

# Design Remote Healthcare Monitoring System for Hypertensive Patient Based On IOT

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**Abstract-** Recent technological advances and Internet availability make it possible to connect various devices which can communicate and share data with each other. The Internet of Things (IoT) is a new concept which enables users to connect various sensors and smart devices to collect data from the environment in real time. In this paper proposed low cost and easy to use remote healthcare monitoring system for hypertensive patients based on IoT. A bio-signal sensor and a microcontroller are the major components of the system. The information is gathered by a bio-signal sensor and sent to a smart server. The IoT device is capable of tracking the hospital's place. The proposed design consisting of wearable sensors which is used for patient physiological information measurement and collection. In case of emergency situation the caretaker and doctor are intimated through short message service for providing adequate help.

**Keywords:** Internet of Things, Healthcare Monitoring System, Sensor, Hypertensive Patients

## I. INTRODUCTION

In India, patients are sometimes killed in rural as well as urban areas due to lack of healthcare resources such as medical devices and most of the time doctors are not present in hospital as well as unavailability of software for health monitoring. The Healthcare System has been developed to provide incentives for remote medicinal services, but there are some limitations, such as exorbitant, lack of patient information protection and highly technical and overhead contact. The number of people in the world aged at age 60 and above reached 910 million in 2015, which is projected to rise to 1.5 billion by 2030 and about 2.5 billion by 2050. It is estimated that the above 65 is the largest age group, and that the normal age in many nations in Asian countries will be around 51-55 in 2050. Second, it increases the different chronic diseases such as heart failure, arrhythmia, blood pressure, diabetes, etc. Hypertension is also a major health issue in India, as hypertension from the WHO has led to the death of 1.64 million people in India per year. Hypertension is popular even among people of younger age groups with around one out of every 10 individuals aged between 20 and 28 years. Striking from it. The third problem is to raise the cost of health care services. In our research uses wearable sensors to resolve the condition without hospitalization for tracking the patients. Wearable sensors are used in various

applications such as entertainment, protection, and medical use. Wearable sensors for temperature, pressure, heart rate etc. are worn on the human body. In the medical sector; sensors collect the personal data and use wireless technology to transmit the information. This approach lowers patients' health-care costs. There have been attempts to use the latest technologies in different ways to enhance the quality of human life with advancement in technology and miniaturization of sensors. The main aim of paper is to develop a remote healthcare system. It is composed of three principal parts. The first part was to monitor the vitalities of patients using sensors, the second part was to send data to cloud storage, and the last part was to provide remote viewing data detected. Remote monitoring of the data allows a doctor or guardian to monitor the progress of a patient's health away from hospital premises.

## II. RELATED WORK

Good and linked health care may be a much needed one of the variety of applications allowed by the Internet of Things (IoT). The sensors technology worn on the body or placed in our living environments, change the set of wealthy data which indicates our physical and mental condition. Continuously collected, aggregated, and efficiently processed, such data would result in a positive structural shift in the healthcare landscape. The exciting potential of the Internet of Things (IoT) technologies for integrated medical devices and sensors has a crucial role to play in quality patient care within the next-generation attention exchange [2].

Traditional wearable devices have many drawbacks, respect awkward long-run carrying and poor accuracy etc. Observation of health by ancient wearable components is therefore tough to be property. In order to obtain huge information by observing property health, we Trend to Smart Clothing design, fostering an uncompromising array of varied physiological markers of soma. Mobile attention cloud platform is rendered through the use of mobile network, cloud computing and broad information analytics to generate widespread knowledge for sensible consumer goods system.

The Internet of Things (IoT), also known as the all internet or the commercial network, may be an incredible modern technology concept as a worldwide network of computers and devices capable of communicating with each other [3].

The Internet of Things (IoT) has recently produced a compelling alternative for systemic observance of health. In

structural health observance based on vibration, structural options that area unit derived from sporadically spaced area unit sensors of exploitation operation are subject to variable environmental conditions [4].

