ENGINEERING IN ADVANCED RESEARCH SCIENCE AND TECHNOLOGY

ISSN 2278-2566
Vol.02, Issue.03
August -2018
Pages: 630-636

# AN EFFICIENT IOT BASED MULTIPURPOSE PATIENT MONITORING SYSTEM

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**ABSTRACT:**

The main objective of this concept is to introduce and implement a new method of take caring a patient even from the remote areas. In this, the main aim is to monitor the patient condition and serving him according to his/her condition, here monitor some basic biomedical parameters like pulse rate, temperature, Pressure. Based on these measured values using the sensors; doctor take care about the patient. Here, concept install a circuit which consists of zigbee to transfer the data for the doctor and concerned care taker. At the doctor's side we have a monitor in which we program with flash magic software to observe the patient's data that was received through the zigbee device according to that data doctor will respond. Along with all above responses, patient conditions will be uploaded to IOT platform through NODEMCU module. With this, we are automating the way of take caring a patient when he was in trouble.

**INTRODUCTION:**

The objective of this project is to monitor and improve the quality of care of people in remote location and to provide continuous information about the patient for making better healthcare decisions in critical situation and to reduce the regular checkup of the aged patients. It helps the doctor to monitor their patients at any time apart from their consulting hours. Improved home care facilities and regular health updates to clinicians reduce the chances of redundant or inappropriate care. It improves patient care and safety by reduction in overall costs for care. Internet of Things (IoT), gather and share information directly from patients and it also make possible to collect, record and analyze new Data Stream faster and more accurately. As the technology for collecting, analyzing and transmitting data in the IoT continues to mature, with the help of sensors, actuators, and computing devices. data communication capabilities. These are linked to networks for data transportation. This connected healthcare environment promotes the quick flow of information and enables easy access to diseases such as hypertension, diabetics and cardiac diseases which needs continuous monitoring. This Internet of Things (IoT) is increasingly recognized by the researchers and analysts as one of the most sophisticated technologies for health monitoring and it is safety for people and it also tackled by all. Our era have been seeing plethora of chronic and critical health problems. With the rapidly growing need for timely medical services, the traditional method of treatment at the clinic or hospital more often falls short in accomplishing success with respect to emergency cases. A method to sense life threatening risks prior to the actual happening sounds to be the need of the hour. IoT for healthcare offers to be a vital solution in adjourning such a serious issue. IoT, the inter-networking of various real world objects has become a popular phenomenon. With the rise in advent of sensors and actuators for use with various platforms, healthcare industry is being revolutionized by breaking the traditional methods. Of many chronic illnesses, Hypertension has become common yet a serious disease that remains as the root cause for major Cardiac mortality and Stroke mortality. Hypertension is a condition where the blood pressure in the arteries of the body is higher than 120/80 mm Hg (more than 120 systolic and more than 80 diastolic). Though it is often a condition occurring in the elderly, children are also susceptible to fall prey to it. Hypertensive heart disease has topped the table for its death toll in India according to Global Burden of Disease Study 2013 [16]. Critical health events like

