# IOT BASED ICU PATIENT MONITORING SYSTEM

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**Abstract -**Intensive care unit is where patients who are officially ill and are admitted for treatment. For such critical conditions the doctors need to have an all-time update patient's health related parameters like blood pressure, heart pulse and temperature. To do manually, this too tedious task and for multiple patients it becomes close to impossible. For this type of situations this IOT based system can bring about an automation that can keep doctors updated all time over internet. IOT based ICU patient monitoring system is a Node MCU based system which collects patient's information with help of sensors. It uses Wi-Fi module to communicate to the internet. Blood pressure and heartbeat monitor module electrically connected to the system and physically to be worn by the user. Temperature sensor senses the temperature of its ambience, so when the sensor is in proximity of the user it reports the user's body temperature. Thus, the doctor can get access to these vital parameters pertaining to the patient's health over the IOT web interface.

*Key Words*: Internet of Things, Arduino Nano, Wi-Fi Module, ICU Patient Monitoring Sensors (Temperature, Blood Pressure, Heart Pulse).

## 1. INTRODUCTION

Medical field is the backbone of any country. Medical field technology place a big role when it comes to patient care. Technology is big when it comes to giving the patient the best type of quality care when they are in the hospital. In the old days doctors or nurses would just communicate with patient manually which causes mistakes. Now with the electronic health systems those mistakes are drastically declining. Statistics have shown that using the electronic health systems has lowered nursing mistakes as well as improved patient care. Our society has progressed through the years and has been introduced with the electronic health care systems which has drastically improved our health care systems. Electronic health care systems are changing rapidly the market is globalized, society is concerned with medical issues, missing of patient data from records, too much.

The work developed in this paper focuses on the study of the development to intelligent health care system. Health monitoring is the major problem in the todays world. Due to lack of proper health monitoring system, patient suffer from serious health issues. There are lots of IoT devices now a days to monitor the patient over internet. Health experts are also taking advantage of the smart devices to keep an eye on their patients in the hospital. IoT based ICU monitoring system which records the patient's heart beat rate, body temperature, blood pressure and also send a SMS alert when ever those readings goes beyond critical values.

Developing an Effective health care monitoring system, several factors need to considered, such as data availability, consistency, and reliability. However, the most important factor is data freshness that needs to be well supported during run time by the health care systems which deals with the people health. More precisely, when authorized people monitoring patient's symptoms, the data has to be refreshed with high frequency so that doctor's platform update continuously to pull the latest data from the patient's warbles. Arduino board collect the data from sensors and the nit transfer through wired network to IoT website.

## 2. METHODOLOGY

IoT Based ICU Monitoring System using Arduino which collects patients information with the help of few sensors. It uses Wi-Fi module to communicate this information to the internet.
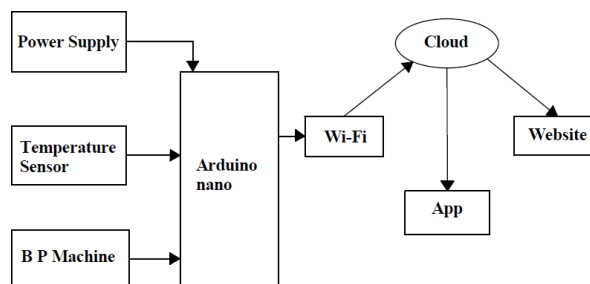


**FIGURE 1:** Block diagram of ICU Monitoring System using Arduino Nano

In this way IoT based ICU monitoring system is an enhanced system that helps in monitoring ICU patients without any manual intervention. In this paper, we have temperature, blood pressure and pulse rate reading results are monitored. These sensors signals send to Arduino via wired cable. Arduino is a micro-controller board which runs dedicated program, there is no OS, just your code. Here patients body temperature, blood pressure and pulse rate is measured using respective sensors and it can be monitored in the monitor screen of computer Using Arduino as well as monitoring through any wherein the world.

### 2.1 Temperature Sensor

LM35 is a temperature measuring device having an analog output voltage proportional to the body temperature. It provides output voltage in Celsius. It does not require any external calibration circuitry. The sensitivity of LM35 is 10mV/degree Celsius. Itisa3-terminal sensor wont to measure surrounding temperature starting from -55 °C to150°C.

### 2.2 Blood Pressure Machine

Blood Pressure & Pulse rating are shown on display with serial out for external projects of embedded circuit processing and display. It shows Systolic, Diastolic and Pulse Readings. Compact design fits over your wrist sort of a watch. Easy to use wrist style eliminates pumping. Intelligent automatic compression and decompression is Easy to figure and switching button to start out measuring 60 store groups memory measurements can read single or all measures 3 minutes automatic power saving device Intelligent device debugging, automatic power to detect Local tests for wrist circumference as 135-195mm Large-scale digital liquid monitor, Easy to Read Display Fully Automatic, Clinical Accuracy, High accuracy Power by External+5VDC Serial out put data for external circuit processing or display.

### 2.3 Wi-Fi Module (ESP8266)

The ESP8266 Wi-Fi Module may be a self contained SOC with integrated TCP/IP protocol stack which will give a micro controller access to the Wi-Fi network. The ESP8266 is capable of hosting an application or offloading all Wi-Fi net working functions from another application processor.

### 2.4 Arduino Nano

The Arduino Nano may be a small, complete, and breadboard friendly board supported the ATmega328 (ArduinoNano3.x). It has more or less an equivalent functionality of the Arduino, but during a different package. It lacks only a DC power jack, and works with a Mini-BUSB cable

rather than a typical one.

### 3. RESULTS

Technology plays an important role in today's world like industries, person's life and environment. Among this field health care process is the most important field and crucial also. From this paper we can help to improve our health care system. The patient in the ICU should need the proper treatment and care from the respective Doctors or from the Nurses. As per the ICU monitoring system the patient is being cared well by checking his/her health condition continuously. And also the data collecting from each Simulation are storing in the cloud parallel. From this process the data can't be deleted permanently from the records. Using this technology development, patient's record about health status will send to particular mobile application or websites which can handle by the respective Doctors.

### 4. CONCLUSION AND FUTURE WORK

IoT (Internet of Things) based ICU (Intensive Care Unit) patient monitoring system may be a system, which measures the patient vital sign, pulse rate and temperature constantly who is admit in ICU. After measuring, this technique also sends this data to dedicated website through IOT system. Where every respective doctor could easily see their respective patient data all the time from anywhere. This system is less costly and more precise as compared to the other systems. Patient health parameter data are stored over the cloud. So, it is more beneficial than maintaining the records on printed papers kept in files.

Future work can include many areas. We can add a GPS module in IoT patient monitoring using Arduino Nano and Wi-Fi module project. This GPS module will determine the position or the situation of the patient using the longitude and latitude received. Then it'll send this location to the cloud that's the IoT using the Wi-Fi module. The doctors can find out the position of the patient in case they have to take some preventive action and also we can send the location or the alert messages to the smart watches. So, we can easily find out the things when the condition is bad.

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