

## Progressed IOT Based Remote Health Monitoring System

Dahlia Sam<sup>1</sup>, S.Srinidhi<sup>2</sup>, V. R. Niveditha<sup>3</sup>, S.Amudha<sup>4</sup> and D. Usha<sup>5</sup>

<sup>1</sup>Assistant Professor, Department of Information Technology,

<sup>2</sup>B.Tech, Department of Computer Science and Engineering,

<sup>3</sup>Research Scholar, Department of Computer Science and Engineering,

<sup>4</sup>Assistant Professor, Department of Computer Science and Engineering,

<sup>5</sup>Associate Professor, Department of Computer Science and Engineering,

<sup>1, 2,3,4,5</sup>Dr. M.G.R. Educational and Research Institute (Deemed to be university)

Maduravoyal, Chennai 600095, Tamil Nadu, India.

### Abstract

*Because of a bustling timetable and unpredictable way of life, health risk isn't an age-subordinate factor in the ongoing time. Under these conditions, Internet of Things has given a lot simpler answer for remote continuous wellbeing check of patients from the clinic, just as home. Sensors secure the information of different parameters with regards to patients' wellbeing, and the Internet of Things stores that information and shows through the site, which also gives access to remote observing. Utilization of sensors decreases the possibility of human mistake, ensures better care and treatment, reduces medical expenses, lessens the involved space of the room and improves overall performance. This extraordinary piece of arrangement is a novel way of giving the recommended prescription to patients in time. The other gainful zone of this framework is the plan of sending the warning through email and SMS alert, if any of the health parameters crosses the limit esteem. Notice plan will keep the medical expert aware of the circumstance. Another huge part of the proposed arrangement, is creating the ideal surroundings according to the necessity of patient's wellbeing condition. This paper deals about the checking of health data like pulse, circulatory strain, breath rate, body temperature, body development and saline dimensions. Overall, IOT in healthcare is a potential area where possibilities are endless.*

**Keywords:** Internet of things, Arduino UNO, sensors, Healthcare IOT

### 1. INTRODUCTION

Web associated gadgets are procuring huge potential as it drives our day by day life forward towards mechanization. The rapid drop in cost for run of the mill IoT parts enables individuals to develop new items. IoT is the mix of installed frameworks, sensors, programming and this can also be additionally alluded to as web of everything [2],[3],[4].

Healthcare industry is becoming costlier than ever in this modern age, but the number of patients and diseases are ever increasing. As health of an individual is a standout amongst the most vital issues these days, IoT could be used in the wellbeing business as a ceaseless health observing framework. In the meantime, the web is presently effectively accessible for portable advancements, which makes remote recognition in everything progressively well known. At the point when a patient gets admitted to a clinic or in other area under perception of therapeutic collaborator, the relatives of the patients are on edge about his/her wellbeing circumstance all through constantly.

### 2. PROPOSED SYSTEM

IOT is constantly relying on providing propelled networks of tools, systems, and administrations which go beyond machine-to-machine (M2M) junctions and cover a range of networks, fields, and applications. The network topology of these implanted devices are needed to implement automation in all kind of the fields and at the same time empowering guided applications.

"Things" present in the IOT has senses that refer to such a broad devices range like heart probe inserts, biochip transponders on homestead species, electric shellfish in beach front waters, autos with definite

sensors, DNA inspection devices for natural / nourishment / pathogen detection or field task gadgets which may assist firemen in hunting and rescue. Lawful researchers are proposing to take a quick look at "things" as an "inseparable combination of equipment, programming, data and management." These devices obtain valuable information with the help of various existing technologies and then stream the information among different devices by self-governing them. The model of recent market include home mechanization is also known as fine home devices, such as lighting control and robotic devices, Heating Ventilation Air Cooling (HVAC) systems, and appliances namely washer and dryers, air purifiers, mechanical vacuums, stoves or iceboxes / coolers using Wi-Fi for remote control[12-14]. Much as the expansion of Internet-associated technological progress into a several amount of recent application regions whereas IOT is also expected to generate a great deal of information from various areas with the resulting needed for a brisk conglomeration of data, and an expansion from the need to list, process and store those information even more appropriately. Therefore, IOT is one of the best ways for initiating smart city and smart management systems at of today.