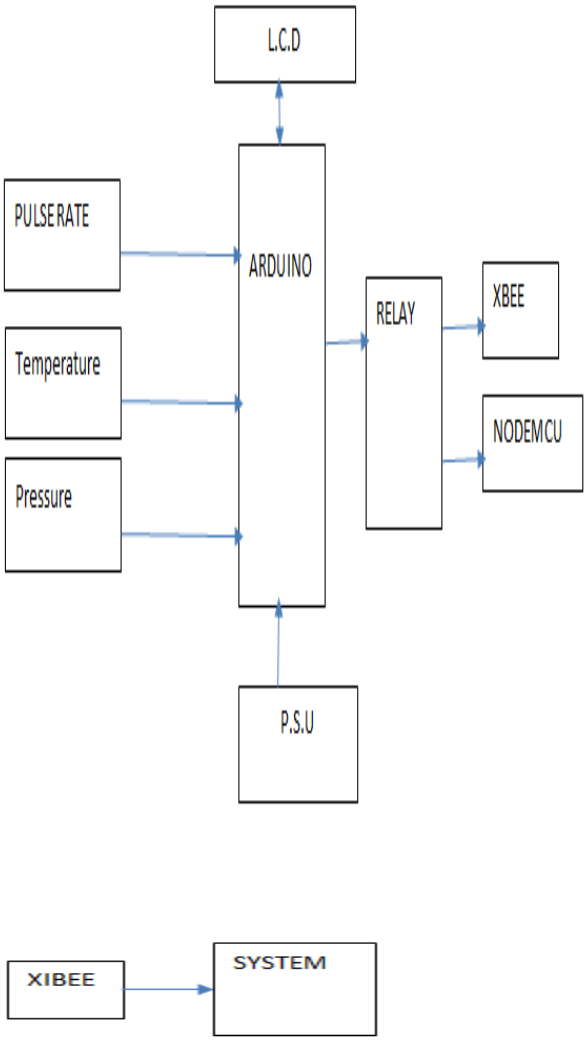
Stroke or Myocardial Infarction (Heart attack) related to Hypertension does not happen all of a sudden, rather it is a continued risk factor that results in such life threatening events. HRV is as an important parameterthat uncovers even dilate intricacies regarding health condition. The study of HRV enhances our understanding of physiological phenomenon, the actions of medications and disease mechanisms [8]. HRV parameters acts to be a predictor for Cardiovascular disease risk [7]. Thus, the proposed system aims to remote monitor as well as alert in critical situation based on the HRV parameters and Heart rate for borderline Hypertensive patients. The embedded health monitoring is to assessing the health changes based on the individual patient health condition. This methodology for monitoring patients remotely using sensor embedded network. The sensor to assessing the patient health conditions. It is very useful for the patient's and the hospitals. The sensor embedded in the environment is used to collect the behavior and activity patterns for the purpose of detecting the patient's health changes. Patient monitoring system consist of equipment, devices and supplies that measure, display and record human characteristics, including blood pressure, body temperature, heart activity, bodily substances (e.g. Cholesterol, glucose, etc.,) pulse rate, respiration rate and other health-related criteria. The patient monitoring systems is one of the major improvements because of its advanced technology. A patient monitoring system for providing continuous monitoring of a data acquisition and the day-to-day activities are watching. This unit may be bedside display unit to display the physiological condition of the patient. The objective of Patient Monitoring system is to have a quantitative assessment of the important physiological variables of patients during critical periods of biological functions. This is an attempt to provide a device which will continuously monitor the body temperature and status of drip status of the patient. If either the temperature goes high or if the drip administration fails, this device will raises an alarm and communicate the concerned doctor by means of sending SMS to the doctor. The major part of this project is the hardware model consisting of sufficient sensor with embedded system.

## LITERATURE SURVEY:

Kaleem Ullah,MunamAli Shah [1] This presents the model named as 'k-Healthcare' makes use of four layers, sensor layer, network layer, internet layer and service layer. There are different sensor used like RTX-4100,Aurduino, Raspberry Pi, pulse oximetry and smart phone sensors. Communication between layers is done through IEEE 802.15.4, 802.15.6, IEEE 802.11/b/g/n, Zigbee etc. For data storage management the system used cloud storage. The proposed system support different protocols and like HTTP, HTTPs, RESTful and Javascript web services. Punit Gupta,Deepika Agrawal [2] The proposed system is enough intellegent to monitore the health parameters of patient. In the hardware they used 2nd generation Intel Galileo, a 32-bit Intel Pentium processor system on chip. It is considered as the brain of the given model. As it provides Linux platform with high processing and computer power, it prefers over Arduino. This collects the data from all the sensors which are connected to the patient and upload this data on the web page through Ethernet. Here they used XD-58C pulse sensor for measuring heart beats, it takes +3.5v to +5v at VCC, 50Hz to 60Hz frequency. For temperature calibration they have used LM-35 temperature sensor and Xampp based data base server used for patient's timely record. Prosanta Gope and Tzonelih Hwang [3] This paper presents a BSN i.e body sensor technology. It consists of wearable and implementable biosensors like EMG (Electromyography), ECG (Electrocardiogram), Blood pressure etc. BSN care server used wireless communication using 3G/GPRS/CDMA. Here they mentioned key security requirements like data integrity, data privacy, data freshness etc. To achieve security requirements here they proposed a lightweight anonymous authentication protocol and to get data security requirements, used OCB i.e. offset codebook (OCB) authenticated encryption mode. Abhilasha Ingole, Shrikant Ambatkar [4] this paper based on basic health parameter monitoring without using heavy or bulky system. The credit card size minicomputer placed beside the patient's bed with power and results can see on the screen of computer which is in the same area network. It provides readings of body temperature and heart beat. For temperature monitoring system used DS18B20 sensor and for heart beat, it works on the principle of light modulation by blood flow through finger at each pulse. The detected values uploaded on the webpage. This web page created by written the code in HTML. As the Python is user friendly, used to interface different measurement parameters with Raspberry Pi. One can see the actual status of the system on LX Terminal. Augustus E. Ibhaze, MNSE, Francis E. Idachaba [5] it is important to measure basic health parameters for aged people often to reduce the risk of ill of falling and dying. So the microcontroller based system is designed to monitor the both heart rate and temperature. This system sends the text message to the mobile phone. When the readings are not normal or increased beyond the threshold level, the device makes used of the sim808 GPRS/GSM/GPS to send

