

AUTOMATIC ACCIDENT DETECTION WITH INTELLIGENT TRAFFIC LIGHT SYSTEM

R.Bhuvanewari¹ and R. Vinoth Raj²

Abstract-Nowadays, as the population is increased day by day the number of vehicle are also increased and this has raised incidents road accident .The loss of human life, so used the ITLS(international traffic light system) smooth flow for the emergency vehicles like ambulance to reach the hospital in the time. This scheme is fully automated , thus it find the accident spot , control the traffic lights, helping to reach the hospital in time.

Index terms-ITLS,GSM ,GPS ,PIC Microcontroller , Zigbee ,RF transmitter , RF receiver.

1 Introduction

India is the second most populous Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints . Also, Indian traffic is nonlane based and chaotic. It needs a traffic control solutions,which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. RFID is a wireless technology that uses radio frequency Electromagnetic energy to carry information between the RFID tag and RFID reader. Some IV gives the implementation details of the proposed model. Section V presents the enhancement RFID systems will only work within the range inches or centimeters, while others may work for 100 meters (300 feet) or more. A GSM modem is a specialized type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. AT commands are used to control modems. These commands come from Hayes commands that were used by the Hayes smart modems. The ZigBee operates at low-power and can

be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands (868 MHz in Europe, 915 MHz in USA and of this work. Australia, 2.4 GHz in rest of the world). Data transmission rates vary from 20 Kilobits/second¹ in the 868 MHz frequency band to 250Kilobits/second in the 2.4 GHz frequency band . The ZigBee uses 11 channels in case of 868/915 MHz radio frequency and 16 channels in case of 2.4 GHz radio frequency. It also uses 2 channel configuration CSMA/CA and slotted CSMA/CA .The whole paper is grouped into 5 parts. Sections II talks about the literature survey. Section III discusses about the current problems that exist in making way to an ambulance and other vehicles. It also talks of how the proposed model will overcome the problems faced in developing Countries as well as developed countries. Section.

2 PROPOSED SYSTEM

In proposed system if a vehicle has met accidents, immediately an alert message with the location coordinates is sent to the Control center. From the control center, a message is sent to the nearby ambulance. Also signal is transmitted to all the signals in between ambulance and vehicle location to provide RF communication between ambulance and traffic section. The vehicle accident observed using vibration sensor and in the control section it is received by the microcontroller and then the nearby ambulance is received from the PC and controller sends the message to the ambulance. The signal to Traffic signal section is transmitted through RF communication. Also if any fire occurs, it is detected using fire sensor and an alarm message is directly sent to the fire station.

^{1,2}Department of Electronic And Communication Engineering, James College of Engineering And Technology^{1,2}, Navalcaud , Nagarcoil, Tamilnadu ,India

3. BLOCK DIAGRAMS

A. Block Diagram Of Vehicle Unit

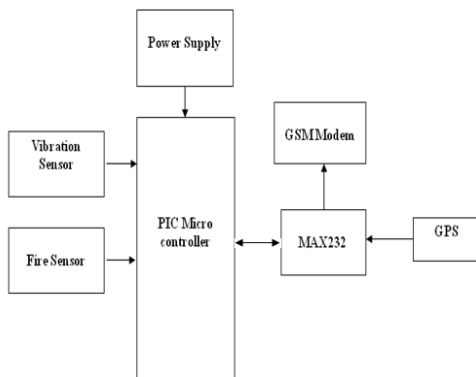


Fig.1 Block diagram of vehicle unit

If a vehicle has met accident, vibration sensor or fire sensor gives the electric signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to control section through GSM.

B. Block Diagram Of Ambulance/Control Unit

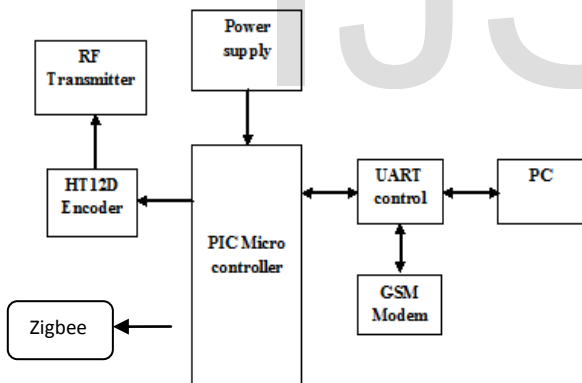


Fig.2 Block Diagram of Ambulance/Control Unit

In control section GSM modem receives message about accident and send it to PC. PC identifies the nearest ambulance and ambulance is instructed to pick up the patient. Control section transmits the control signal to all the signals in between ambulance and vehicle by RF transmission .

