

Ambulance Tracking and Health Monitoring System

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Abstract—Road accidents are detrimental to the health and well being of our citizens, and our first responders face great adversity when it comes to ensuring that the affected individuals reach hospitals as fast as possible. The objective of our project is to design a system which can reduce the number of deaths caused due to lack of medical assistance at the time of road accidents. There is scope in future to enhance our system in implementation and future research to store data that we receive. Our project consists of a combination of an ambulance tracking system and a remote health monitoring system. This system can be deployed to make sure that hospitals are better prepared to receive patients by having access to the patient's health data from beforehand, and also knowing how far the ambulance is from the hospital, and its expected time of arrival.

I. INTRODUCTION

In order to improve our healthcare system's response to accidents, and the preparedness of our first responders in general, we need a robust system in place that allows first responders to be better prepared to tackle the odds they face. In this project, we propose a solution by creating an integrated ambulance tracking and patient health monitoring system for the same. Allowing doctors to have an idea of the patient's vital while the patient is in transit would avoid the necessity for the doctors to measure the vitals themselves once they come in, and allow them to plan out a prospective set of actions that can be implemented as soon as the ambulance reaches. The ambulance tracking system, which would inform the hospital staff of the ambulance's real time location, and allow them to be better prepared for treatment, as compared to a situation when the ambulance just rolls up at the hospital bay without any prior communication with the hospital. The

unreliable traffic conditions in our country make such a tracking system even more important for more efficiency in the treatment process.

II. PROPOSED SOLUTION

This project involves a system for ambulance tracking as well as health monitoring, and the two systems work in tandem in order to ensure that hospitals and doctors are better prepared to receive patients, which inevitably results in patients getting better treatment. The health monitoring system records the patient's vitals, such as heart rate during the time of transit, and simultaneously communicates the data to the hospital staff so that the doctors already have an idea of the patient's condition, saving crucial time that is spent on recording vitals after the patient comes in. The ambulance tracking system consists of a GPS module fitted onto the ambulance that is constantly transmitting the location of the ambulance to the hospital bay, making sure that staff is prepared to receive the ambulance with all required equipment, depending on the severity of the patient's condition. We also have a setup for visualizing the patient's health data, allowing for easy analysis.

Our project comprises a combination of hardware and software working simultaneously for providing efficient results. Our project comprises of the three major parts:

- A. Health Monitoring System
- B. Ambulance tracking System
- C. Data Visualization

A. Health Monitoring System

The hardware consists of the following components: -

- Pulse Sensor
- Arduino
- Temperature (LM35)

- Power Supply
- LCD Display
- Variable Resistors & button



Fig 1. Hardware Setup of Pulse Sensor for Obtaining Heartbeat values

The pulse sensor is placed over the wrist to take the real time data of the pulse and the input of it is fed into Nodemcu via which the data is sent to firebase for analysis .

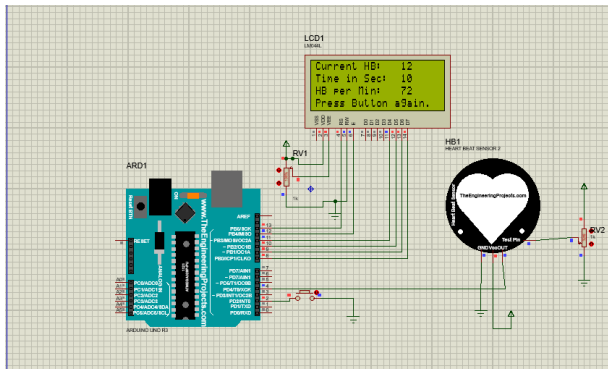


Fig 2. Software Simulation of Pulse Sensor for Obtaining Heart Rate

The software simulation is performed on Proteus, and the value from the pulse sensor is displayed on the LCD . It measures the heart rate value for upto 10 sec and then multiplies it with 6 to determine its value over a min (HB / min).

The code for the health monitoring system can be checked [here](#)

B. Ambulance Tracking System

The hardware consists of the following components

- Arduino
- GSM Module
- GPS Module
- Power Supply
- Virtual Terminal

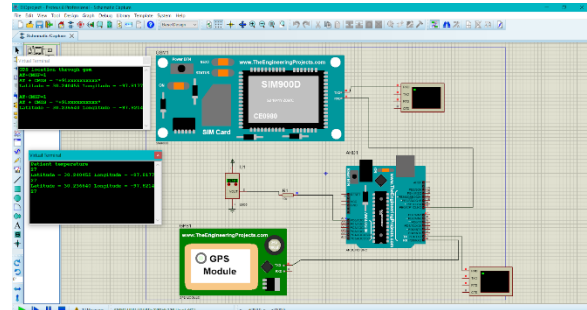


Fig 3. Software Simulation of GSM and GPS sensors for ambulance tracking

For ambulance tracking we use GPS and GSM modules . We track the location of the ambulance using GPS and the data is sent over to the doctor (message) using GSM . Output is displayed over two serial monitors.

