TEST Engineering & Management

May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

Health Monitoring System using Augmented Reality

Chaitanya R[1], Dr Puviarasi R[2], Saveetha School of Engineering,
Saveetha Institute of Medical and Technical Sciences
chaitanyaravi739@gmail.com[1], puviarasi88@gmail.com[2]

Article Info
Volume 83
Page Number: 1928 - 1934
Publication Issue:
May - June 2020

Article History
Article Received*: 11August 2019*
Revised*: 18November 2019*
Accepted*: 23January 2020*
Publication*: 10 May2020*

Abstract:

In rural and urban areas it is very important to create awareness about personal health and appoint doctors for regular and good check-ups. In this system, there is an implementation of the advancement of wireless technology and IoT which act as a screening device for health issue identifications. It permits doctors to attend multiple patients in urban and rural areas without constant focusing on a single patient. In this proposed project a system is designed in which such a type of device which is used for regular monitoring of patients in hospital is utilised. The introduction of IoT technology makes it more flexible and accurate that a doctor can monitor his patient's condition without his physical presence all the time. On the whole there is a need to introduce such a type of design which can monitor health condition and emergency application and analyze the parameters and give an alert if something goes in an abnormal fashion and data can be transmitted wirelessly anywhere by utilising IoT technology. The primary motive behind this paper is to make the health monitoring system for patients basic and accurate. Currently in this paper, monitoring of body temperature, respiratory rate and heart rate is done but it can be further expanded to measuring various parameters like stress, vibration, blood pressure, etc. Another objective of this proposed system is to examine these parameters to distinguish the issue precisely and to give the patient better medication at the earliest and these analyzed data can be transmitted wirelessly to the doctor anywhere around the globe by using Augmented Reality.

Keywords: *Augmented Reality, IoT, Pressure, Respiratory, Blood Pressure*

I. INTRODUCTION

Ease of access to essential healthcare and especially medical care remains a difficult issue for the helpless populace and adulthood, especially those living within the remote communities of numerous nations. They have restricted access to healthcare due to their proximity to different areas where healthcare is available. This is frequently vital for those influenced by interminable sicknesses and hence the need of continuous consideration, not only for the remote communities but also for the general population is required. The shortage of access to essential or primary care has resulted in overcrowded emergency departments and overstretched health system. Advancements in telehealth solutions have demonstrated chances to beat any boundaries to any infrastructural changes required within the community care settings and absence of general experts, making virtual specialists visits conceivable. Nonetheless, absence of web network, authoritative structure and non-satisfactory repayment models for discussions, confines its selection. Telehealth solutions are booming over all across the world endeavoring to cover individuals of the remote communities. Ongoing advancements in VR and AR demonstrate colossal potential to improve video consultations to create 3D telepresence for patient experience. While majority of these advancements, for instance, the Microsoft's HoloLens are head-mounted wearable gadgets, the research exercises have concentrated chiefly on medical procedural training. These gadgets help to show data, mix with the present reality, or even recreate a virtual world. Such innovations will have low consistence to persistent take-up because of inconvenience and the weight of wear experienced on their head and constrained memory limit, whilst being expensive. Developing AR innovation accessible through cell phones shows

the capability of patient uptake because of its conveyance over life advancements. The main aim is to show the reasonability of upgrading telehealth consultation by means of this new technology over the portable devices to yield a vivid genuine experience to patients and make it more lively. These technologies are the new-age innovations which help connect real world with the virtual world.

Fig 1.1 Augmented Reality

II. LITERATURE SURVEY

In [1] Abitha, Akshaya proposed a system in which significant information for the doctors are seen on semi-transparent glasses included in an AR-headset and therefore are blended with the real-world view.

In [2] Mr Randhave Bhagwat, Mr Rasal Chandrakant, Mr Yewale Nitin, Prof. Rupali Adhau proposed the present IoT architecture designed for healthcare applications. In this system it takes input from the data and transfers it to the cloud where it is analyzed and processed. The feedback approach based on the data which is analyzed is sent back to the source through Microcontroller.

In [3] Ansari Kasaf, Ayashabi Mashayak, Saima Shaik, Patill S.C described this system as an application which helps the visually impaired people to find the medicine and to take the medicines according to their doctor's prescription. In this approach, a reminder is set which tells the output user when to take the medicines.

