

Accident Detection and Intelligent Navigation System for Emergency vehicles in Urban Areas using IoT

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Abstract:

With the current mechanical and populace blast, the utilization of vehicles has quickly accumulated and in the meantime the frequencies of accidents have likewise expanded. Nobody can turn away the accidents, yet can spare their life by pushing the ambulances to the doctor's facilities in time. In this paper accidents discovery and route of crisis vehicle utilizing IoT is proposed. The target of this plan is to limit the delay caused for movement of emergency vehicles. This approach additionally plans to give the accident spot to emergency vehicle utilizing GPS which is accessible in rescue vehicle.

Keywords — **IoT, Intelligent Navigation, Emergency Vehicles, Urban Areas.**

I. INTRODUCTION

As the populace blast is in its walk, the quantities of vehicles have likewise expanded on the streets and expressways [7]. The outcome is more number of accidents that intern leads to the traffic jams and public has to get help instantaneously. IoT has played a vital role in easing the life of public by its applications in various domains. Some of the well-known applications of IoT include Smart Home Automation, Wearables, Rural Health care and Automobiles.

Right now there is no appropriate innovation for mishap location and keen route navigation. As it must be done physically there are odds of death toll. Numerous a times when a mishap happens it is unnoticed for a considerable length of time before somebody comes to help [8]. Attributable to every one of these reasons there is a high rate of mortality of the mishap casualties. Notwithstanding this there is delay in emergency vehicle achieving the doctor's facility due clog between mishap area and healing facility which rises the odds of the passing of casualties.

The IoT approach can be connected to the present situation to decrease level of passings caused because of mischances and keeping in mind that getting the clumsy casualties to clinic. This paper

examine about the intelligent route of emergency vehicles utilizing IoT which can spare open life because of the automobile overloads caused in urban ranges while casualty is conveyed to healing facilities.

This paper provides a fully automated IoT powered approach to emergency vehicle and controls the traffic lights, provide the shortest path to reach the hospital in time. Rest of the paper is composed as takes after: Section 2 talk about Literature overview conveyed. Segment 3 gives the framework design of proposed approach. Area 4 demonstrates the exploratory outcomes took after by conclusion.

II. LITERATURE SURVEY

YogitaJadhavetal [1] has discussed a study about the automotive localization system using GPS and GSM services. In this paper the designed system permits localization of the automobile and transmits the vehicle position to owner on his mobile phone as a short message on his request. The system is also provided with emergency switch which can turn off the vehicle through an SMS. The drawback of this system is that if there is no provision of GSM networks, it would be difficult for communication also if network is not available at accident spot then the SMS cannot be sent.

Zhang Wen et.al [2] has developed a vehicle positioning system based on ARM. In this study to get the position of the vehicle, the owner sends a request through a SMS. This is acknowledged by a GSM modem in the device and processed by the Spartan processor and the processor sends command to a GPS module in the device. The GPS module replies with coordinates of vehicle's position. This position is sent back to user as an SMS with date, time, latitude and longitude values. The drawback of this system is that when there are air masses in the sky GPS will stop working and cannot send message and determine the location.

Yilin Zhao et.al [3] has shown in his study about the crash notification system that can be implemented in portable handheld and aftermarket devices. This system features a crash detector, which can be coupled over a wired or wireless network. This literature has some weakness as the delay in communication networks to send message that is recorded when the accident has occurred and has less strength to capture the data provided by their accelerometers, compasses, and GPS sensors.

Elie Nasr et.al [4] has proposed a technique which conveys a smart and reliable IoT system solution which instantly notifies whenever an accident takes place and locates its coordinates on the map. When an accident takes place, a shock sensor detects it. Then, an algorithm is applied to process the sensor signal and send the geographic location along with some indicating accident occurrence.

S.Sonika et.al [5] has proposed a new vivid scheme called Intelligent Transportation System (ITS). The objective of this methodology is to minimize the delay caused by congestion in traffic and to provide smooth flow of emergency vehicles. The idea of this methodology is to turn the traffic signal green in the path where ambulance is expected to go. The main server finds the nearby ambulance to the accident location and sends the latitude and longitude points to ambulance.

ModugulaRavikanth Reddy et.al [6] has concentrated on accident detection and alerting by sending message to the Android Mobile. An android app that specifies the location name and Vehicle position on the road is important consideration for detecting accidents. Using this approach accident can be detected by using vehicle position on the road.

III. PROPOSED ARCHITECTURE

A smart and reliable IOT system that requires no user interaction during or after the accident; consequently, it provides instant automated vehicle accident detection and reporting. The proposed architecture detects accident; notify the monitoring and providing ambulance to accident location. The product is developed using hardware devices such as Raspberry Pi, GPS, Gyroscope, RF transmitter and receiver, and implementing an android app. Proposed architecture is shown in figure 1.

