

Design and Implementation of Self Monitoring System for Distant Analysis of Patients Condition Using IOT

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Abstract

In medical field, Electronics industry is gaining to develop medical equipment at very high advanced level techniques. In the past pace of life it is difficult for people to be constantly available for their near once who might need them while they are suffering from any diseases or physical disorder. So constant monitoring of patients body parameter such as body temperature, pulse rate becomes difficult. Generally in ICU's nurse are taking care of patients health 24x7. So sometimes in absence of care taker it may happen that the health of the patient becomes abnormal or critical from normal condition. So to remove this condition we have proposed self monitoring system which continuously monitors/measures the health parameter of the patient and if any abnormal condition occurs, it directly sends a message to doctor mobile application. Due to this alert message, doctor can do the fast assessment of the patient's health without wasting the time.

Keywords:—*Internet of Things, Temperature sensor, Heart Beat sensor, PIC Microcontroller*

INTRODUCTION

The term Internet of Things was coined more than 10 years ago by industry researchers but has emerged into

mainstream public view only more recently. In IoT, the data is transferred into the network. All the devices are observed and/or managed by the network without

any human interference. IoT simply means increasing the Availability of smart devices that are connected to the Internet. In medical field, monitoring is an observation of a diseases condition or one or several patient body parameters over time.

Monitoring your loved ones becomes a tough task in modern day life. Monitoring of health status of the patient at the hospital is a tough task. Recently, the healthcare sensors are playing the vital role in the medical field. The patient monitoring system is one of the major enhancements because of its advancement in technology. This proposed system provides a smart patient health monitoring system that uses sensors to track patient health and uses the internet to inform the doctor in case of an issue.

In this system, the hardware kit consisting of temperature and heartbeat sensor is connected to the patient so that we can supervise the patient condition and ruling out the use of the thermometer and other devices to check the condition of the patient. This project not only alerts the doctor but also the patient relatives to know the health status of the patient in the hospital.

This system captures the data of patient who is under the critical condition and sends the same wirelessly to cloud and then send it to mobile application of doctors all prepared and ready to treat them.

LITERATURE SURVEY

- 1) In 2015 Sakshi Sharma, Rashmi Vashisth proposed Zigbee Based Centralised Patient Monitoring System. The main objective of this paper is to make centralised patient monitoring system using wireless transmission mesh network. It represents measurement of all physiological parameters in real time collected in patient monitoring system and sending it to the central monitor using Zigbee ISM 2.4 Ghz band frequency.
- 2) In the year 2016 N.Gowri Priya and Vasudha V proposed Real Time Ambulatory Health Monitoring System using Wearable Sensors. The main focus of this paper is to implement the health monitoring system continuously without hospitalization using wearable sensors. Implemented using Zigbee, Bluetooth, GSM, and GPRS.

- 3) In the year 2017 Trie Maya Kadarina proposed Preliminary Design of Internet of Things (IoT) Application for Supporting Mother and Child Health Program in Indonesia. The main objective is to design a system with IoT technology as a solution to reduce maternal and child mortality rate by providing better healthcare services to improve the quality of mother and child health care.
- 4) In the year 2018, Sharanbasappa Sali, Dr. Parvathi C. S. Proposed Health Monitoring System Using Wireless Sensor Networks. This paper proposes an efficient approach to monitor the

illness of the patient during the checkup condition using ZigBee and GSM technology

METHODOLOGY

A. Proposed system

Monitoring your loved ones becomes a difficult task in modern day life. Keeping track of the health status of the patient at hospital is a difficult task. Recently, the health care sensors are playing vital role in medical field.

Our proposed system helps in monitoring the patient's health and health status message will be forwarded to respective people time by time continuously.

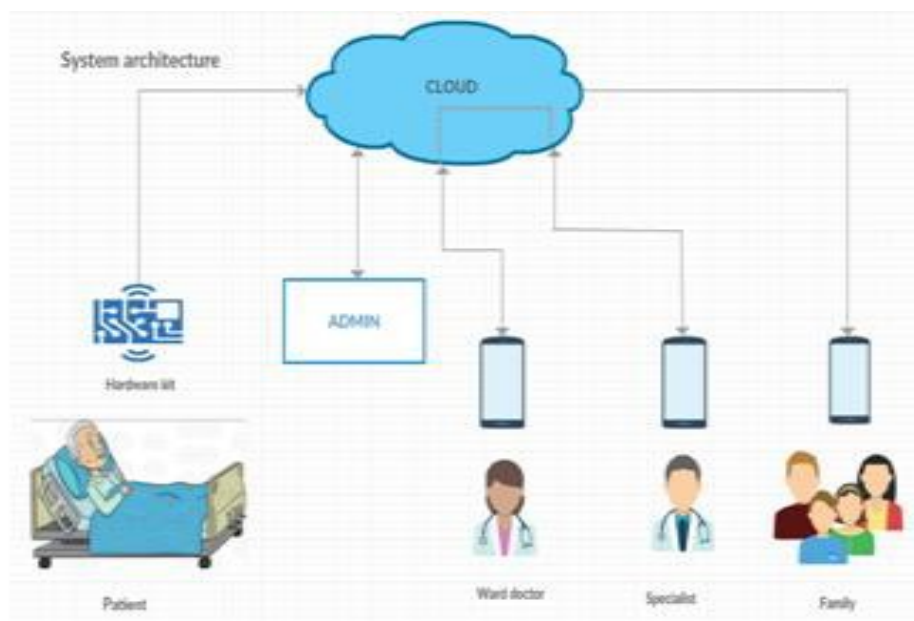


Fig 1: System Architecture

This system architecture consists of hardware kit on the patient side that will be connected to the patient. It collects the information about the health status of the patient such as temperature and heartbeat value and sends it to the respective mobile application through the cloud. It consists of three mobile application i.e. ward doctor, specialist and for relatives of the patient. There is an admin module using which the admin can keep the record of patient details. Admin can also update and delete the details of the patients.

