

# IoT And Cloud Server Based Wearable Health Sensors Monitoring System

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**Abstract:** The healthcare monitoring systems has emerged as one of the most vital system and became technology oriented from the past decade. Humans are facing a problem of unexpected death due to various illness which is because of lack of medical care to the patients at right time. The primary goal was to develop a reliable patient monitoring system using IoT so that the healthcare professionals can monitor their patients, who are either hospitalized or at home using an IoT based integrated healthcare system with the view of ensuring patients are cared for better. A mobile device based wireless healthcare monitoring system was developed which can provide real time online information about physiological conditions of a patient mainly consists of sensors, the data acquisition unit, microcontroller (i.e., Arduino), and programmed with a software (i.e., JAVA). The patient's temperature, heart beat rate, EEG data are monitored, displayed and stored by the system and sent to the doctor's mobile containing the application. Thus IOT based monitoring system effectively monitor patient's health status and save life on time.

**Keywords:** Arduino; Java; IoT; Data Acquisition Unit; Mobile Application Etc;

## INTRODUCTION

The increased use of mobile technologies and smart devices in the area of health has caused great impact on the world. Health experts are increasingly taking advantage of the benefits these technologies bring, thus generating a significant improvement in health care in clinical settings. Likewise, countless ordinary users are being served from the advantages of the M-Health (Mobile Health) applications and E-Health (health care supported by ICT) to improve, help and assist their health.

According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. As we are truly inspired by this, we attempt to propose an innovative system that puts forward a smart patient health tracking system that uses sensors to track patient vital parameters and uses internet to update the doctors so that they can help in case of any issues at the earliest preventing death rates.

Patient Health monitoring using IoT is a technology to enable monitoring of patients outside of conventional clinical settings (e.g. in the home), which may increase access to care and decrease healthcare delivery costs. This can significantly improve an individual's quality of life. It allows patients to maintain independence, prevent complications, and minimize personal costs. This system facilitates these goals by delivering care right to the home. In addition, patients and their family members feel comfort knowing that they are

being monitored and will be supported if a problem arises.

## EXISTING SYSTEM

In the existing system, we use active network technology to network various sensors to a single PMS. Patients' various critical parameters are continuously monitored via single PMS and reported to the Doctors or Nurses in attendance for timely response in case of critical situations. The sensors are attached to the body of the patients without causing any discomfort to them. In this PMS we monitor the important physical parameters like body temperature, ECG, heart beat rate and blood pressure using the sensors which are readily available. Thus, the analog values that are sensed by the different sensors are then given to a microcontroller attached to it. The microcontroller processes these analog signal values of health parameters separately and converts it to digital values using ADC converter.

Now, the digitalized values from more than one microcontroller are sent to the Central PMS. Each of the sensors attached microcontroller with a transceiver will act as a module which has its own unique ID. Each module transmits the data wirelessly to the gateway attached to the PC of the Central PMS. The gateway is attached to the PC i.e. Central PMS which is situated in the medical center, is capable for selecting different patient IDs and allowing the gateway to receive different physical parameter values the patient specified by the ID.

The software designed using Graphical User Interface (GUI) can operate on different physical parameters of each patient, consecutively with a specified time interval for each patient.

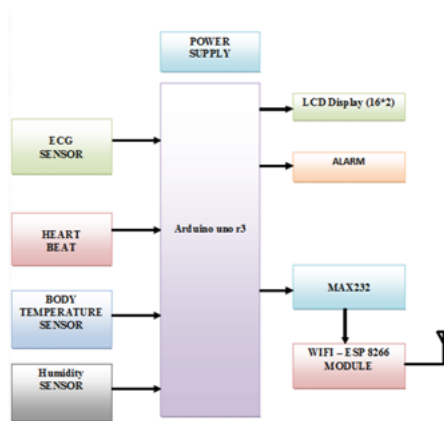
At any time, any of the doctors or nurses can log on the Central PMS and check the history of the observed critical parameters of any of the patient attached to the network.

### PROPOSED SYSTEM

In this proposed work the vital parameters such as temperature, EEG and heart beat etc readings which are monitored using Arduino Uno. These sensors signals are send to Arduino Uno via amplifier circuit and signal conditioning unit (SCU), because the signals level are low (gain), so amplifier circuit is used to gain up the signals and transmit the signals to the Arduino Uno. Here patients body temperature , EEG and heart rate is measured using respective sensors and it can be monitored in the screen of computer using Arduino Uno connected to a cloud database system as well as monitored anywhere in the world using internet source.