### 2.1. IOT in Healthcare Monitoring

The framework of the proposed healthcare IoT products can transform the whole system of healthcare. It can provide a better experience for both patients and medical professionals. It is adaptable, permitting other home apparatuses structured by various merchants, to be safely and securely added to the current home system with the base measure of exertion. The accomplishment of signal can provide an endorsed drug on time, which may be displayed through the LCD screen. This caution notice will diminish the human blunder and help the restorative associate or capable individual to deal with the patient all the more effectively. The extra and another advantageous piece of the framework is the sending of an email alarm and SMS to the specialist, restorative aide and relatives of the patient, if any of the deliberate physiological parameters cross the limit esteem. Another interesting piece of the proposed arrangement is to make the ideal surroundings according to the necessity of patient's wellbeing condition. This is accomplished by sending the deliberate information to the control unit of which will convey to the apparatuses of the patient's space to make ideal room conditions.

### 2.2. Proposed Architecture

IoT Healthcare process can be split into two systems: Transmitter section and Receiver Section. These are shown in Fig 1 and Fig 2. Both these are together involved in the following processes:

Process 1: The devices are deployed at the patient side. These can be different sensors, monitors, cameras etc. These are used to collect the live health details and transmit to the next stage.

Process 2: The data received from the devices are collected, converted to proper digital form and transmitted through the OSM 9[1][5].

Process 3: Data is received at the received at the receiving end. It is then analyzed and further action taken. This could be sending a prescription, giving appropriate instructions to patient or preparations for further treatment.

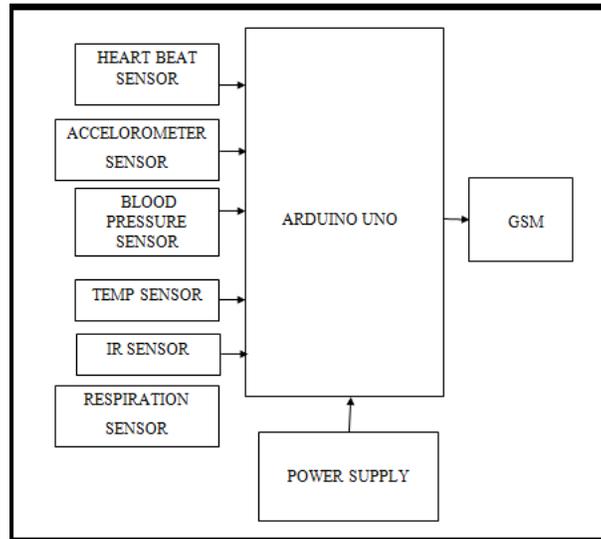


Fig 1: IoT Based Transmitter section in health monitoring system

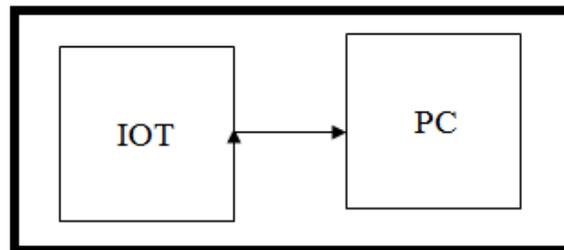


Fig 2: IoT Based Receiver section in health monitoring system

Both the transmitting and receiving end devices communicates to bring out a faster and effective treatment plan.

### 3. IMPLEMENTATION

The devices of IOT have been used for empowering remote well-being examination [10]. According to an instance, pacemakers Fitbit electronic wristbands or powered mobile hearing assistants are used for better monitoring devices which may run from circulatory strain and pulse screens, in order to observe specific inserts. Some medical clinics have begun implementing "keen beds" which can discern if a patient is trying very hard to get up. It may also modify itself to ensure sufficient weight and the service is linked to the patient without the professional caregiver's manual collaboration. Special sensors may also be designed within living spaces to track senior citizens' well-being and overall health. Certain device purchaser such as compatible scales or wearable heart displays to endorse solid living, are also in coherence with IOT. The IoT testing has been increasingly used for analyzing from the beginning to the end for regular patients by allowing one to track critical health vitals and repeating medication necessities. Fig 3 shows the sensors that have been taken for the purpose of this study. The proposed framework variation has posted three parameters namely Blood pressure, Heartbeat and Temperature over IoT web. The monitors are connected to the micro-controller and the output is transmitted to the health center [6][7].



