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Smart Traffic System for Emergency Vehicle

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Abstract

The traffic of vehicles in India is increasing drastically. This is creating traffic jams everywhere and leaving no place to pass. India is a country where development is in process, in most of the crossroads there is no flyovers and due to increase in population the traffic is increasing. This increased traffic makes jams on the crossroads as well as on the busy streets of any market. The roads are overcrowded by peoples and vehicles so it is required to reduce. There is a Transmitter in the ambulance which transmits the EM signal and a Receiver on the rest of the vehicles. The Received signal is then activating the system which gives indication and message to pull the car side and give pass to the ambulance. This message will work as a proof and due to this everyone will follow the rule. We can use either Bluetooth, wi-fi or ZIGBEE for receiving and transmission.

Key Words: e-yantra module, Microcontroller (at mega 2560), Zig-bee module, Atmel studio, Proteus

Introduction

According to the past news and research it comes to know about the death rate of people due to traffic jams. The ambulance reach hospital very late due to increase in traffic which is again a huge disadvantage for a smart city. Our objective is to reduce the road traffic by using ad hoc and GPS technology and some of the part is of embedded system. The ambulance will spread the message in every nearby vehicles and on other hand the predefined path will keep the traffic open and clear. Along with it we can control traffic light from 1 km using RFID. With this all the traffic light within the path of ambulance will give a green signal. Till ambulance/emergency vehicle passes through the signal, the signal will be green and after it will turn normal.

We will also allot a separate lane, right lane for emergency vehicle. The lane will be a multipurpose lane, i.e. it would be used for the normal traffic movement and also for movement of emergency vehicle, we will just change the lane to emergency vehicle lane only when the emergency vehicle is 1 km away. This will give chance to normal traffic to switch the lane and free the right lane. This can again be implemented through RFID sensors and warning LEDs.

Literature Survey

Michael G. Leanne, of Monash University Accident Research Centre, in his research studied the effects of an advance warning device (AWD) on the safety of driver interactions with emergency vehicles (EVs). The AWD provides advance warning of an approaching EV to the drivers via visual and auditory warnings when the EV was within a 300m to 400m radius. He limited this research only to driving simulator devices. The experiment was a success but not feasible for a heavy traffic like we have in our country (India).

IBM purposed a system that is designed to control the traffic signals along the emergency vehicle's travel path. This is achieved remotely by a Traffic Management Server (TMS). This server is centrally located on the cloud, powered by IBM Bluemix and all the communication between TMS with the emergency vehicle and traffic signals happen through PubNub's Realtime Data Stream Network. The idea of doing traffic management by using server is good but a little costly.

Problem Statement

The fast and hindrance free movement of emergency vehicles is a big challenge everywhere and specially in India this field is still untouched. Recently we have seen the formation of green corridor for vital organ transportation in Bengaluru but that require a huge man power and normal traffic suffered heavily. What we are going to do is to improve the problems faced

by emergency vehicle on the road by traffic management.

Hardware Requirement

a) RFID
b) ZIGBEE for wireless connection with the vehicles
c) Microcontroller
d) A.V warning systems

Software Requirements

a) Atmel studio for embedded programming.
b) GPS and google maps for finding shortest path
c) Proteus for simulation

Implementation

According to the result of google maps application we will check the shortest route with less traffic. We will install a sensor (RFID) 1000m before every traffic signal and the other crowded places which will detect the EVs (emergency vehicles). Whenever the RFID detects the EV it will send a feedback to the zigbee. The range of zigbee is up to 1000m so two zigbees can easily cover the track of 1500m. average traffic jam length is approximately to the distance of 250 to 500 meters. We mount the zigbee on the firebird V robot. The firebird V will move on its track and will connect one by one to every vehicle in its range and will send a warning message to pull the car on the left lane. Whichever car violates the law will be charge a punishable fine. The message will work as a proof so that no one can over pass the law.
Another part of this project is to automatically use the traffic light whenever any EV is detected by the RFID sensor. When the EV passes the sensor, the sensor will send the feedback to the traffic light and request to turn the light green. In case the two or more emergency vehicles approaches towards the junction or crossing the FIFO based order shall be followed. We will also highlight a part of the lane with red lights so that it can warn the other drivers.
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Steps of the Project

Detecting the EV (emergency vehicle) using RFID: The RFID is part of group of technologies referred as AIDC (automatic identification and data capture). RFID utilizes the radio frequency waves to an accomplish AIDC. The frequency we will use is the ultra-high frequency and the range will be up to 10 meters.
The RFID consists of two parts

1. RFID RECIVER
2. RFID TAG

RFID tag can be active or passive. The passive is powered by radio waves that are sent by the receiver while active have their own power supply. RFID tag contain the integrated circuit and an antenna, which will transmit data to the RFID receiver/reader which will covert radio wave to data. information collected can be then sent to database and used.

ZigBee: This device can transmit data over long distance. ZigBee will transmit the data to the vehicles. ZigBee will scan for the devices and then make a personal area network. It will pair with the discovered networks and pass on the message to the vehicles. Mounting the ZigBee on a conveyer belt will help to communicate with those vehicles who are out of range.

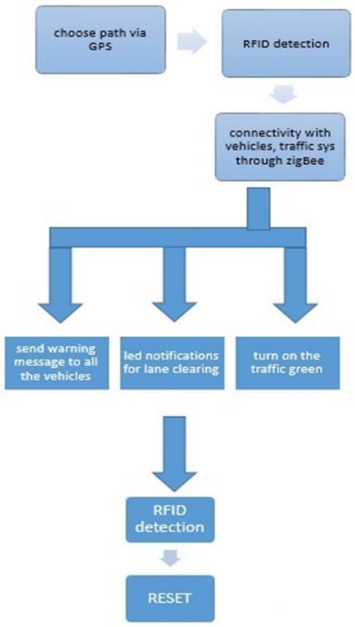

Fig 1: Block Diagram of SMART TRAFFIC SYSTEM FOR EMERGENCY VEHICLE

FISIBILITY

The number of users connected in one time is less but the moving transmitter will one by one connect to a group of vehicles and then after the work is done it will move ahead and connects with other group of vehicles. So there is no issue in communication with every vehicle.

Since we are proposing this in a smart city this means the roads will get wide, this will make the task of pulling the vehicle to the left side easier. So that we can use one lane for emergency.

Previously the implementation was done but it only turns the traffic light green. We are using GPS and google maps to find the path of EV so that no other route will compromise. The project is a medium cost project but we can lower the cost by placing the communication part in a different way. The manpower is less, all the process are automatic.

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