Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection

Abstract:

This paper presents an intelligent traffic control system to pass emergency vehicles smoothly. Each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. We use RFID reader, NSK EDK-125–TTL, and PIC16F877A system-on-chip to read the RFID tags attached to the vehicle. It counts number of vehicles that passes on a particular path during a specified duration. It also determines the network congestion, and hence the green light duration for that path. If the RFID-tag-read belongs to the stolen vehicle, then a message is sent using GSM SIM300 to the police control room. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light. This module uses ZigBee modules on CC2500 and PIC16F877A system-on-chip for wireless communications between the ambulance and traffic controller.

Existing system:

In existing system a RFID and GPS based automatic lane clearance system for ambulance is developed. The focus of this work is to reduce the delay in arrival of
the ambulance to the hospital by automatically clearing the lane, in which, ambulance is travelling, before it reaches the traffic signal. The communication between the ambulance and traffic signal post is done through the transceivers and GPS. The system is fully automated and requires no human intervention at the traffic junctions.

**Disadvantage:**

- The disadvantage of this system is it needs all the information about the starting point, end point of the travel.
- It may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance.

**Block Diagram:**
Proposed system:
It mainly consists of three parts. First part contains automatic signal control system. Here, each vehicle is equipped with an RFID tag. When it comes in the range of RFID reader, it will send the signal to the RFID reader. The RFID reader will track how many vehicles have passed through for a specific period and determine the congestion volume. Accordingly, it sets the green light duration for that path. Second part is for the emergency vehicle clearance. Here, each emergency vehicle contains ZigBee transmitter module and the ZigBee receiver will be implemented at the traffic junction. The buzzer will be switched ON when
The vehicle is used for emergency purpose. This will send the signal through the ZigBee transmitter to the ZigBee receiver. It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the ZigBee signal and the traffic light is turned to red. The third part is responsible for stolen vehicle detection. Here, when the RFID reader reads the RFID tag, it compares it to the list of stolen RFIDs. If a match is found, it sends SMS to the police control room and changes the traffic light to red, so that the vehicle is made to stop in the traffic junction and local police can take appropriate action.

Advantages:

- These 3 parts are available as convenient modules in the market and easily connectable to MCU.
- The critical levels of the traffic jam have been indicated through alerting unit.
- The system successfully detected the primary appearances of emergency vehicles.

Conclusion:

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. As the entire system is automated, it requires very less human intervention. With stolen vehicle detection,
the signal automatically turns to red, so that the police officer can take appropriate action, if he/she is present at the junction. Also SMS will be sent so that they can prepare to catch the stolen vehicle at the next possible junctions. Emergency vehicles like ambulance, fire trucks, need to reach their destinations at the earliest. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Further enhancements can be done to the prototype by testing it with longer range RFID readers. Also GPS can be placed into the stolen vehicle detection module, so that the exact location of stolen vehicle is known. Currently, we have implemented system by considering one road of the traffic junction. It can be improved by extending to all the roads in a multi-road junction.

Reference:


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