

# HEART STROKE DETECTION & ALERT SYSTEM USING ARDUINO - GSM TECHNOLOGY

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**Abstract** - In this paper, an architecture and a scheme of heart stroke detection based on GSM technology is proposed in order to overcome the risk of death under severe health conditions. The proposed system uses sensors that allow detecting heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over to the patient's guardians. In particular, devices and techniques for monitoring blood pressure, cardiac activity and respiratory activity are discussed; in addition, on-body propagation issues for multiple sensors are presented. They also are generating a wealth of data that they can use to re-engineer delivery models to become more dynamic, efficient and responsive to patient needs driving lower costs and higher patient satisfaction. Furthermore, it offers the potential to alter the current health-care system by enabling out-patient care and preventing unnecessary hospitalizations. A practical implementation is carried through the experimental setup.

**Keywords** – Cardiac, Arduino, GSM, Respiratory.

## I. INTRODUCTION

Cardiovascular disease is one of the main causes of death in the many countries and in 1999, it accounted for over 15 million deaths worldwide. In addition, several million people are disabled by cardiovascular disease (WHO, 1999). The delay between the first symptom of any cardiac ailment and the call for medical assistance has a large variation among different patients and can have fatal consequences. One critical inference drawn from epidemiological data is that deployment of resources for early detection and treatment of heart disease has a higher potential of reducing fatality associated with cardiac disease than improved care after hospitalization. Hence new strategies are needed in order to reduce time before treatment. Monitoring of patients is one possible solution. Also, the trend towards an independent lifestyle has also increased the demand for personalized non-hospital based care [1] & [4].

The GSM technology continues to transform healthcare delivery at an unprecedented pace. The design of wearable physiological measurement systems has been a growing research interest in the last decade, due to the potential applications in medicine, sports and security. With the increase in the size of the elderly population, as well as the emergence of chronic diseases because of the changes in lifestyle, there has been a need to monitor the health status of individuals in their daily routine to prevent fatal disorders. The emergence of wireless technologies and advancements in on-body sensor design can enable change in the conventional health-care system, replacing it with wearable health-care systems, centered on the individual. Wearable monitoring systems can provide continuous physiological data, as well as better information regarding the general health of individuals. Thus, such vital-sign monitoring systems will reduce health-care costs by disease prevention and enhance the quality of life with disease management.

## II. DESIGN METHODOLOGY

The design methodology inculcates the transmitter circuit with ECG Readings, Heart Beat is measured, and then it is applied to the microcontroller. The Microcontroller maintains the records of the measured readings. It compares the measured with the normal readings and checks whether the heart beat rate is within the normal range or not [3]. If it is normal, then it just monitors otherwise it sends information of abnormal to the specified mobile number.

Long waiting time for hospitalization or ambulatory patient monitoring/treatment, are other well-known issues for both the healthcare institutions and the patients. This paper provides healthcare authorities to maximize the quality and breadth of healthcare services by controlling costs. As the population increases and demand for services increases, the ability to maintain the quality and availability of care, while effectively managing financial and human resources, is achieved. The use of modern communication technology in this context is the sole decisive factor that makes such communication system successful.

Some severe diseases and disorders e.g. heart failure needs close and continual monitoring procedure after diagnosis, in order to prevent mortality or further damage as secondary to the mentioned diseases or disorders. Monitoring these types of patients, usually, occur at hospitals or healthcare centers. Heart arrhythmias for instance, in many cases, need continual long-term monitoring. However, the patients are often too early released, owing to need of hospital bed for another patient on the waiting list, who needs to be hospitalized immediately.