### III. IOT IN HEALTHCARE

In the healthcare industry the Internet of Things (IoT) technology is becoming increasingly popular. In the field of intelligent medicine, IoT's primary applications include visualizing material management, digitizing patient knowledge, and digitizing the medical processes.

**Digital Hospital:** The Internet of Things has wide prospects for implementation in the field of handling medical knowledge. The need for the management of medical information in hospitals is currently primarily in the following aspects: diagnosis, sample recognition, and diagnosis of medical records.

**Patient Information Management:** The family history of the patient's medical history, the patient's medical history, numerous tests, medical reports, reactions to medications, and other electronic health information will help doctors establish care programmes. Doctors and nurses can calculate the vital signs of the patient, and they can use real-time tracking information during procedures such as chemotherapy to avoid the use of incorrect medications or needles and will constantly alert nurses to conduct drug tests and other duties.

**Medical Emergency Management:** There are certain rare situations, including when there are large numbers of fatalities, an inability to contact family members, or the seriously ill. In such cases, the accurate and effective storage and testing methods used by IoT technologies can help to rapidly classify pertinent information such as the name, age, type of blood, emergency contact and past medical history of the patient.

**Medical Devices and Drug Tracking:** Accessible medical equipment and medication are cared for by correctly tracking objects and patient names, and having good support for accident handling. We can monitor and manage bad goods by accurately tracking basic details such as product use, adverse effects, places where quality control issues can occur, including patients and locations of unused items.

### IV. SYSTEM ARCHITECTURE

This system is mainly used to monitor the health condition automatically. In our system, we use the Blood pressure sensor, Temperature sensor, Pulse oximeter sensor, Breath Sensor, Air Quality Sensor for monitoring the patient health. Temperature Sensor LM 35 gives the Body Temperature of the patient, Heart rate sensor- Max 30100 gives pulse

Rate/Heart Rate and Oxygen Concentration in Blood i.e. SpO2, Blood Pressure Sensor gives the Systolic Blood Pressure and Di-systolic Blood Pressure ,Breathing Sensor gives the Breathing Rate and Air quality sensor MQ135 gives the Air Quality of environment. Any one condition abnormal sending information is send to internet through IoT. A bio-signal sensor and a microcontroller are the major components of the system. The data has been collected by the bio-signal sensor and are transmitted to an intelligent server. The IoT system is able to monitor the location of the patient. The proposed system consists of a body sensor network that is used to measure and collect Physiological data of patient. A system to monitor the blood pressure of a hypertensive patient using mobile technologies has been proposed. By using the system a doctor can carefully monitor the patient and can perform diagnosis.

