

# WEARABLE EMERGENCY NOTIFICATION SYSTEM IN HEALTHCARE USING IoT

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**Abstract** — *Health is an important factor affecting many lives in our society. Sudden death is also one of the problems that the society faces. Many factors are responsible for sudden death like lifestyle of the individual, hypertension, heart attacks, etc. One of the main reasons is that lack of the affected person at the exact time i.e. if there are no persons nearby a patient and he is affected by any sudden calamity, he may be unable to inform the concerned. Sometime he himself cannot predict his body problems that may lead him to severe consequences.*

*This paper is about a wearable device that detects our vital body signals and helps to diagnose our health conditions. This device is basically a portable version of patient monitoring system. For a safe and sound health, frequent diagnosis of vital body parameters will be helpful. The main use of this device is continuous patient monitoring along with notification of health conditions of an individual who has undergone major surgeries. This is a wearable device and will be connected via IoT to nearby hospitals so that the device will send SMS messages to the concerned medical authorities/care takers in no time. The exact location of the individual can be traced and the doctors/care takers can take necessary steps to admit the patient in the hospital on time to avoid future complications. This wearable device becomes very useful when there are no persons nearby the patient. The doctors/medical authorities also can maintain a pre medical record of the patient for any kind of references.*

**Key Words** — Patient Monitoring System, Internet of Things,

## Introduction

### PATIENT MONITORING SYSTEM (PMS)

The Patient Monitoring System (PMS) is a very critical monitoring systems, it is used for monitoring physiological signals including Electrocardiograph (ECG), Respiration, Invasive and Non-Invasive Blood Pressure, Oxygen Saturation in Human Blood (SpO<sub>2</sub>). Body

as ECG Electrodes, SpO<sub>2</sub>Finger Sensor, Blood Pressure Cuff and Temperature Probe to measure the physiological signals.

During treatment, it is highly important to continuously monitor the vital physiological signs of the patient.

Therefore, patient monitoring systems has always been occupying a very important position in the field of medical devices. The continuous improvement of technologies not only helps us transmit the vital physiological signs to the medical personnel but also simplifies the measurement and as a result raises the monitoring efficiency of patients

The most basic vital parameters of our body are pulse rate and blood pressure. Body temperature measurement is done in any individual before any kind of diagnosis. The three main parameters used in the design of the prototype are pulse rate sensor, blood pressure sensor and temperature sensor.

There are basically two types of Patient Monitoring System; Single Parameter Monitoring and Multi Parameter Monitoring systems.

## STATEMENT OF PROBLEM

The detection of critical situation of a patient using sensors and notify them using IoT

## OBJECTIVE OF THE PROJECT

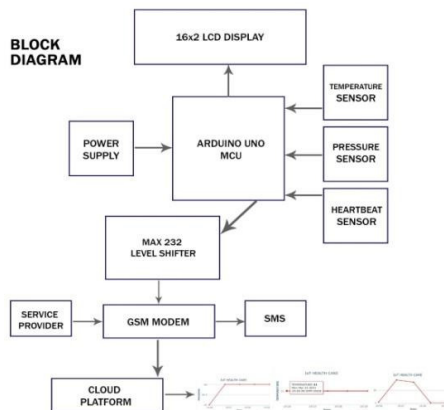
The following are the objective of the project:

1. To detect the critical situation of the patient
2. To send emergency notification to doctors or care takers

## METHODOLOGY

- The impedance for both the hardware components is AC.
- It is of 12 voltage form.
- The mainly supply is connected to step alarm transformer.
- Then the AC is converted in to DC using Analog to

- The diode used is 194007 and the capacitor used is 570 microfarad ,25 volt
- An LCD Display is used for Display whatever implemented in the code.
- Arduino UNO is used for coding and to run the code. Arduino is the key component of the project.
- A buzzer exhibit Beep Sound whenever the patient falls in critical condition i.e., whenever there is a variation in the parameters.
- Modem functions as the when patient falls critical, A message sent to the caretaker.
- Additionally, by using TCP/IP protocol for sending data through cloud platform.
- The three measurement values of: (Temperature sensor, pressure sensor, heart beat sensor value) can be accessed by the Doctor as well as Caretaker.
- The entire data of the project is achieved through the URL Link