Fig 3 Implementation of sensing module

#### 4. RESULTS AND ANALYSIS

This examination prompted the improvement of a framework that estimated both temperature and heartbeat of a patient has been sent through remote to an end by Arduino and Atmega328 micro-controller at a sensible expense using extraordinary impact.

Nowadays, the major portion of the systems is operating in isolated model and the test has utilized two sensors to measure a body's pulse and temperature. Such sensors are controlled by the micro-controller Atmega328 to measure pulse and it has placed at a fingertip for reliably gauge. The device makes use of optical engineering to discern the blood stream through the finger [9][11].

The output of the monitors are combined in the Arduino and transferred through the Wi-Fi module to a remote end where it displays the observed information on the website. This can be seen in Fig 4 and Fig 5.

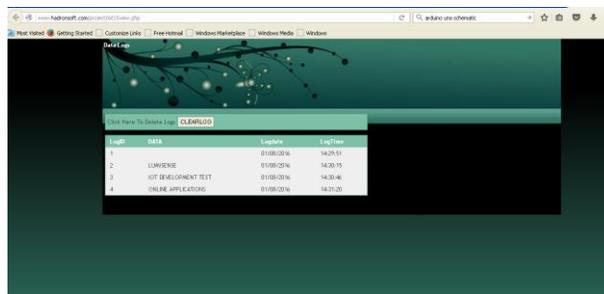


Fig 4 IoT web server

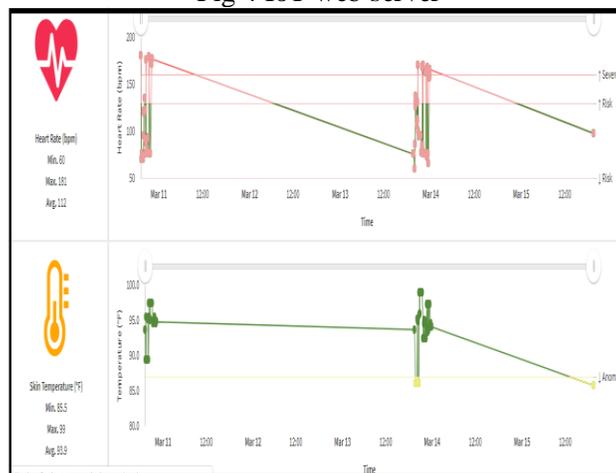


Fig 5 Heartbeat and temperature of patient monitored

In this research, the heart beat screen provides the heart beat rate through thumps [8] at each moment (bpm) for clear interim, passes the calculated rate through the Wi-Fi module and transfers it to a remote end. This can be seen in Fig 6.

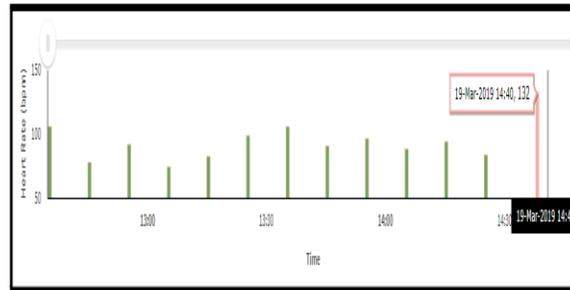


Fig 6 Patient heartbeat monitoring for certain time span

In this research, LM35 is used as a temperature sensor that assists in estimating the body temperature and bolsters the deliberate information to the transmitter module (Fig 7). Remote system is used for transmission of information to a remote region and also gets acquired in a separate terminal named as beneficiary module.

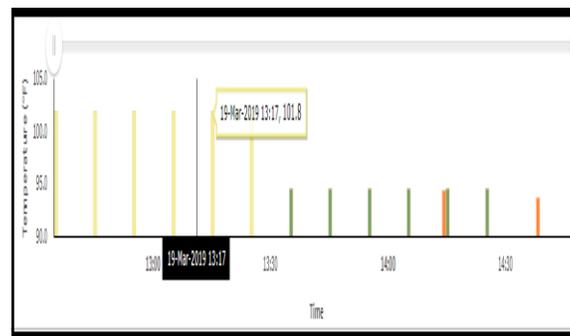


Fig 7 Patient skin temperature monitoring for certain time span

The optical sensor with a blend of Infrared - Light Emitting Diode (IR-LED) and IR photodiode contains the beat rate that generates low yield of basic flag. The flag is being improved and isolated, but backed up to the input of the micro-controller whereas each moment the micro-controller has shapes of information and measures of heart beat rate in pulsates. The purpose of Fluid Precious Stone Showcase (LCD) has shown the determined heart beat rate. Similarly, the information is displayed on a mobile phone or PC's screen using WiFi module.