## III. BLOCK DIAGRAM

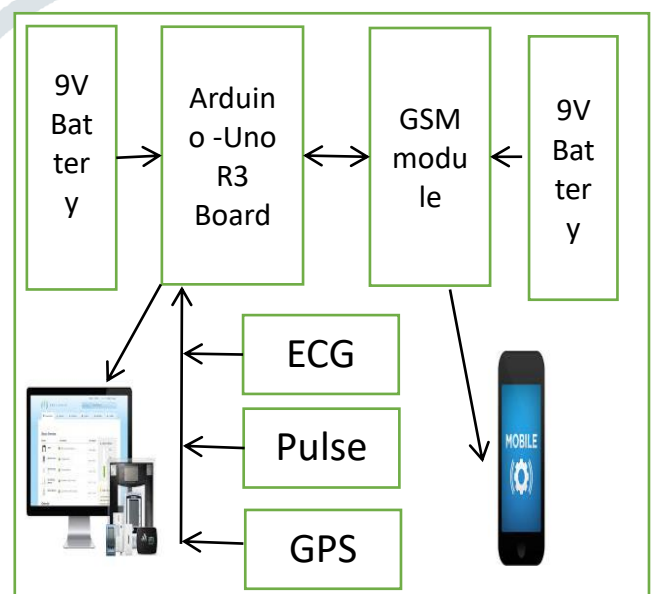


Fig. 1. Block Diagram of GSM Based Heart Stroke Detection

The framework significantly comprises of three segments like Pulse rate sensor (Ear clip Heart rate sensor), ECG sensor, GPS Tracker Sensor, GSM modem and Arduino Uno (ATmega328P) as shown in figure 1. This works introduces a ton of contemplations and upgrades that were consolidated into the usefulness of the device in order to reflect craved components, for example, cost, plan multifaceted nature, size, programming advancement, weight, absence of versatility and so on [2].

This configuration utilizes a scaled down heartbeat sensor (IC sensor) which has been improved for extremely precise detecting and estimation of changes in the pulse rate and body temperature. The frame-work ascertains the pulse rate in beat every moment (BPM) with the assistance of the microcontroller, shows the deliberate heart rate, ECG pattern. Heart rate sensor detects the heart rate by taking the normal of readings by altering most extreme and least values (ordinary scope of heart beat is 60-100bpm) and the information is exchanged to GSM.

Precious stone oscillator creates signals utilized for operation and by empower info MCU works, stores the information in EPROM chip which is shown serial screen. Underneath demonstrates the test setup of proposed framework. MCU stores the advanced information in the wake of changing over the simple information from sensor unit through ADC, for some postponement unit of time and resets the perusing in MCU. MAX232 gets the computerized information and proselytes into serial structure suitable for GSM correspondence with the goal that information is gotten by the client (specialist) by checking the IMEI number.

This paper presents a lot of considerations and improvements that were incorporated in to the functionality of the device so as to reflect desired features such as cost, design complexity, size, software development, weight, lack of portability etc. This design uses a miniaturized pulse sensor (IC sensor) which has been optimized for very accurate sensing and measurement of changes in the heartbeat rate. The system calculates the heartbeat rate in beat per minute (BPM) with the help of the microcontroller, displays the measured heart rate on PC and sends an SMS with current BPM value, each time the heart rate goes above or below a fixed threshold, while at the same time setting off a buzzer alarm attached to the patient module to trigger an alert. With small size and portability in mind, the choice of the LCD display and miniaturized sensor aims at eliminating the need for a PC display, while making it easier to carry the system about, for continuous monitoring.

#### IV. EXPERIMENTAL SETUP

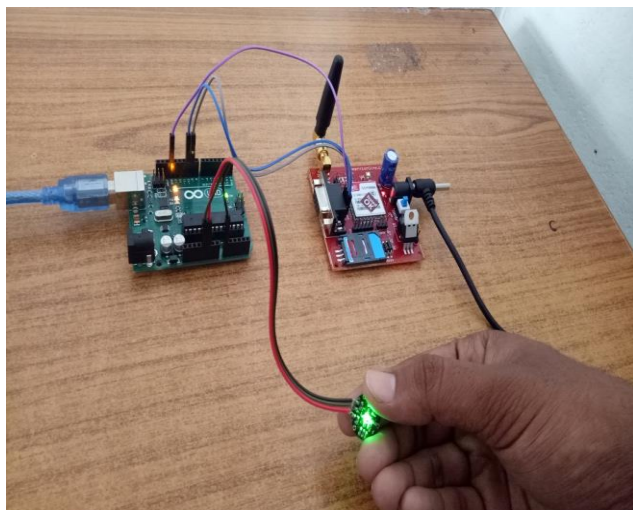


Fig.2. Experimental Setup

The Experimental Setup for the proposed system is as shown in figure 2. In this, a arduino board connected with GSM module and Pulse sensor. If finger is placed on the pulse sensor the pulse sensor gives the output BPM reading in serial plotter of the arduino IDE software tools.

