021.
[4] Patient Monitoring System Based on Internet of Things by Jorge Gómeza, Byron Oviedob , Emilio Zhumab, ANT 2016.
[5] IOT based health monitoring system by Prajoona Valsalan, Tariq Ahmed Barham Baomar, Ali Hussain Omar Baabood, 10th Feb 2020.
[6] E-health monitoring system by Aleksandar Kotevski, Natasa Koceska and Saso Koceski, 2016.
[7] S.M. Riazulislam, Daehankwak, M.H.K.M.H., Kwak, K.S.: The Internet of Things for Health Care: A Comprehensive Survey. In: IEEE Access (2015).
[8] Linklabs" IoT In Health Care: What You Should Know", online [Available]: https://www.link-labs.com/blog/IoTin-healthcare
[9] P. Bonato, "Wearable sensors/systems and their impact on biomedical engineering," IEEE Eng. Med. Biol. Mag., vol. 22, no. 3, pp. 18–20, May/Jun. 2003.
[10] Secured Smart Healthcare Monitoring System Based on Iot, International Journal on Recent and Innovation Trends in Computing and Communication Volume: 3 Issue: 7, Bhoomika.B.K, Dr. K N Muralidhara .
[11] Luigi Atzori et al, "The Internet of Things: A survey", Computer Networks, Vol.54, pp. 2787-2805,2010.
[12] 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).



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