III. EXISTING SYSTEM

To measure the heart level and pressure level of the environment there is no continuous monitoring for the levels. Manual work is performed to predict the pressure level in the environment. In this proposed health monitoring systems often there is no need to completely address the assessment of population exposure to poisonous air pollutants and the assessment of the resulting health effects. In the existing studies in the activity recognition utilised vision-based systems with one or more camcorders, remains the most notable intends to date. Such systems might be satisfactory and viable in a research facility or a well-controlled environment.

A. Disadvantages

- Human intervention is required.
- Effects of external lighting conditions affect monitoring.
- Camera based approach includes shadow disturbances.

IV. PROPOSED SYSTEM

In this project, the real time data to track and monitor the patients in hospital is collected by the multiple sensors attached to patients and once the sensor measures the values then it is processed and sent to doctors through augmented reality glass through wireless transmitter and receiver pair and alerted if abnormal condition occurs. The doctors can then take appropriate actions based on the patient's current health condition. To measure the human body temperature, a LM35 sensor is used. LM35 sensor measures body temperature more accurately compared to a thermistor since it is an industrial temperature sensor. Heart beat sensor provides a simple approach to measure heart beat rate which is measured based on the principle of psycho- physiological signal virtual for the stimulus for the augmented reality system. A simple solution to this problem can be made using Arduino which is a small-sized single board computer. The illness is then identified from the immunity calculations and

May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

is intimated to the doctor. If any of these multiple parameters cross beyond a threshold level, it is notified to the doctor immediately at the stage and necessary medication is given to prevent further complications.

A. *Advantages*

- Continuous measurements are available for the physical parameters and those measurements are then updated on the mobile phone.
- Confidentiality is maintained and new updated data are monitored regularly.
- Multiuser access is feasible and they can be able to get information from anywhere in the world.

V. BLOCK DIAGRAM

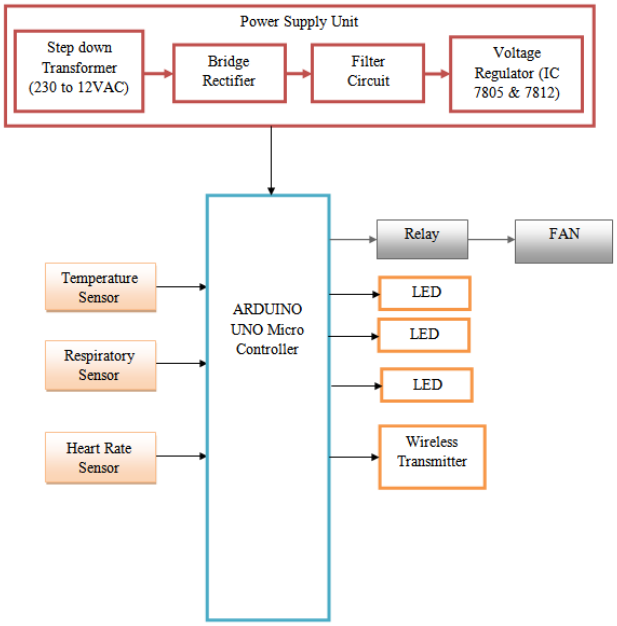


Fig 1.2 Block Diagram –Main Unit

Fig 1.3 Block Diagram –Receiver Unit

VI. MODULE DESCRIPTION

A. *Power Supply Unit*

The DC power supply unit is converted in every stage in the electronic system to a measurable quantity. Thus a mandatory requirement for all these phases will be the DC power supply circuit. All low power supply AC to DC system can be run with a battery. But, for long time operating devices to implement AC to DC conversion, batteries could prove to be expensive and complicated. The best method to be used is in the form of an unregulated power supply – a combination of a step down transformer, bridge rectifier and an electrolyte filter.

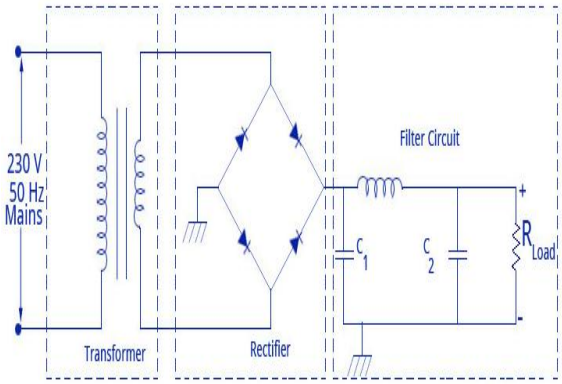


Fig 1.4 Power supply Unit

B. *Arduino UNO*

It is a microcontroller board which is based on the ATMega328P. This board contains about 14 digital output/input pins. There are 6 Pulse Width Modulation outputs available out of the 14 pins. It also contains a quartz crystal of frequency 16 MHz, an USB port, power jack and an ICSP header.