The proposed method of patient monitoring system monitors patient’s health parameters using Arduino Uno. After connecting internet to the Arduino uno, it is connected to cloud database system which acts as a server. Then the server automatically sends data to the receiver system. Hence, it enables continuous monitoring of the patient’s health parameters by the doctor. Any abrupt increase or decrease in these parameter values can be detected at the earliest and hence necessary medications can be implemented by the doctor immediately.

### ARCHITECTURE



### SYSTEM REQUIREMENTS

**Hardware:**

- Temperature sensor
- Humidity sensor
- 16x2 lcd display
- ECG sensor
- Heart beat sensor
- Body fall detection sensor

**Software:**

- C++, MYSQL, php
- Embedded C language
- Arduino uno r3

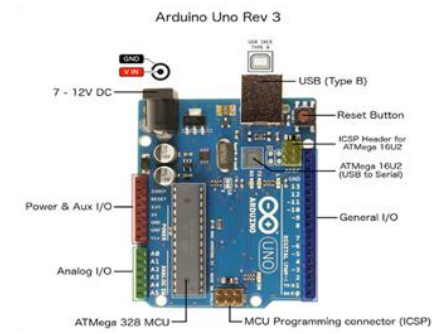
**Modules and its descriptions:**

**ARDUINO R3**

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

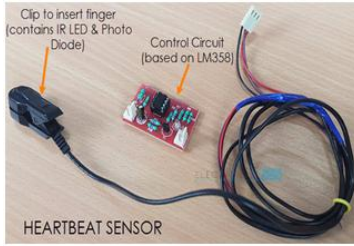
Starting clockwise from the top center:

1. Analog Reference pin
2. Digital Ground
3. Digital Pins 2-13
4. Digital Pins 0-1/Serial In/Out - TX/RX (dark green)
5. Reset Button - S1
6. In-circuit Serial Programmer
7. Analog In Pins 0-5
8. Power and Ground Pins
9. External Power Supply In (9-12VDC) - X1 16
10. Toggles External Power and USB Power (place jumper on two pins closest to desired supply) - SV1
11. USB



**Fingertip heart beat sensor:**

Heartbeat sensor provides a simple way to study the function of the heart which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual reality system. The amount of the blood in the finger changes with respect to time. The sensor shines a light lobe (a small very bright LED) through the ear and measures the light that gets transmitted to the Light Dependent Resistor. The amplified signal gets inverted and filtered, in the Circuit. In order to calculate the heart rate based on the blood flow to the fingertip, a heart rate sensor is assembled with the help of LM358 OP-AMP for monitoring the heartbeat pulses.



**Fall detection sensor:**

A **fall detection system** can be defined as an assistive device whose main objective is to alert when a **fall** event has occurred.

In a real-life scenario, they have the potential to mitigate some of the adverse consequences of a **fall**.



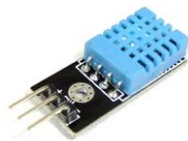
**Temperature sensor:**

Most temperature sensor have a positive temperature coefficient, meaning that the sensor output goes up as the temperature goes up

Many control systems require temperature sensors, especially for temperature-dependent applications

**Humidity sensor:**

A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal.



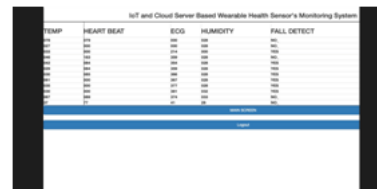
**ECG sensor:**

ECG records the electrical activity generated by heart muscle depolarizations, which propagate in pulsating electrical waves towards the skin. Although the electricity amount is in fact very small, it can be picked up reliably with ECG electrodes attached to the skin. The full ECG setup comprises at least four electrodes which are placed on the chest or at the four extremities according to standard nomenclature (RA = right arm; LA = left arm; RL = right leg; LL = left leg). Of course, variations of this setup exist to allow more flexible

and less intrusive recordings, for example, by attaching the electrodes to the forearms and legs. ECG electrodes are typically wet sensors, requiring the use of a conductive gel to increase conductivity between skin and electrodes.