## ARDUINO UNO

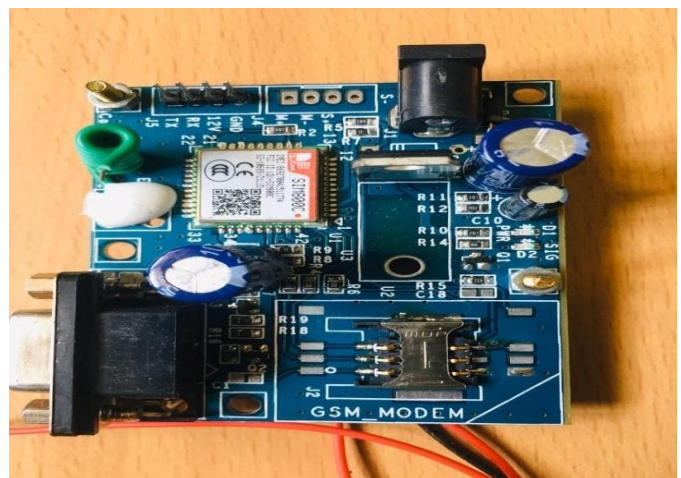
Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a



## SIMCOM GSM VOICE MODEM

This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number. Advantage of using this modem will be that its RS232 port can be used to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily using this.

The modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send/receive SMS and make/receive voice calls. It can also be used in GPRS mode to connect to internet and run many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.



## LCD (LIQUID CRYSTAL DISPLAY)

LCD stands for liquid crystal display. They come in many sizes 8x1, 8x2, 10x2, 16x1, 16x2, 16x4, 20x2, 20x4, 24x2, 30x2, 32x2, 40x2 etc. Many multinational companies

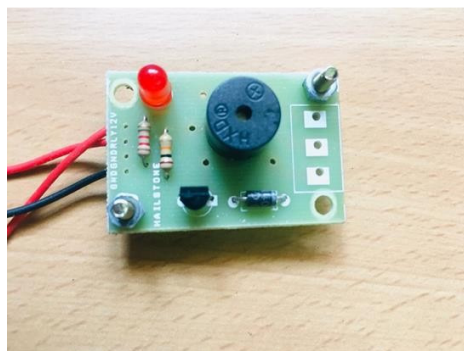
LCD'S to be used in their products. All the LCD'S performs the same functions (display characters numbers special characters ASCII characteristic). Their programming is also same and they all have same 14 pins (0-13) or 16pins (0 to 15). Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc.



## BUZZER

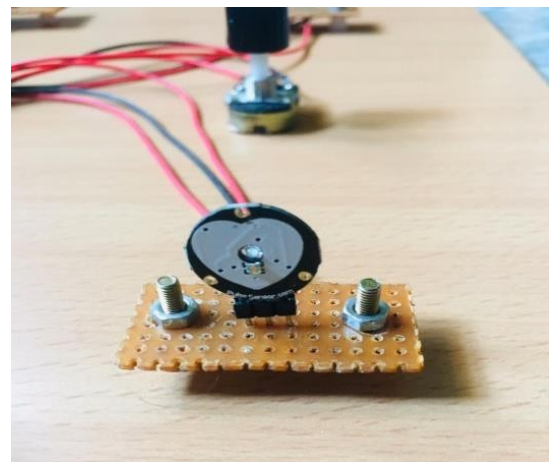
A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section

dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."



## HEART BEAT SENSOR

Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detectors working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.



## INTERNET OF THINGS (IoT)

IoT is the advanced network infrastructure of connectivity, transportation and technology. IoT smart devices can implement the facilities of remote health monitoring and also emergency notification system. IoT has appreciable application of smart healthcare system. In the healthcare system the highlighted policies and strategies that help to the researchers and scientists and experts who develop smart device which is the up-gradation to the existing technology. This survey paper states that how IoT interrelate to various system including the smart healthcare which is one of the prevalent systems. Healthcare system has the surveillance that proposed the need of smart devices and smart objects to decrease the inefficiency of available healthcare system. The IoT based healthcare has enhanced technology which is exclusive from the traditional healthcare and whole medical system

## CONCLUSION & FUTURE WORK

The main objective of the experiment was successfully achieved. All the individual modules like Heartbeat detection module, fall detection module etc. and remote viewing module gave out the intended results.

The designed system modules can further be optimized and produced to a final single circuit. More important fact that came up during project design is that all the circuit components used in the remote health detection system are available easily.



Penetration in most developing countries through mobile phones, and with use of Internet of things (IoT) will become adopted at a faster rate. The Remote Health Care system utilizes these concepts to come up with a system for better quality of life for people in society.

From an engineering perspective, the project has seen concepts acquired through the computer science and embedded study period being practically applied. The

Electric circuit analysis knowledge was used during design and fabrication of the individual modules. Electromagnetic fields analysis used in the wireless transmission between microcontrollers and Software programming used during programming of the microcontrollers to come up with a final finished circuit system

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