the reports of patient's health and the location to a doctor's and caretaker mobile phone. By using Aurduino microcontroller sensors attached to the finger of patient for measuring temperature and heart rate. Also it is designed to recognize the location of the patient. This device takes 9v powered battery. Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour [6] Here authors used Arduino shield to connect different sensors like temperature LM-35 sensor, blood glucose sensor and blood pressure sensor. By using LabVIEW software one can take reading of different parameters from the patient's body. The updated data displayed on LabVIEW front panel using Data Dashboard application. This collected biometric information sent wirelessly via ZigBee.

## PROPOSED TECHNIQUE:




## METHODOLOGY:

Of many chronic illnesses, Hypertension has become common yet a serious disease that remains as the root cause for major Cardiac mortality and Stroke mortality. The proposed system that is based on IoT shares the results of sensor data in terms of graph and manipulated HRV data to a remote medical practitioner through a web application. This helps in following up the patient's condition without a hospital visit and to check the effectiveness of the treatment offered by the doctor.

In this paper, the sensing devices from the patient are connected to the ARUDINO and programmed to convert the sensed data from the patient to readable signals and then transfer the signal wirelessly to IoT or the doctor's checking. The Block diagram of the proposed system is shown in figure. The sensors Temperature, Heartbeat and pressure is connected to the Arduino board. The values from the Microcontroller is given to the Web Server using net Connectivity. The parameter values can be viewed by the OS Application installed in doctors and patient's system.

## ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, 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. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

## TEMPERATURE SENSOR:

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1°C temperature rise in still air.

## PRESSURE SENSOR:

**Pressure** (symbol: *p*) is the force per unit area applied on a surface in a direction perpendicular to that surface. Mathematically:

$$p = \frac{F}{A}$$

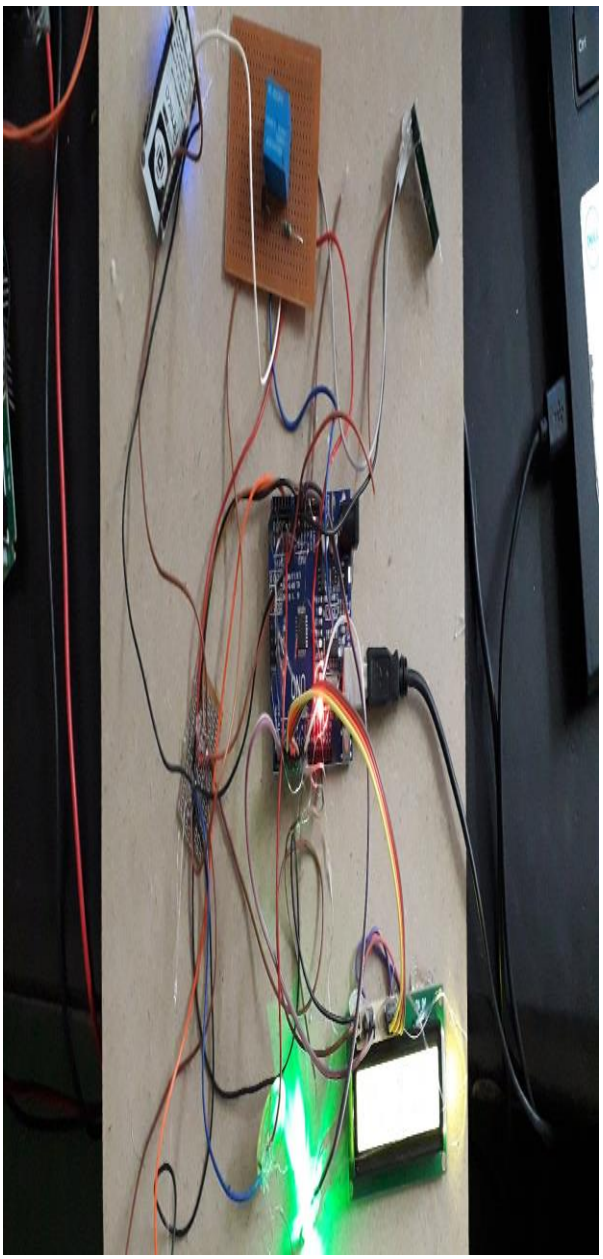
where:

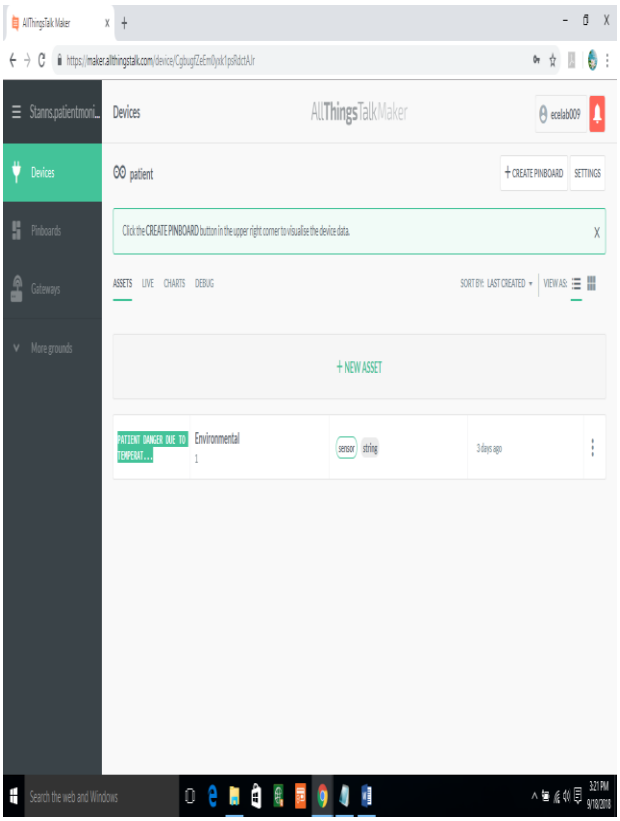
$p$ is the pressure

$F$ is the normal force

$A$ is the area.

**RESULT:**






**CONCLUSION:**

Finally, designed an enhanced and unique way to measure and monitor the patient parameters in hospitals. Lot of advantages yields by producing this project with more experimental results. Zigbee, IOT communication with more accurate range of transmission and reception is very useful in this project. Patient temperature, pressure, heartbeat values are passed with zigbee and IOT technology. Not only bio medical, but also industrial applications use this technology with more enhanced results.

**FUTURE ENHANCEMENT:**

Wireless sensor networks, a well-known technology consist of small, battery-powered "motes" with limited computation and radio communication capabilities. This technology has the potential to impact the delivery and study of resuscitative care by allowing vital signs to be automatically collected and fully integrated into the patient care record and used for real-time triage, correlation with hospital records, and long-term observation. This network technology provides a better solution for remote monitoring of post-operative patients in a hospital, elderly patients at home and patients affected by COPD and PD during

their rehabilitation period in ambulatory environments. There are many other extensions possible to the current work that can be studied further. The direct extension is to use artificial intelligence in wireless sensor networks to explore simple parallel distributed computation, distributed storage, data robustness and auto classification of sensor readings to help the physicians in the early interpretation of diseases.

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