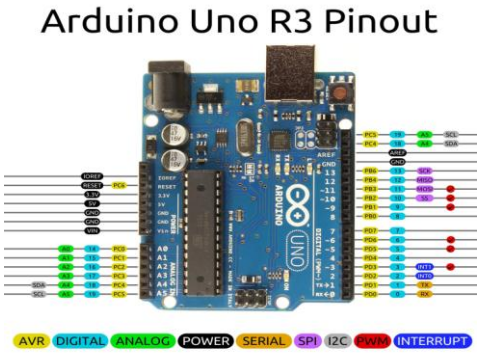


Fig 1.5 Arduino UNO

TEST Engineering & Management

May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

Arduino board designs are useful for a variety of microprocessors and microcontrollers. These pins can be interfaced to plenty of other expansion boards (shields) and other electronic circuits. The boards contain several serial communications interfaces, including Universal Serial Bus (USB), Serial Peripheral Interface (SPI) on some models. The microcontrollers are generally programmed using a dialect of features from the typical programming languages like C and C++ for its simplicity.

C. Temperature Sensor

Temperature is one of the most vital and measured process variables in industrial automation and application. This sensor is utilised to change a temperature value to a quantifiable electrical value. These sensors are the key to observe temperatures from environment precisely and to control temperature in industrial applications. Sensors have different properties like contact-way, calibrating method and detecting component.

Fig 1.6 Temperature Sensor

D. LED

LED is the most widely used semiconductor diodes among the different types of semiconductor diodes available. It is made from semiconductor elements like GaAs, GaP, SiC, etc. LED emits either visible light or invisible infrared light depending upon the biased condition. It operates in forward biased condition and does not operate under reverse biased condition.

Fig 1.7 LED

E. Relay

A relay is an electrically operated switch to control motor etc. A large portion of them use electromagnets to operate a switch, but other operating principles are also utilised, such as solid-state relays. These relays were generally not used in short distance application telegraph circuits. Prior they were utilised in telephone exchanges for communication and in early computers to perform operations such as logical operations.

Fig 1.8 Relay

F. Respiratory Sensor

The Respiratory Sensor is utilised to monitor and update abdominal or thoracic breathing, in bio-feedback applications for example, stress and depression management and relaxation training. Despite quantifying breathing frequency, this sensor additionally gives you an indication of the relative depth of breathing. The Respiratory Sensor is generally placed in the abdominal area, with the middle part of the sensor. The sensor should be placed tight enough to prevent loss of tension.

TEST Engineering & Management

May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

Fig 1.9 Respiratory Sensor

G. *Heart Beat Sensor*

The heart beat sensor is designed and implemented to give digital and analog output of the heart beat when a finger is placed on the sensor. The beat LED flashes once for every heart beat showing the heart beat at any instant when the heart rate sensing detector begins detection. The digital output obtained can be connected to Arduino UNO for the quantification of the BPM (Beats per Minute) rate directly. This works under the principle of light modulation by blood flow through our finger.

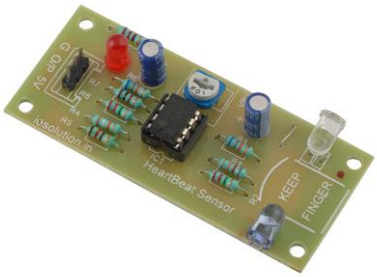


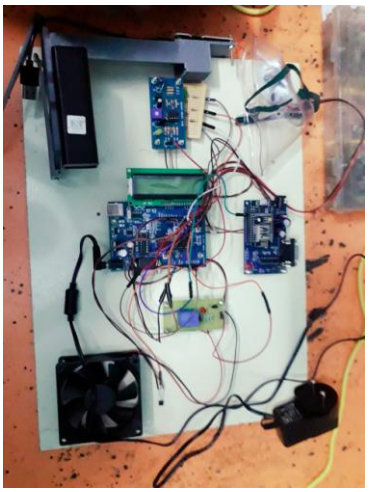
Fig 1.10 Heart Beat Sensor

H. *DC Fan*

A fan is a machine particularly used to create stream inside a fluid, commonly a gas, for example, air. The fan comprises of a rotating arrangement and management of vanes or blades which follow up on the fluid.