## 5. CONCLUSION

The utilization of remote patient observation system innovation that enabled patient observations outside clinical settings and facilitated expanded access for medical facilities as well as reduced social insurance operating costs. The major difficulties faced in this research is utilization of wire but finally, the information is shown in the flexible screen or Laptop at the less than ideal end in which the experts or doctor will be able to analyze the information and will almost certainly provide support. In future, security of the transmitted data can be taken care of.

On the whole, IoT adds a new dimension of health and patient care with remote monitoring. Hence, the system is guaranteed to be easy, solid and sensible to utilize for a bright future in the field of healthcare.

## 5. REFERENCES

- [1] OMS, Overview – Preventing chronic diseases: a vital investment, [http://www.who.int/chp/chronic\\_disease\\_report/part1/en/](http://www.who.int/chp/chronic_disease_report/part1/en/), visited, April 2017.
- [2] Swan, M. Sensor mania! The internet of things, wearable computing, objective metrics, and the quantified self 2.0. *Journal of Sensor and Actuator Networks*, 1(3), 217-253, 2012.

- [3] Praveen Sundar, P.V., Ranjith, D., Vinoth Kumar, V. et al. Low power area efficient adaptive FIR filter for hearing aids using distributed arithmetic architecture. *Int J Speech Technol* (2020). <https://doi.org/10.1007/s10772-020-09686-y>.
- [4] Umamaheswaran, S., Lakshmanan, R., Vinothkumar, V. et al. New and robust composite micro structure descriptor (CMSD) for CBIR. *International Journal of Speech Technology* (2019), doi:10.1007/s10772-019-09663-0.
- [5] Charalampos Doukas, “Building Internet of things with arduino”, Apr 02 2012. Available online: <http://www.buildinginternetofthings.com/wp-content/uploads/INTRODUCTION.pdf>, visited April 2017.
- [6] Purnima, Puneet singh, “Zigbee and GSM based Patient Health Monitoring System”, IEEE International Conference on Electronics and Communication System, September 2014.
- [7] Shalini A, Jayasuruthi L, Vinoth Kumar V, “Voice Recognition Robot Control using Android Device” *Journal of Computational and Theoretical Nanoscience*, 15(6-7), pp. 2197-2201.
- [8] Sankar Kumar S, Gayathri N , Nivedhitha D , Priyanka A S “A Cost effective Arduino Module for Bedridden patient’s Respiratory Monitor and Control” *International Journal of advanced research trends in engineering and technology (IJARTET) VOL. II, SPECIAL ISSUE XXI, MARCH 2016*.
- [9] Kouser, R.R., Manikandan, T., Kumar, V.V (2018), “Heart disease prediction system using artificial neural network, radial basis function and case based reasoning” *Journal of Computational and Theoretical Nanoscience*, 15, pp. 2810-2817.
- [10] Ch.Sandeep Kumar Subudhi, ‘ Intelligent Wireless Patient Monitoring and Tracking System (Using Sensor Network and Wireless Communication)’, 2014.
- [11] Jayasuruthi L, Shalini A, Vinoth Kumar V., (2018) ” Application of rough set theory in data mining market analysis using rough sets data explorer” *Journal of Computational and Theoretical Nanoscience*, 15(6-7), pp. 2126-2130.
- [12] Karthikeyan, T., Sekaran, K., Ranjith, D., Vinoth kumar, V., Balajee, J.M. (2019) “Personalized Content Extraction and Text Classification Using Effective Web Scraping Techniques”, *International Journal of Web Portals (IJWP)*, 11(2), pp.41-52
- [13] Vinoth Kumar, V., Arvind, K.S., Umamaheswaran, S., Suganya, K.S (2019), “Hierarchical Trust Certificate Distribution using Distributed CA in MANET”, *International Journal of Innovative Technology and Exploring Engineering*, 8(10), pp. 2521-2524
- [14] Maithili, K , Vinothkumar, V, Latha, P (2018). “Analyzing the security mechanisms to prevent unauthorized access in cloud and network security” *Journal of Computational and Theoretical Nanoscience*, Vol.15, pp.2059-2063.