The code for the ambulance tracking system can be checked [here](#)

C. Data Visualization

The data from the pulse sensor is transported to Firebase, and stored on the cloud. Once the data is sent to Firebase, it is accessed via the database API key, and used for creating visualizations.

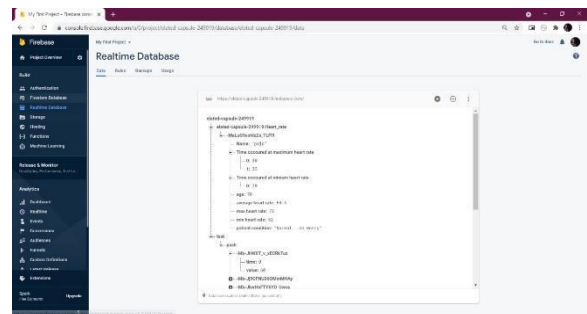


Fig 4. Real Time Data in Firebase

The Pandas library is used to arrange the arrays of heartbeat and time into two separate columns and then a csv is created of this data, which is then utilized for visualizations.

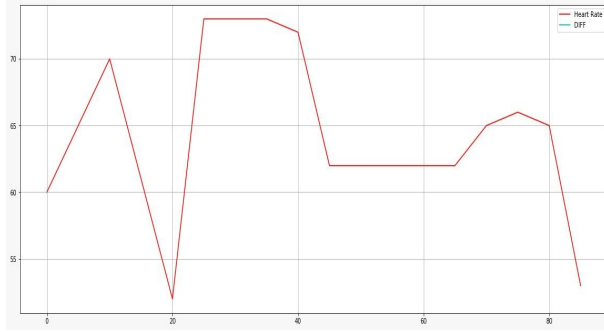


Fig 5. Heart Rate vs Time

Fig5 shows the graph between Heart Rate and Time.

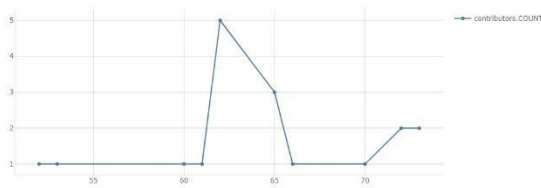


Fig 6. Count of each individual heart rate value

Fig6 represents the count of each heart rate value, i.e, it specifies how many times each heart rate value occurs. This allows us to determine the modal value or modal range of the heart rate of an individual.

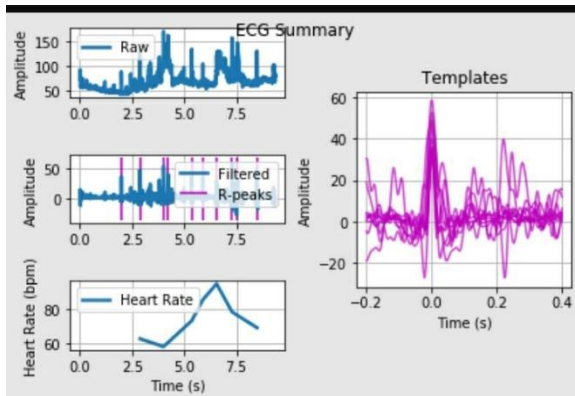


Fig 7. ECG Summary

Fig7 provides the ECG summary from the heart rate data obtained.

The code for data visualization can be accessed [here](#)

III. CONCLUSION AND FUTURE SCOPE

Given the fact that road accidents are so common in India, and the mismanagement in our traffic systems, a solution that tries to mitigate the problems of the long transit time from the region of the accident to hospitals is absolutely necessary. While there is still scope for lots of improvement, this system ensures that the hospital staff is informed whenever the patient's vitals cross the permissible level, letting them be better prepared for any adversities. The tracking system also ensures efficient preparation of the hospital bay for accepting the ambulance and the patient. The patient's vitals can be analyzed remotely from any location, which reduces the doctor's work load and also gives accurate results.

IV. REFERENCES

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