Fig 1.11 DC Fan

VII. RESULTS AND DISCUSSION



May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

VIII. CONCLUSION

Thus this system helps the doctor identify the critical patients faster by using the AR goggles and the microcontroller with sensors ,which displays the respiratory rate, temperature and heart beat of the patient which helps to classify if the patient requires immediate attention or not. This reduces the doctor's time to a greater extent preventing the doctor to check the basic details moving to each patient's bed.

REFERENCES

[1] Neera Singh, "Early Detection of Diabetic Retinopathy Using Image Analysis Techniques", *International Journal of Computer Applications*, 2010.

[2] Satish Kumar Kotha , Gujjula Sanketa , K Purnima , K Ramya Krishna ,"Diagnosis of Diabetic Retinopathy and Glaucoma using Fundus and OCT Images", *International Journal of Innovative Research in Advanced Engineering*, 2015.

[3] Muhammad Waseem Khan,"Diabetic Retinopathy Detection using Image Processing: A Survey",*International Journal of Emerging Technology & Research*, 2013.

[4] Bhagyashri S. Mankar, "Automatic Detection of Diabetic Retinopathy using Morphological Operation and Machine Learning",*An International Journal of Engineering & Technology*,2016.

[5] N Venkateswara, "Simulation of Zigbee Based Health Monitoring System for Patients", 2018 *Fourth International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB)*

[6] Prof. Neha N.Gaikwad, Prof. Pravinkumar R. Badadapure, "Image Processing Technique for Hard Exudates Detection for diagnosis of Diabetic Retinopathy",*International Journal on Recent and Innovation Trends in Computing and Communication*, 2015.

[7] Jyoti D. Patil, "Tool for the Detection of Diabetic Retinopathy using Image Enhancement Method in DIP", *International Journal of Applied Information Systems*, 2012.

[8] Meera Walvekar "Detection of diabetic retinopathy with Feature extraction using Image processing", *International Journal of Emerging Technology and Advanced Engineering*, 2015.

[9] Mahsa Partovi, Seyed Hossein Rasta, Alireza Javadzadeh,"Automatic detection of retinal exudates in fundus images of diabetic retinopathy patients" ,*JARCM*, 2016.

[10] Filip Malawski; (2018),‟ Driver Assistance System Using Augmented Reality Headset‟, IEEE 978-1-5386-4695-3/18.

[11] Hakan Altinpulluk;(2017),‟Current Trends In Augmented Reality And Forecasts About The Future‟, ISBN: 978-84-697-6957-7.

[12] Gou Kotaki, Ryota Kimura, Nobutomo Matsunaga, Hiroshi Okajima, (2017), Design of Virtual Platoon Control System using Augmented Reality to Assist Welfare Vehicle Users‟, 978 978-89-93215-13-7/17/ICROS

[13] Arash Haddgar, Egui Zhu, Italo Masiello, Nabil Zary(2014), Augmented reality in healthcare education: An integrative review‟, DOI:10.7717/peerj.469; Source: PubMed.

[14] Mithun P, Raajan N R, Shiva G , Mithun P, Vijayabhaskar P V M; (2014);‟ A Review On: Augmented Reality Technologies, Systems And Applications‟ Journal of Applied Sciences; Volume 14 (14): 1485-1495.

[15] Embedded C – Wikipedia.

[16] PIC Microcontrollers Programming in C: A Complete Guide to Pic Microcontrollers, Milan Verle.

[17] J. C. Oliveira, G. A. Giraldi, "Introduction to Augmented Reality", National Laboratory for Scientific Computation.

[18] Sharvari Govilkar, Amin and Dhiraj,. "Comparative study of augmented reality Sdk's." International Journal on Computational Science & Applications 5.1 (2015): 11-26.

May – June 2020
ISSN: 0193-4120 Page No. 1928 - 1934

[19] R. Schlegel, C. Chow, Q. Huang, D. Wong. User-defined privacy grid system for continuous location-based services. IEEE Transactions on Mobile Computing, Jan. 2015.

[20] Xu, L.D., Xu, B., Xie C, Bu, J., Hu, F.: Ubiquitous data accessing method in IoT-based information system for emergency medical services. IEEE Trans. Ind. Inf. 10(2), 1578-1586 (2014)