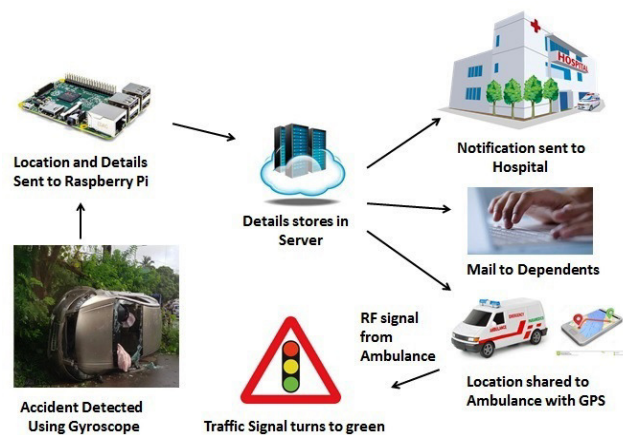


Fig.1 Proposed Architecture

The car's dashboard will consist of a display which asks for driver's blood group. The options will be in the form of radio buttons, which are displayed along with the gyro - rotation and GPS values.

When the car encounters with an accident, the gyro placed in the car reads the rotation angle and if the angle crosses the threshold value i.e 40 Deg in

this case. Then it sends the blood group and the real time location to the active server.

The Android app developed will be continuously listening to the server, whenever the server gets the accident notification; the app retrieves the data from the server and notifies the user about the location.

The app when placed in the ambulance will also help it to navigate to the accident spot providing the shortest and lesser traffic route using Google Maps API.

When the ambulance is on its way to the accident location, due to the traffic congestion, it may be delayed in reaching the spot in time. So the ambulance will be transmitting a RF signal continuously and the receiver will be in the traffic lights. When these traffic lights sense the RF signal then they turn green.

The accident notification is sent to nearby hospital and also to the victim dependents by mail.

Figure 2. Shows the activities involved in the proposed architecture.

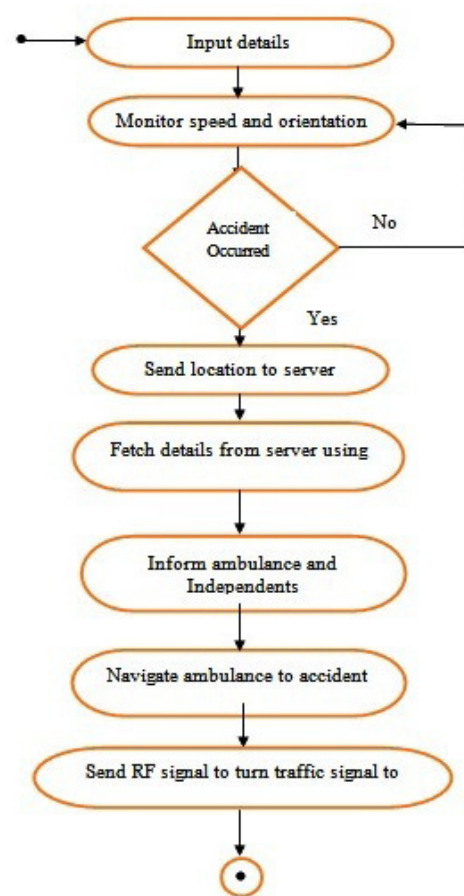


Fig. 2 Activity Diagram

IV. EXPERIMENTAL RESULTS

The proposed architecture was implemented using Raspberry Pi 3, GPS [10], Gyroscope, DC motor, RF 434 Mhz transmitter, Arduino controller. Pressure sensor along with GPS and GSM module are integrated in car [9]. Whenever accident occurs GPS traces the current position and sends the data gathered to server. Server in turn responds to the nearby hospital and to the app which is in ambulance which shows the exact location of the accident. The experimental setup is shown in following figures.

