

Accident Detection and Ambulance Control using Intelligent Traffic Control System

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Abstract—In highly populated countries like India, every 3.7 minutes a death swoops in. A leading cause of the global burden of public health and fatalities is road accidents. The loss of human life due to accident is to be avoided. Traffic congestion and tidal flow are major facts that cause delay to ambulance, as most of the countries follow predetermined sequence of traffic lights. Sometimes the accidents are also not detected in time, which also in many cases leads to loss of life. The idea here is to provide an Intelligent Traffic Light System, which would help the ambulance reach the destination in minimum possible time by providing an adequate route of passage. Along with this a controller is to be fit on vehicles, which would help in fully automatic detection of the occurrence of accident and locate the vehicle as well.

Keywords: accident, congestion, predetermined, intelligent, traffic control.

I. Introduction

Traffic management on the road has become a severe problem of today's society because of Growth of the urbanization, industrialization and population; there has been a tremendous growth in the traffic. With growth in traffic, there is occurrence of bundle of problems too; these problems include traffic jams, accidents and traffic rule violation at the heavy traffic signals. This in turn has an adverse effect on the economy of the country as well as the loss of lives. So problem given above will become worst in the future.

In order to confiscate the need of controlling traffic congestion and implementing ITLS, we can use Raspberry Pi (ARMv6) Processor along with RFID technology. The problem of traffic light control can be solved by RFID based system. With this system, we can consider the priority of different type of vehicles and also consider the density of traffic on the roads by installing RF reader on the road intersections. Radio frequency identification is a technique that uses the radio waves to identify the object uniquely. RFID is a technique that is widely used in the various application areas like medical science, commerce, security, Electronic toll collection system, access control etc. There are three main components of RFID: RFID tag, RF Reader and Database. The Vehicular System provides information of a vehicle like velocity, position, through a GPS module and identity of a vehicle to a monitoring station and to a

mobile phone according to a definite event stored in a program or a query from a monitoring station. 760 Accelerometer senses the collision of the vehicle and sends this information in real time to a hospital/police station. The monitoring station display these information on GUI also stored these information in database for further process according to a program. The system is useful in much application such as surveillance, security, tracking, which may be installed in cargo trucks, cars, motorcycle, and boat. The system can be used in many applications.

II. LITERATURE REVIEW OF RELATED WORK

A. Using ARM processor:

Arm architecture is a general purpose 32 bit microcontroller. It offers high performance and low power consumption. It is based on RSIC principles. The work in [5] proposes the use of ARM7 (LPC 2129) processor and has GPS, GSM, RF transmission modules attached to ambulance. It is based on an approach to make way for an ambulance using intelligent traffic light control with the help of Internet Of Things. The ambulance driver here accesses the device through GPS. The driver traces the location and sends the updates to traffic control management and GPS is connected to ARM processor. It uses GSM module to send message to traffic management and get acknowledgement from receiver side. The communication takes place with high security as information is encrypted. Through IOT information can be sent without delay. The management side uses optocoupler to pass information and control to PC. PC controls the traffic light.

The paper [1] focuses on collecting the information of a moving emergency vehicle using GSM, GPS, ARM and provide a clear path. As the ARM has low cost and they are small in size they are widely used as processors. Two RFID systems are also used. RFID tag, a heartbeat sensor and temperature sensor are placed in ambulance, they monitor the patient's health and send sms to mobile using GSM module. Two RFID readers are placed on intersections to detect traffic density on roads. When an ambulance is detected on any road, RFID reader turns the traffic signal green.

B. Using Arduino processor:

This [3] proposes a system consisting of two parts smart traffic light control system (STLCS) and

congestion avoidance system. System is based on Arduino dvemilanove atmega which is 328 family based microcontroller. Here IR proximity sensors , Arduino, xbee are mounted on either sides of roads and emergency vehicle respectively.

C. Using FPGA:

It [8] is mainly used to track position of any vehicle and send automated message to pre programmed number. The owner of vehicle, police to clear traffic , ambulance to save people can be informed by this device. FPGA controls and co-ordinate all parts used in system. With the help of accelerometer sensor, we can tell the exact position of the vehicle. We can predict whether the vehicle is in normal position or upside down.

D. Using Raspberrypi:

In [7] design of vehicular monitoring and tracking system using RASPBERRY PI is proposed. The whole system is wirelessand uses microcontroller (ARM 11) CHIP, Shock sensor, eeprom, thermistor, gps module. The 760 accelometer senses the collision of vehicle and send this information in real time to hospital/police.