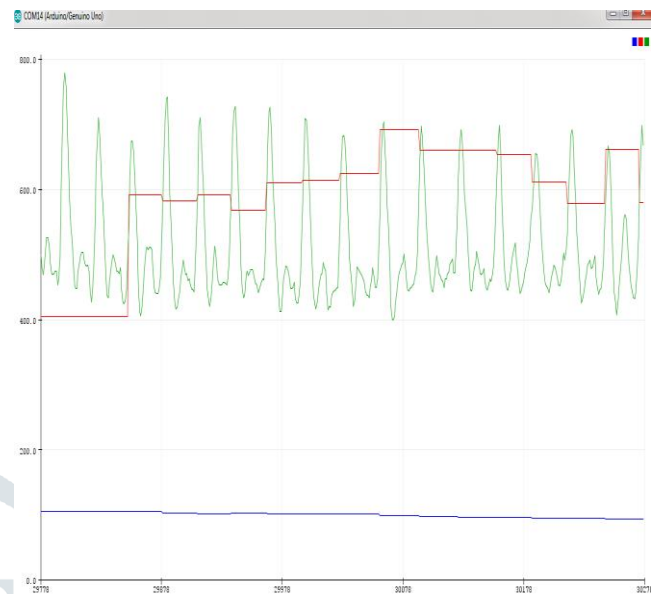


Fig.3. Pulse Rate, IBI and BPM output signals

Notice the three traces in the Arduino Serial Plotter as shown in figure 3. The **green** trace is your pulse wave data from the Signal variable. The **red** trace is your IBI, or the time between each beat. The **blue** trace is your BPM or your Beats Per Minute.

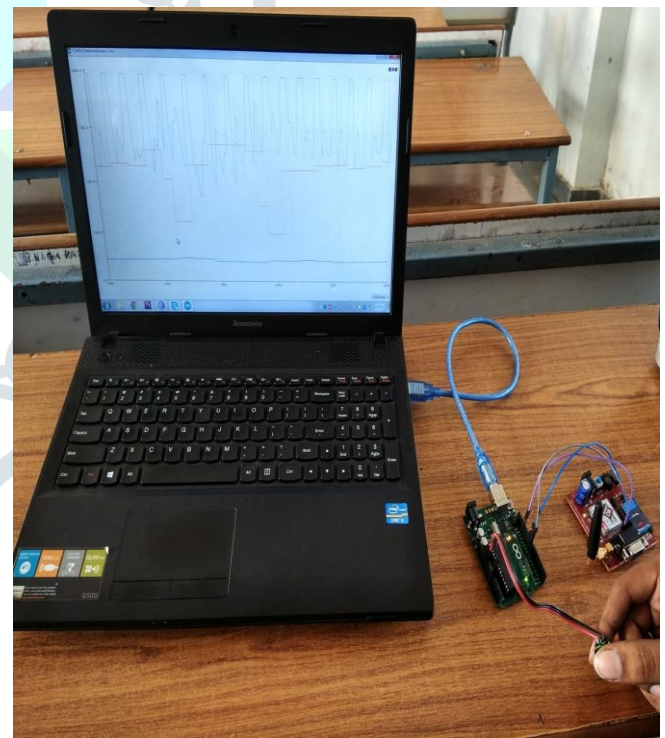


Fig.4. Experimental Setup with PC

The implemented framework significantly comprises of three segments like Pulse rate sensor (Ear clip Heart rate sensor), ECG sensor, GPS Tracker Sensor, GSM modem and Arduino Uno (ATmega328P) as shown in figure 4. This introduces a ton of contemplations and upgrades that were consolidated into the usefulness of the device in order to reflect craved components, for example, cost, plan multifaceted nature, size, programming advancement, weight, absence of versatility and so on.

## V. CONCLUSION

This paper is initiated to alert the family members about patient's heartbeat via SMS. It fulfills the objective to detect and monitor patient's heart using PPG technique, interfaced with GSM modem and sends alert to the family or/and medical experts via SMS. The connection between microcontroller and HyperTerminal is successfully established before the system can be interfaced to the GSM modem. At the moment, ongoing test on sending alert directly from PIC circuit to mobile phone is still carry out to get a stable system. For future development, this paper can be properly designed. It can be modified to become very light, portable, smart and elegant. E.g. like a watch or embed with i-POD.

Remote and portable advancements are key segments that would empower patients experiencing unending heart diseases to live in their own homes and lead their ordinary life, while in the meantime being observed for any cardiovascular occasions. This won't just serve to decrease the weight on the assets of the medicinal services focus however would likewise enhance the nature of social insurance division. This remote correspondences would not

just give us sheltered and exact observing additionally the opportunity of development. For a patient who is as of now determined to have lethal coronary illness, their heart rate condition must be checked constantly.

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