# Wearable Sensor Healthcare Monitoring System using Cloud Computing With IoT

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**Abstract—At present Health-care system has developed science and intelligence based on Wireless-Sensing nodes.Patients are confronting numerous issues because of the particular explanation of heart issues and assault due to nonexistence of good clinical upkeep to patients when they required. by this innovative project we can reduce death rates by using Patient Health Monitoring.This system uses Temperature, heartbeat sensor, saline level indicator and accelerometer to track patient's health. Both the sensors are associated with the Arduino. In Detail, the challenges and open issues regarding healthcare security, privacy, and QoS. Finally, suggestions and recommendations for IoT healthcare applications are laid down at the end of the study along with future directions related to various recent technology trends.**

**Keywords: IOT, Arduino UNO Microcontroller, GSM, Cloud Server, Wi-Fi, Smartphone, Electronic Wearable Gadget.**

## I.INTRODUCTION

IoT based remote monitoring is major role in healthcare system. IOT based system increased patient engagement and can interact with doctor have become easier and efficient. The major impact of the system to reducing cost of healthcare and also improving treatment to be in efficient. Continuous healthcare monitoring system which helps to diagnosis disease at early stage before the symptoms of the disease develop. The Internet of things (IOT) which comprises sensors, network and interconnection of devices, to gather and exchange data based on cloud environment. The IOT based healthcare system is to monitoring a patient physical parameter like blood temperature and heart rate. The input data (patient physical parameter) are stored in a cloud server environment(database) and send an automatic alert (smart mobile application) to the doctors if any is critical in chronic condition. An IOT stands on sensor, gateway and wireless network that modify user to communicate and access the information. IOT offer more assurance within the healthcare. As a saying goes "Health is wealth" it's exponentially crucial to form utilization of modernism for well-being enhanced. IOT enables real-time tracking, monitoring and alerting, which gives hand-on treatment to provide better solution. IOT security deals with transmit data in real time.

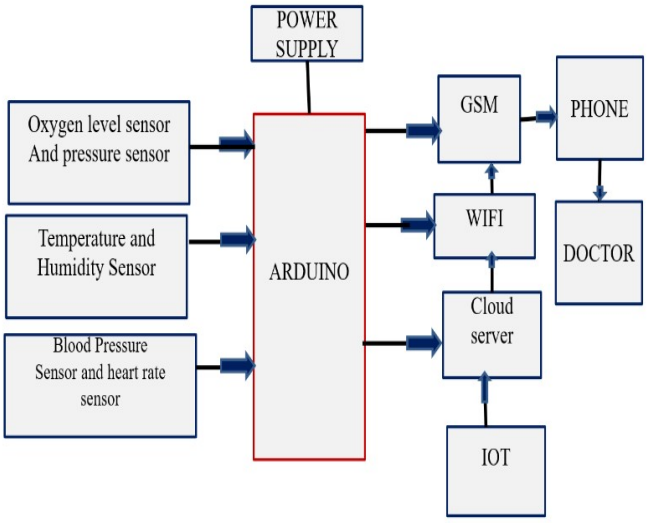
*Existing System:*

The existing system in a hospital, either the doctor or nurse has to move physically from one person to

another for checking health condition, which may not be possible to monitor their health conditions continuously. Thus, any critical situations are not found easily unless the doctor or nurse checks the person's health at that moment. This may be a strain for the doctors who have to take care of many numbers of people in the hospital.

*Proposed System:*
This system enables doctors to monitor vital parameters like body temperature, heart rate, acceleration and saline level of patients in remote areas of hospital as well as he can monitor the patient when he is out of the premises. If the parameters go to abnormal these system sends alert Popup message to the doctors or it makes a buzzer sound. The IOT will be able to provide efficient data connections from multiple locations. These sensors used to monitor the different parameters of an ICU patient remotely and also control over medicine dosage is provided.

*Proposed Block Diagram:*




*Major Hardware Components:*

Figure:1.Body Temperature Sensor

Temperature measures by LM35. It is used to measure Mean arterial Pressure (MAP) of human body about 60 seconds after that shown accurate temperature of body. It is a combination of analog sensor whose output

value is directly proportional to centigrade temperature. If the temperature will get increases then the corresponding an output voltage will get increases. LM35's functional range between -55 °C to +150°C. LM35 sensor make interfacing to any type of circuit because, it is better than linear temperature sensor. LM35 operating range +5v DC and provide result in centigrade. it is suitable for remote application.

*Oxygen Level Sensor:*


To monitor oxygen level of patient. It starts working light beams to calculate the level of oxygen saturation in blood and pulse rate. It gives the amount of oxygen level carried out in the blood. If oxygen saturation level (SpO2) is <=95% then there is no problem. otherwise SpO2> 90%, there is some abnormalities.