The figure 2 and 3 shows the complete working block diagram of patient monitoring system. It includes two parts, a Smart monitoring unit and Alerting unit.

The Smart monitoring unit includes microcontroller, temperature sensors, heartbeat sensors, GSM module. Alerting unit includes the GSM module, Cloud and Mobile applications for ward doctor, Main doctor (Specialist) and Family members.

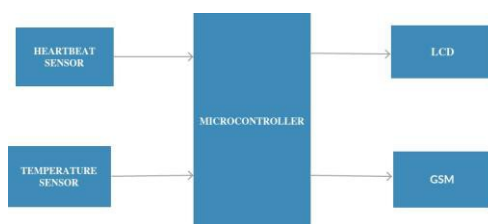


Fig 2: Smart Monitoring Unit

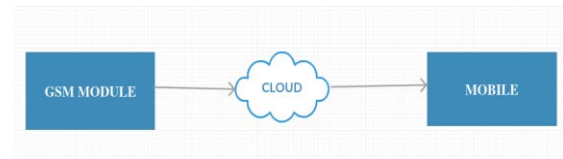


Fig 3: Alerting Unit

B. Modules

1. **Admin module:** The Admin module keeps records of patient's details like patient name, age, blood group and so on. This page displays current patient status and allows you to update.
2. **Smart Monitoring Board:** It is the hardware system on patient side that collects the data of patient body condition. It consists of temperature sensors, heartbeat sensors, microcontroller, GSM module and LCD display.

Temperature sensor: This sensor measures the body temperature of the patient and can be read at anytime. When the temperature exceeds the threshold value, it sends the value using gsm module to the mobile applications.

Heartbeat sensor: This sensor senses the pulse rate of the patients and sends the value of pulse rate to mobile applications.

Microcontroller: This model uses Renes as microcontroller. It collects the data from

sensor and sends the data to the cloud which can be accessed anytime by the doctor.

GSM module: The GSM module is used to transmit the information. All the data sensed by the sensors is displayed on LCD display and also transmitted on the mobile of doctors through GSM module.

LCD display: This LCD has a display format of 128x64 dots and has yellow-green colour backlight. Here it is used to display all details of patient such as heartbeat rate and temperature rate.

Cloud server: It is a core application developed using spring rest API, it receives data from hardware devices and Stores in mongo database and same will be shared with Mobile applications.

3. Ward Doctors Mobile App:

Initially all patient information will be viewed by the ward doctor and he can take proper action according to the patient condition, if he is not able to handle the particular situation then he can forward same information with some more details to Main Doctor. The ward doctor mobile app shows patient details such as patient name, date, time, temperature, pulse rate, age and bed number.

4. Main Doctors Mobile App (specialist):

The main doctor i.e the specialist will be able to see the escalated patient details forwarded by ward doctor. The specialist can suggest the prescription based on the condition of the patient. The main doctor also can monitor the heartbeat rate and body temperature of the patient using the application.

5. Family Mobile App:

Using this application, the family member of the patient can know the health status of the patient i.e. the heartbeat rate, body temperature, date and time etc.

ADVANTAGES

- i. Operation of this device is very simple.
- ii. Bridging the gap between patients and the doctors.
- iii. Highly accurate and reliable.
- iv. Monitoring saves the lives and protects the health.
- v. No loss of time and patient can be cured instantly.

APPLICATIONS

- i. **Hospitals:** It is used in ICU' s, Operation Labs for diagnostic purposes. It can also be used in ambulance.
- ii. **Village Areas:** Visiting hospitals for doctor from cities to village areas is a difficult task. Hence, this method can be useful.
- iii. **Defense:** It will provide high level security to injured soldiers life.
 - a. Military
 - b. Naval base
 - c. Air force
- iv. **Homes:** It can be used in old age homes to monitor the various parameters of sick patients.

FUTURE ENCHANCEMENT

- i. If in case of emergency if one specialist is not available some measures can be taken to forward the same message to another specialist.
- ii. The whole system can be integrated into a small compact unit as small as a cell phone or wrist watch.

- iii. Various sensors such as ECG, glucose, blood pressure sensors can be deployed.
- iv. Alert notifications can be implemented.

CONCLUSION

This system will improve the situational awareness, not only for the doctor, but also for relatives of patient through mobile application. From above designed project we can conclude that we are able to transmit the data which is sensed from patient to the doctors app by using cloud. Temperature and heartbeat sensors are used to measure health condition of patient. This can be a great use in the field of medicine and helps the doctors to keen eye on patient health.

HARDWARE KIT

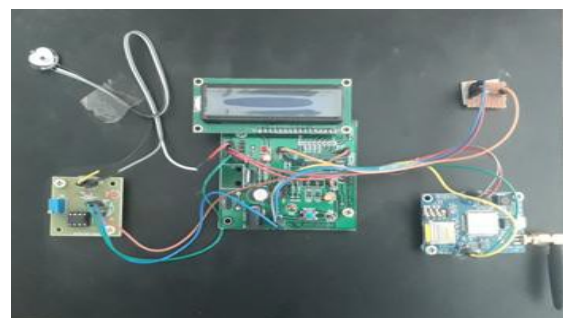


Fig 4: Experimental setup of Patient monitoring



Fig 5: Measurement of Body Temperature & Heartbeat

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