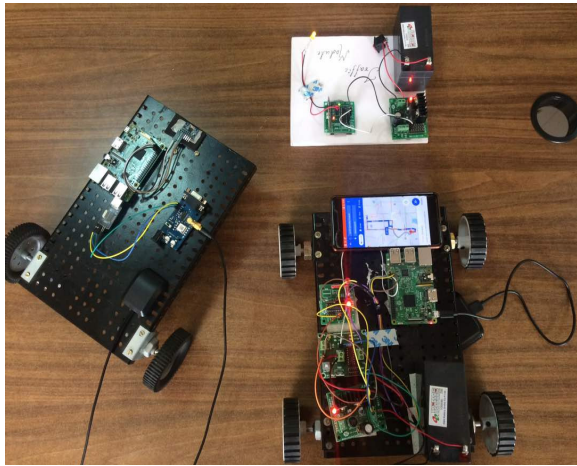


Fig. 3 Experimental Setup

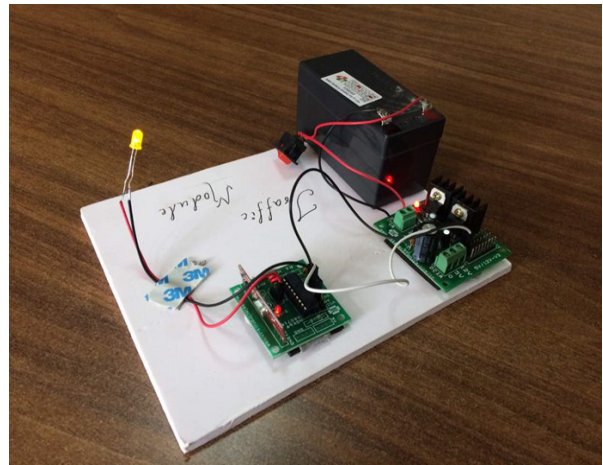


Fig. 6 Traffic Module

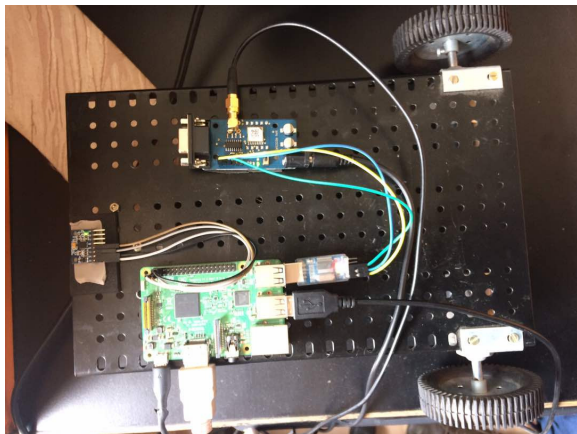


Fig. 4 Vehicle Module

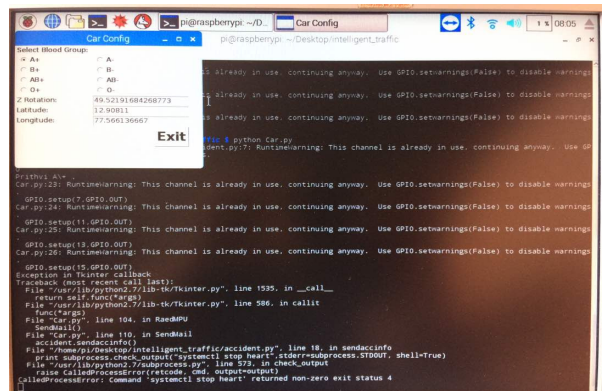


Fig. 7 Dashboard in car

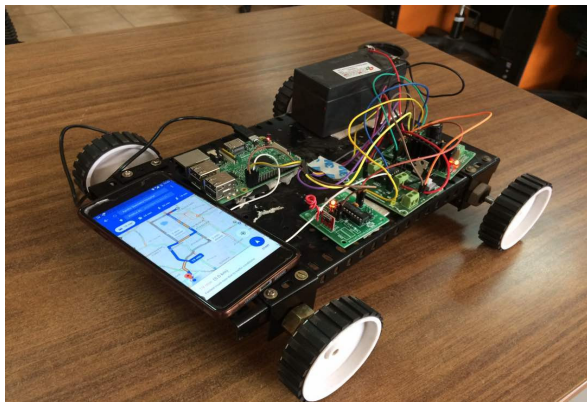


Fig. 5 Ambulance Module

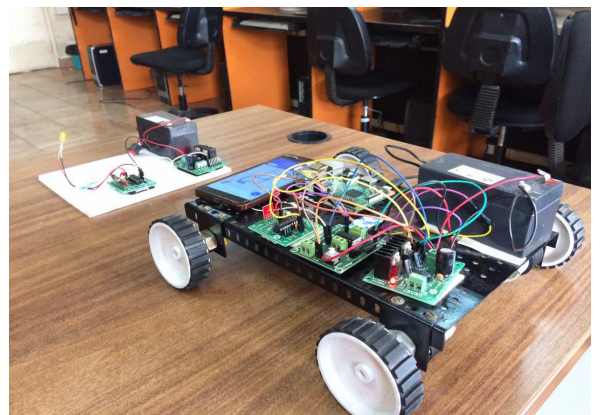


Fig. 7 Ambulance showing the navigation with signal turning green

V. CONCLUSION

We have proposed a system that aims to detect an accident and notify the monitoring systems like ambulance and hospital succeeded by controlling traffic signals in favour of ambulance. By this new framework the time slack is diminished by applying the RF advancements that controls the movement signals. The rescue vehicle which is close to the mishap area is educated by the server. This guarantees the decreased time hole between the mishap spot and healing facility. In future we can utilize cloud to store all the data in regards to the closest hospitals, current traffic movement. The information put away in cloud may play key part in immediate response and traffic monitoring system to reach the mishap spot in short span on time.

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