*Heart beat sensor:*

The sensor based on photoplethysmography principle, to measure the volume of the blood changes in any of the organ which leads to change in the value of intensity in that organ [11]. It starts working Light Emitting Diode (LED) when the light is absorbed or scattered through its path during the blood as the heartbeat changes. To measure heart rate i.e., number of beats per minutes (BPM). The heart rate ranges of human in between 60-100 bpm.

*Pressure Sensor:*

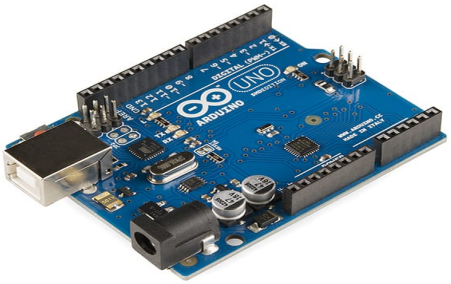

The tonometry technique is used to measure the pulse wave of pressure by using pressure sensor without intervention of skin. The range of blood pressure in normal is 120/80 or lower.

*Global System for Mobile Communication (GSM):*

GSM is used to transmit mobile data service using TDMA (Time Division Multiple Access) technique. GSM 300 is triband modem, operating ranges from 4.0V to 5.5V, and flexible serial baud rate ranges between 1200 bps 115200- bps and default baud rate is 9600bps. It has external antennas, power control, and SIM holder. Standard RS-232 used for interface with microcontrollers. 25MHz large frequency band spilt up into small frequency band is called channel, cache channel 200KHz, bandwidth for upload and download and 124FDMA carrier split up into 8 time slots of TDMA.

*WiFi*
It is Highspeed internet connection. To use single network by connection multiple devices.

*Microcontroller:*




An open-source microcontroller board is Arduino Uno with ATmega328P Microchip Commercially purpose lots of Arduino boards are available such that uno, due, Leonardo, mega, prominin etc. The Arduino Uno is single board microcontroller, contains 14 digital I/O pins .6 analog I/O pins .2kb SRAM,1 kb EEPROM. operating range 5V and Arduino Due has analog input pins 12, digital 1/0 pins 54, operating range 3.4V, SRAM 96 kb. and analog output pins 2. Arduino Leonardo has analog inputs 12, digital I/O pins 20, and

EEPROM 1kb, SRAM 2.5 kb, no output pins.

*WORKING:*
In this paper patients' physical parameters like blood pressure, temperature level, oxygen level and heart rate, are measured by sensors, those data are stored in cloud environment by using wireless communication Wi-Fi. A user can view the data anytime. In our system which comprises sensors blood pressure, temperature level, oxygen level and heart rate, input data generated by these sensors. The Arduino Uno microcontroller board read the input from sensors which measures physical parameters of patients, and connects through wireless communication and store the data in cloud server by sending information with specific IP. In case there isno network communication available then the entire system will not work. When the patient in critical situation, patient wearable electronic gadget (water resistant), that is integrated smart phone-based technique to track location of patient (geo fencing) based on GPS & WIFI, and also send an automatic alert message to doctor and primary contacts. The cloud server data can be accessed through wireless communication, where Global System for Mobile communication (GSM) technique is applied through sent message (SMS). Lots of IOTbased health apps are developed and the doctor will track the patient healthcare details through smart application with smart phone.

The proliferation of IOT based Health System contains following steps.
Step 1: Collect data from interconnected device like sensors, display.
Step 2: Data preprocessing can be performed, In case the data in analog form we convert the data into digital, required to aggregate.
Step 3: After data preprocessing the standard data which can be stored in cloud server.
Step **4:** An analytical tool is used to analysis the data at the necessary level (based on their age). IOT based health
Care system ensuring better concern for cost reduction, fastdiagnosis and better treatment for patients.

## II.CONCLUSION

There are endless ways in which the IoT can improve medical care. These include reduced cost, and increased efficiency, accuracy, and performance. The benefits of using the IoT have made it possible to automate healthcare systems in the best way. In this respect, this work aims to be an introductory guide for those who will work in this field in the future, providing them with a detailed reference document related to the IOT and healthcare- monitoring systems. In this work, recent research on IoT-based health-monitoring systems have been reviewed and analyzed in a systematic way. The paper provides in-depth information on their benefits and significance, and a literature review. We also discuss IOT wearable things in healthcare systems and provide a classification of health-monitoring sensors, including thechallenges and open issues regarding security and privacy and Quality of Service (QoS). Suggestions for future work have also been included.

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