

# Patient Health Monitoring in Multi-Specialty Hospital by using IoT System

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*Abstract*— Now-a-days Health care Environment has become technology oriented. Humans are facing a problem of unexpected death due to the reason of heart attack which is because of lack of medical care to patient at right time. So we are developing project to avoid such sudden death rates by using Body Health Monitoring. In this system a patient will be carrying hardware having sensors and android phone application, the sensors will sense the body temperature and heart rate of patient and these data is transferred to android smart phone via Bluetooth/Wi-Fi. System has the cloud database which stores all information about patient's health and the Doctors will prescribe medicine using this information stored on cloud. Device even it allows patient to move freely and can be monitored continuously. The android phone will be containing an application which will detect the heart attack according to the received data respectively and if any abnormalities are found regarding heart attack message will be send to patient's doctor, relatives and hospitals. The SMS contains patients situation and location (via GPS) to provide urgent medical attention.

**Key words:** Adriano Uno Board, Internet of Things, Cloud Computing, Heart Rate Sensor, And Body Temp Sensor, Healthcare System, Android, GPRS

## I. INTRODUCTION

Hospitals always need better management. The database of all patients should be handy enough. But also, there should be data prevention. Also the patient data should be kept private in case. Healthcare is the most important concern of many countries in the world. Improving the lives of patients especially in the weaker parts of the society which include the elderly, physically and mentally disabled as well as the chronically ill patients is the major factor to be improved. In existing system, the data is recorded in the form of paperwork or on general storage server. But generally that data is accessible to all the staff and doctors. Hence we are proposing a new way where patient and doctors able to communicate through mobile application and web application.

In hospitals there are provisions for continuous monitoring of patients. Their heartbeats are continuously monitored. There is no provision to check the parameters when they return to home. And hence there is a chance that the disease may return again. Patient's data (temperature, heart rate, position) will be frequently measured and sent to server. Period of sending (say every 3min) can be set. Monitoring person learns patient specific threshold. Say the regular body temperature of a patient is 37° C whereas one person feels feverish if his body temperature is 37.0°c. By employing an averaging technique over a relatively long time, Observer can learn these thresholds for patients. Using Android Application in doctor's smart phone, doctor can view his patient's health status. When any of the parameter

goes beyond the threshold value he will get an alert notification. Using Android Application in patient's or his caretaker's smart phone the patient can view his health status. Early detection and diagnosis of potentially fatal physiological conditions such as heart attack require continuous monitoring of patients health following transfer from hospital to home. Studies have shown that 30% of patients with a discharge diagnosis of heart failure are readmitted at least once within 90 days with readmission rates ranging from 25 to 54% within 3 – 6 months. In response to these types of needs, health monitoring systems are being proposed as a low cost solution. Such a system consists of physiological data that stores, process and communicate through a local manner such as smart phones, personal computers. Such systems should satisfy strict safety, security, reliability, and long-term real-time operation requirements [2]. In the proposed system we present health monitoring system that uses the sensors for collecting data from patients, intelligently predicts patient's health status and provides feedback to doctors through their mobile devices having android application. The patients will participate in the healthcare process by their mobile devices and thus can access their health information from anywhere any time. Today Internet has become one of the important parts of our daily life. It has changed how people live, work, play and learn. Internet serves for many purpose educations, finance, Business, Industries, Entertainment, Social Networking, Shopping, E-Commerce etc. The next new mega trend of Internet is Internet of Things (IOT). Visualizing a world where several objects can sense, communicate and share information over a Private Internet Protocol (IP) or Public Networks. The interconnected objects collect the data at regular intervals, analyze and used to initiate required action, providing an intelligent network for analyzing, planning and decision making.

This is the world of the Internet of Things (IOT). The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring. But this definition was referred only to part of IOT evolution considering the machine to machine market today. But actual definition of IOT is creating a brilliant, invisible network which can be sensed, controlled and programmed. The products developed based on IOT include embedded technology which allows them to exchange information, with each other or the Internet and it is assessed that about 8 to 50 billion devices will be connected by 2020. Since these devices come online, they provide better life style, create safer and more engaged communities and revolutionized healthcare. The entire concept of IOT stands on sensors, gateway and wireless network which enable users to communicate and access the application/information.

## II. PROBLEM DEFINITION

In today's social insurance framework for patients who stays in home during post operational days checking is done either via overseer/ medical caretaker.