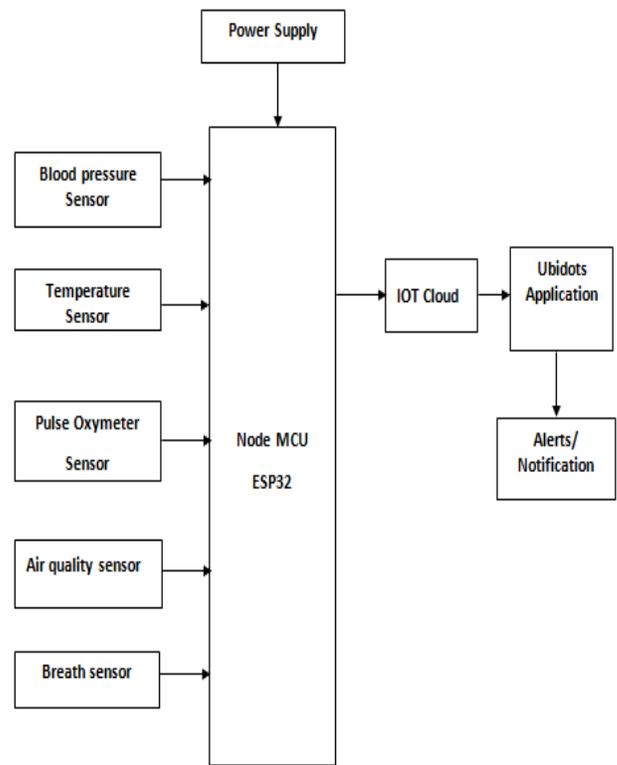


Figure 1: Block diagram of Proposed System

Figure 1 shows the proposed system in which the various sensors is interface with controller ESP 32. We will use ubidots web to collect and analyze the sensor data and develop IoT application. If any abnormal condition is occurred in patient health that means patient heart rate, blood pressure is increasing above the normal range then ubidots web give the alert to the doctor by message .for that we will create account on ubidots web for getting current information regarding patient health.





Figure 3: Respiratory belt for breath analysis



Figure 4: Blood pressure sensor unit to wrist for measuring systolic and diastolic

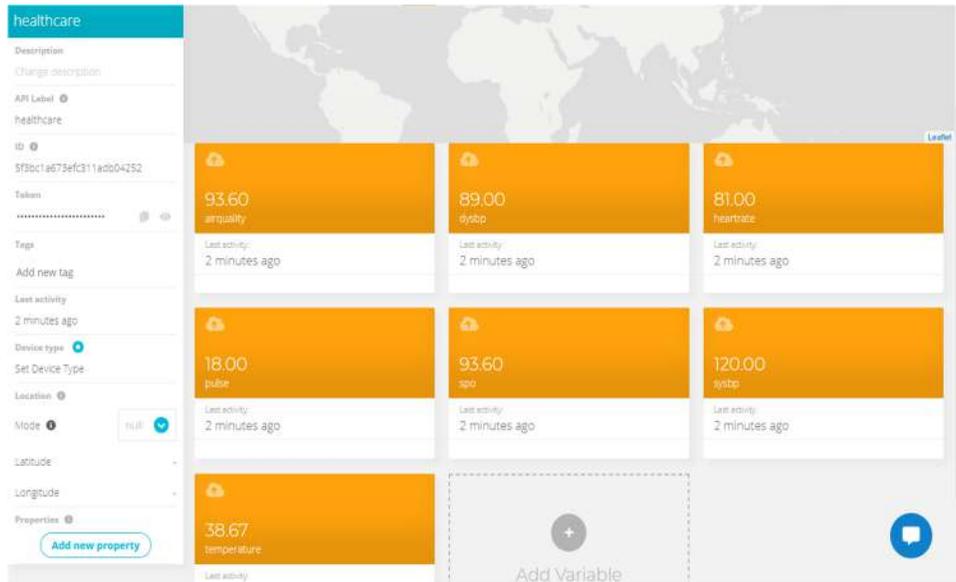
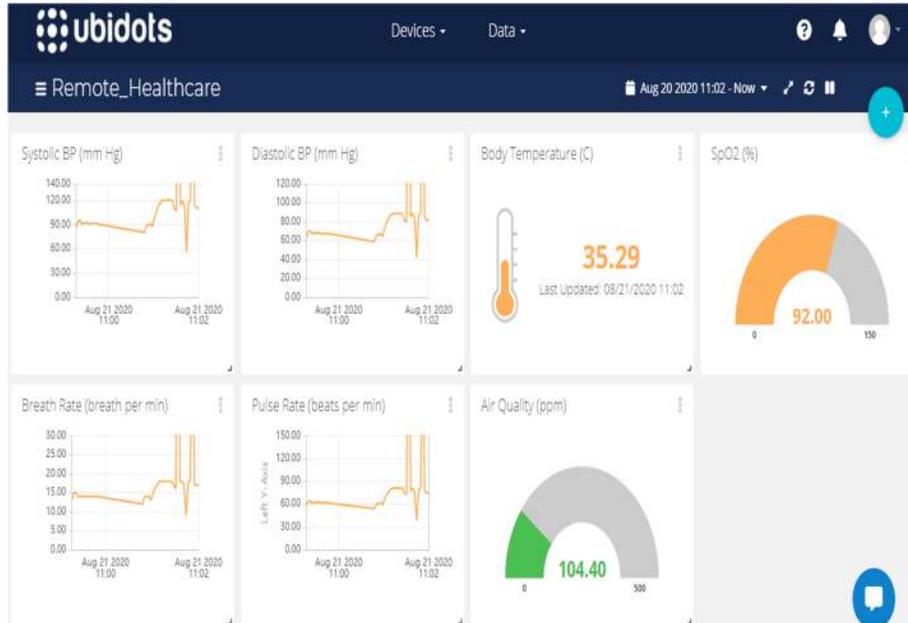
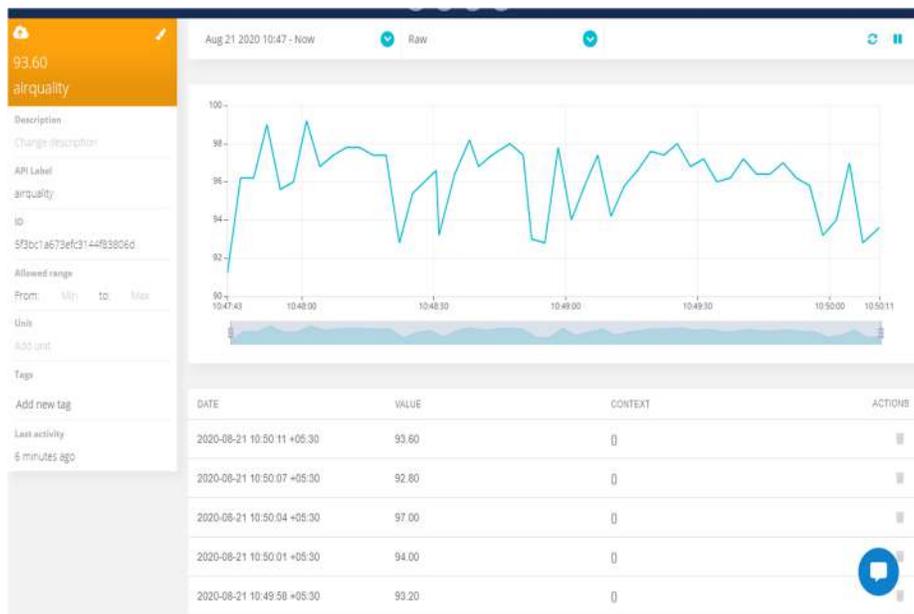


Figure 5: Values in variable parameters after device power on with internet connection using IoT (Online)



**Figure 6: Dashboard UI visual when device sends real time value using IOT (Online)**



**Figure 7: Periodic values storage visibility**



**Figure 8: Alert On email after value exceed some threshold value set in event generation**

## VI. CONCLUSION

Health is one of humanity's globalized problems. The highest attainable quality of health is a fundamental right for a person according to World Health Organization (WHO) constitutions. Healthy people also alleviate pressure on the already overloaded hospitals, clinics, and physicians and minimize the burden on the public safety networks, charities, and governmental or non-profit organizations. Hypertension globally affects one in five people. Procedures in healthcare involve interdisciplinary collaboration and coordination among medical teams, clinical processes, and patients. The lack of patient control and commitment to care makes the integration of patients, data collection systems and clinical processes important. To this end, we will build a low-power and low-cost model, as well as the framework that has global reliable and low entry barriers. We would suggest a healthcare monitoring system for hypertensive patients in remote areas using different body sensors such as temperature, blood pressure, pulse rate sensor and microcontroller connected to the Internet of Things (IOT) which also saves our time and money.

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