C. Block Diagram Of Traffic Unit

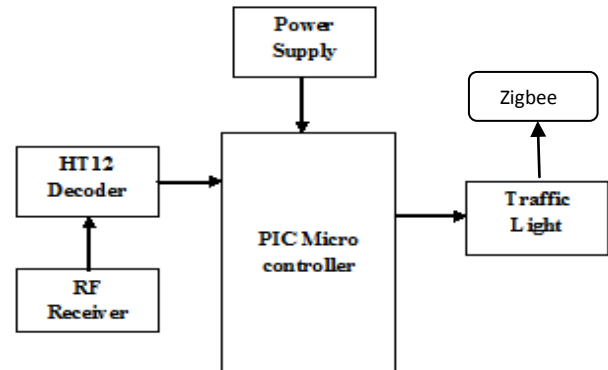


Fig.3 Block Diagram Of traffic unit

Whenever the ambulance reaches near to the traffic signal (approximately 100m), the traffic signal will be made to green through RF communication. Thereby the ambulance is recommended to reach the hospital in time.

4. SYSTEM IMPLEMENTATION

Our system consists of three main units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time lag. Thus our system is divided into following three units,

- The Vehicle Unit
- The Ambulance/control Unit
- Traffic unit

A. Vehicle unit

The vehicle unit installed in the vehicle senses the accident and sends the location of the accident to the controller. According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, controller, siren, a user interface, GPS system and a GSM module. The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is given to the controller GPS SYSTEM inside the vehicle. The GPS SYSTEM finds out the current position of the vehicle (latitude and the longitude) which is the location of the accident spot and gives that data to the GSM MODULE. The GSM MODULE sends this data to the control unit whose GSM number is already there in the module as an emergency number.

B. Ambulance unit

The controller finds the nearest ambulance to the accident spot and also the shortest path between the ambulance, accident spot and the nearest hospital. The controller then sends this path to the ambulance. Also using this information the controller controls all the traffic signals in the path of ambulance and makes it ready to provide free path to ambulance, which ensures that the ambulance reaches the hospital without delay. At the same time, the ambulance unit turns ON the RF transmitter. This will lead to communicate with the traffic section.

Components list

- PIC 16F77A
- GPS
- GSM
- Microcontroller
- RF Module

Software's used

- Proteus 6
- Keil Micro Vision 4
- MATLAB

5.OBJECTIVE

The main objective behind this is to minimize the time gap between the occurrence of accident and time required for ambulance to reach at the location of accident for giving treatment to the victim. When accident takes place lot of time is wasted for searching the location of accident, such a time our system work faster and avoid the loss of life due to time delay.

Our project based on four main modules:

1. Sensor
2. Controller
3. Police control room
4. Hospital
5. Ambulance

Sensor acts as a trigger that senses the location of the accident place and sends notification to the main controller. Controller is a database where information about the police control room then it sends response from sensor to control room with GPS location for tracing the location where accident has occurred. Then controller sends request to the hospital and when message is received at hospital the ambulance go to accident place .

6. WORKING

Vibration sensors detect the vibration of the ground soil in case of a debris flow. Prior to installing a vibration sensor, it is extremely important to determine what level of vibration is appropriate to activate the sensor in case of a debris flow. It is also important to keep in mind the risk of unintentional activation caused by earthquakes, as well as areas in which there is construction traffic and other vibration causes that may activate the sensor.

Microcontroller (PIC16F877A)

Peripheral Interface Control (PIC) 16F series has a lot of advantages as compared to other series. It executes each instruction in less than 200 nano seconds. It has 40 pins and has 8K program memory and 368 byte data memory. It is easy to store and send UINs. At the junction, it is easy to store large number of emergency vehicles. Before switching to green, it should satisfy all the conditions. Simple interrupt option gives the advantage like jump from one loop to another loop. It is easy to switch any time. It consumes less power and operates by vehicle battery itself without any extra hardware. The mobile phone attach to vehicle unit IP address is tracking to the police control room it is easily identify the accident spot.

7.ADVANTAGES

- Totally Advanced version of Ambulance.
- With the help of GPS we get the latitude and longitude of the detected position.
- We get exact location of the ambulance will reach there in few minutes.
- The ambulance would be able to cross the traffic junction without waiting.

8.APPLICATION

- Anti-theft system
- Crash recorders
- Dead reckoning
- Bio medical application

9. 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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