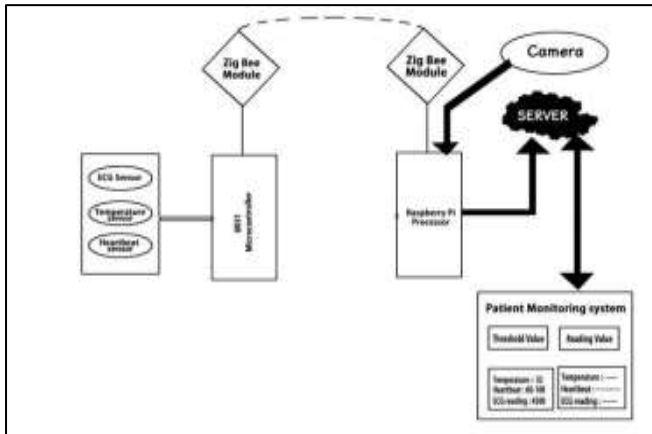


Fig. 1: General Monitoring System

## III. RELATED WORK

The area of health in recent years has been rapidly integrating technology in the monitoring, diagnosis and treatment of patients remotely and in situ. Most studies reviewed point to a chronic disease monitoring in particular as in which are responsible for the first remote monitoring of vital signs and the second of a tele medical ECG system of a patient. All these systems although quite complete is your scenario; include individual problems with regard to the treatment of some diseases that affect human being in the economic and social. Is a very important way to develop a comprehensive solution where no matter what kind of disease, the type of check, the different units to be handled this can become a possible solution for sequential monitoring of these patients. Other systems such as those proposed are fixed in the IOT bring advantages in terms of perception, transmission and application of information in the field perspectives of health and medical care. Enabling smart, an accessible and communication system based on IOT hosting segments such as: medical equipment, information management control medication of patients, telemedicine, mobile medical care, and personal health management, among others.

## IV. SYSTEM ARCHITECTURE

The Block diagram of the proposed system is shown in figure. The sensors Temperature, ECG and Heartbeat are connected to the Adriano board. The value from the Microcontroller is given to the Web Server using Wi-Fi Connectivity. The parameter values can be viewed by the Android Application installed in doctors and patient's smart phone.

### A. Processing Unit

In our system Adriano Uno Board is used. The microcontroller is connected with all other hardware units in the module. This module takes analog parameters from the sensors attached to patient, Process it and convert them in digital output. This module also contains Wi-Fi connectivity device which sends the sensors converted data to the android smart phone.

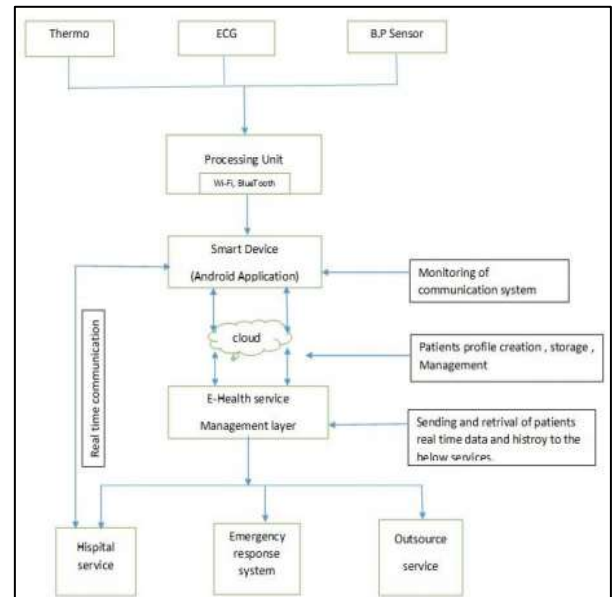


Fig. 2: System Architecture

### B. Heartbeat Sensor (ECG) Sensor

Heart beat sensor is designed to give digital output of heart beat when a finger is placed inside it. This digital output can be connected to Adriano directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger each pulse. IC LM358 is used for this sensor. Its dual low power operational amplifier consists of a super bright red LED and light detector. One will act as amplifiers and another will be used as comparator. LED needs to be super bright as the light must pass through finger and detected at other end. When heart pumps a pulse of blood through blood vessels, finger becomes slightly more opaque so less light reach at the detector. With each heart pulse, the detector signal varies which is converted to electrical pulse.

## V. EXPERIMENTAL RESULTS

The implementation of patient monitoring system consists of 8051 microcontrollers, temperature sensor, ECG sensor, heartbeat sensor and Zig-bee modules which is used to take the continuous reading of patient of his/her conditions. Patient node consists of threshold values of human beings like heartbeat ranges between 60-100 times per second, ECG ranges from 4000-5000 and the body temperature ranges between 96F-103F. When the patient reading excess the reference values automatically buzzer will be in ON state. And these values are transmitted to doctor node via central node. To transmit the data from patient node to central node zigbee module is used. The implementation of central node system consists of Raspberry pi2 processor.



Fig. 3: Results

## VI. CONCLUSION

Patient supervisory system is more popular because it is slow cost and easily available. This permits to use the multiple sensors for patient supervisory system. The patient may be having chronic and acute conditions. Here we are using high bit sampling rate sensors like video, ECG, along with typical signal processing techniques which will absolutely increase the processors to go under more work, and it may go to starvation of tasks in real time jobs. A patient supervisory system based on Operating System in Real time can optimize the time criticality jobs to know that alarms are generated in an exact manner.

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