Ref no.	Processor	Processor bits	Technology	Advantages	Components	Application
[1]	ARM7 TDMI-S	32 bits	Rfid	1.Low power embedded applications 2.Risc architecture 3. cheap, simple low code side	Arm,heart beat sensor,temperature sensor,gsm,gps,rfidtag and reader	1..Monitors patients health. 2.Priority to VIP vehicles
[2]	-	-	Rfid	1.No line of sight limitations. 2.Scans multiple items simultaneously. 3.Rfid reader can scan tag in millisec.	Rfid tag, reader, database	1.Traces stolen vehicle 2.traffic control
[3]	Arduino	32 bits	zigbee	1.Easy and fast prototyping. 2.Flexible	Rf module, Ethernet, xbee pro, arduino,gsm	1.effective debugging
[4]	PIC	32 bits	Wireless sensor network	1.Small,cheap,simple 2.low power consumption	Vibration sensor, fire sensor,siren, gps,gsm, pic	1.Accident spot detection. 2.Traffic control
[5]	ARM7 (LPC2129)	32 bits	gsm	1.Easy to navigate 2.Works in all weather 3.Low cost	Rf transmitter,Optocoupler,gsm , gps	Clear traffic for ambulance
[6]	Pic16F877a	13bits	zigbee	1.Network is very scalable 2.Consumes little energy 3.All old IR devices are replaced	lcd(2''16), encoder unit,rf transmitter,bio sensors.	Accident spot and traffic ligh control
[7]	Arm 11	32 bits	Raspberry pi	1.Inexpensive And simple 2.Tools are free 3.Can open every application without the internet 4.Small in size.	Raspberry pi, gps,gsm,eprom, thermistor, shock and gas sensors.	1.information of vehicle speed, identity 2.track vehicles
[8]	FPGA Spartan3E	16 bits	gsm	1.Electrically programmed, re-programmable2.Easy to navigate 3.Works in all weather4.Low cost	Gps, gsm, Accelerometer sensor, Spartan 3E Board.	3. senses accident and intimates hospital

III. COMPARISON OF PAPERS

Table 1

IV. METHODOLOGY

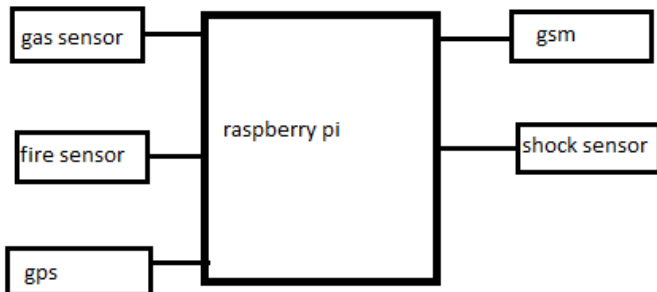


Fig1. Vehicle unit

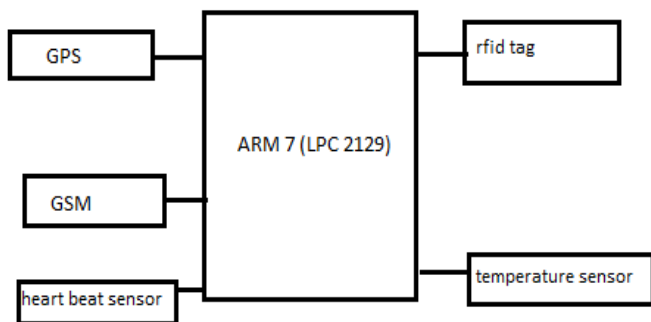


Fig2. Ambulance unit

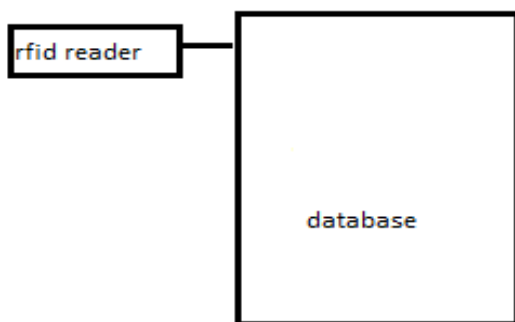


Fig3. Control unit

This whole project is divided into two modules. First is the vehicular detection when accident occurs. The vehicle has a raspberry pi controller fixed in it which is interfaced with sensors like gas sensor, temperature sensor and shock sensor. These sensors are fixed at a predetermined value before accident. But when accident occurs the value of one of the sensor changes and a msg to a predefined number (of the ambulance)

is sent through gsm. The GPS module which is also interfaced with the controller also sends the location of the vehicle.

When the message is received by the ambulance, our work to provide a clear route to the ambulance starts. The ambulance has a controller ARM which is interfaced with the RFID tag sends electromagnetic waves. When an ambulance reaches the traffic signal the RFID reader which is placed on the joints detect the electromagnetic waves of the tag. If the traffic signal is red, then the readers goes through the database in fraction of seconds and turn the red light green. And automatically in such condition the RFID on opposite joints turn the opposite signal red. This provides a clear route to the ambulance. Also the heart beat sensor and the temperature sensor placed in the ambulance send a regular record of the patient through GSM to the hospital. This provides enough time for the doctor to prepare. This module not only focuses on one aspect of accident handling, but it covers all the possible ways to provide help save the life in a n accident.

V. CONCLUSION

In this paper, a novel idea is proposed for controlling the traffic signals in favor of ambulances during the accidents. With this system the ambulance can be maneuvered from the ITLS can be proved to be effectual to control not only ambulance but also authoritative vehicles. Thus ITLS if implemented in countries with large population like INDIA can produce better results. The ITLS is more accurate with no loss of time. But there may be a delay caused because of GSM messages since it is a queue based technique, which can be reduced by giving more priority to the messages communicated through the controller.

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