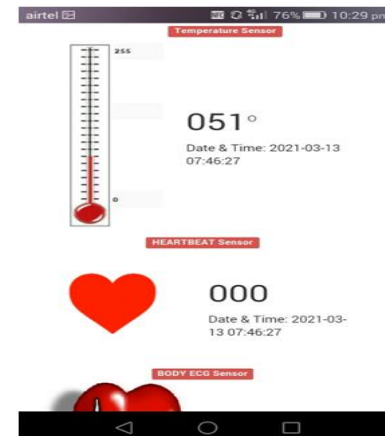
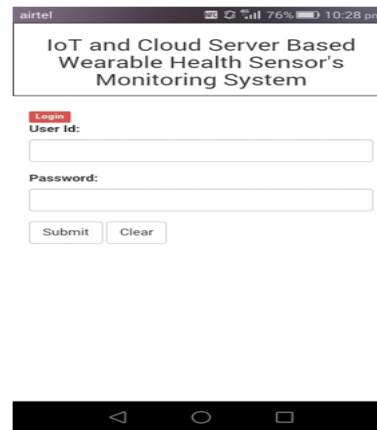


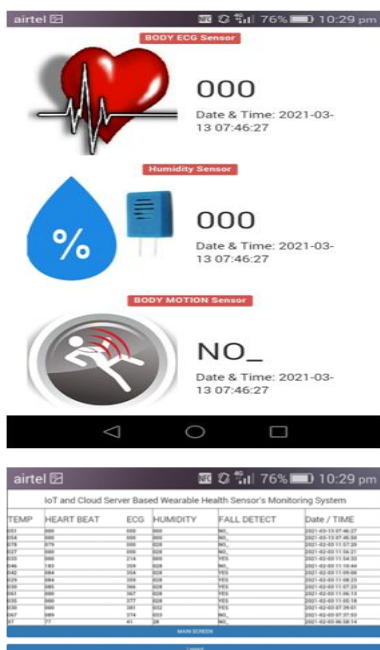
**Output:**



**Data display in the mobile application unit :**

The day to day vital parameters such as heart beat, body temperature, EEG signals can be displayed in the mobile phone and the same can be send to the doctor during emergency situations.





## CONCLUSION

The proposed system of patient health monitoring can be highly used in emergency situations as it can be daily monitored, recorded and stored as a database. In future the IOT device can be combined with the cloud computing so that the database can be shared in all the hospitals for the intensive care and treatment.

## REFERENCES

[1] S. J. Jung and W. Y. Chung, "Flexible and scalable patient's health monitoring system in 6LoWPAN," *Sensor Lett.*, vol. 9, no. 2, pp. 778–785, Apr. 2011.

[2] W. Y. Chung, C. Yau, K. S. Shin, and R. Myllylä, "A cell phone based health monitoring system with self-analysis processor using wireless sensor network technology," in *Proc. 29th Annu. Int. Conf. Eng. Med. Biol. Soc.*, Lyon, France, 2007, pp.

[3] G. Lawton, "Machine-to-machine technology gears up for growth," *Computer*, vol. 37, no. 9, pp. 12–15, Sep. 2004.

[4] C. Kim, A. Soong, M. Tseng, and X. Zhixian, "Global wireless machineto-machine standardization," *IEEE Internet Comput.*, vol. 15, no. 2, pp. 64–69, Mar.–Apr. 2011.

[5] Real time wireless health monitoring application using mobile devices, *International Journal of Computer Networks & Communications (IJCNC) Vol.7, No.3, May 2015, Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, and Mohammed Tarique.*

[6] 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.*

[7] Real time wireless health monitoring application using mobile devices, *International Journal of Computer Networks & Communications (IJCNC) Vol.7, No.3, May 2015, Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, and Mohammed ,Tarique.*

[8] 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.*

[9] Goutam Motika, AbinashPrusty, "Wireless FetalHeartbeat Monitoring System Using ZigBee & IEEE 802.15.4 Standard", 2011 Second International Conference on Emerging Applications of Information Technology, 978-0- 7695-4329-1/11, 2011 IEEE DOI 10.1109/EAIT.2011.89 .

[10] S. M. Mahalle, P. V. Ingole, "Design and Implementation of Wireless Body Area Sensor Network Based Health Monitoring System", *International Journal of Engineering Research & Technology*, Vol. 2 Issue 6, pp. 105- 113, June 2013.

[11] M.Prakash, CJ Kavitha Priya, "An Analysis of Types of Protocol Implemented in Internet of Things Based on Packet Loss Ratio", *Proceedings of International Journal of Information and Communication Technology for Competitive Strategies*, ISBN: 978-1-4503-3962-9, DOI: <https://doi.org/10.1145/2905055.2905085>, 4<sup>th</sup>– 5<sup>th</sup>Mar 2016