

Discerning Gridlock Avoidance and Consent for Emergency Vehicles besides Pothole Detection

Yuvaraju.M¹, Abirami. T²

¹Assistant Professor, Dept. of EEE, Anna University Regional Campus, Coimbatore, Tamil Nadu, India
rajaucbe@gmail.com

²Pg Scholar, Dept. of EEE Anna University Regional Campus, Coimbatore, Tamil Nadu, India
abiramitharmavel92@gmail.com

Abstract-Traffic management has become a challenging task in the urbanized cities and also Indian roads claim the maximum lives due to the improper guidance of the traffic and the bad road conditions. This paper presents a intelligent gridlock clearance system along with the system that detects potholes and humps which has also become a reason for accidents. RFID is placed at a strategic location in every vehicle along with a PIC microcontroller. Traffic signals accomplished with the RFID reader and GSM helps in immediate motion of those vehicles in traffic signals, without any blockage of those vehicles. Besides the RFID reader and receives the vehicles possess ultrasonic sensors which detects potholes and humps in road conditions can be avoided. The vehicles which are stolen can be recognized by the RFID which is placed in the vehicle at a strategic location if the vehicle passes through the traffic signal in roads.

Keywords: RFID, PIC 16F877A, gridlock, emergency vehicles.

1. INTRODUCTION

The most populous country and one of the fast growing economies in the world is India, which has a gigantic network of roads which are the dominant means of transportation in the country. Road transport system serves the function of carrying people and goods around the city, which resembles blood vessels circulating nutrients to feed human body. Besides the large number of vehicles running on roads, blockage of traffic in local areas is customarily caused by various activities competing for the use of road space. Unplanned traffic, adverse public transport infrastructure, migration and rapid legal sophistication makes the metropolitan areas in India as the worst traffic hit cities in the world. Traffic management is an extremely high challenging task and traffic is controlled

by the traffic lights. These signaling devices are located in the intersection points of roads. These lights are operated based on the predefined fixed timing. But the average number of vehicles passing through a lane might differ sometimes and moreover the vehicles may be locked by the red signal for few minutes even though there is not much traffic. This is a waste of time for the people in those vehicles. The bad road conditions leads to many accidents. Overloading in roads, awful construction of roads and heavy rain fall causes potholes and humps.

2. RELATED WORKS

Congestion on roads leads to slow movement of vehicles which proportionally increases the travel to reach the destination. Still camera placed in the traffic signals captures consecutive images periodically (1 or 2 sec). Emergency vehicles can be easily categorized by the edge detection technique. LABVIEW helps in converting AVI file as a series of JPEG images. This makes the particular signal as green and turns the remaining signals as red. Despite of the advanced techniques, there is no discussion about the signal if it is already red when the emergency vehicle arrives at that particular junction. In addition to that there is no information about the communication between the emergency vehicles and the traffic signals [16]. Every traffic intersection contains 8 RFID readers. The Vehicle Identification Number which is unique is assigned to all the vehicles. This VIN provides the details of the priority of the vehicles and the type of the vehicle. VIN has three sections in which each section provides information about the priority of the vehicles, type of the vehicle and the vehicle number respectively. The vehicles are categorized into four. Ambulance, fire brigade vehicles and the VIP vehicles are grouped as one category and are assigned with the highest priority. School buses, college buses and other buses are assigned with the second highest priority.

Whereas the third category includes vehicles such as cars, motor cycles etc. The heavy vehicles are assigned with the lowest priority. The traffic light controller uses the method of round robin sequence of the lights until an emergency vehicle is detected at the junction. The presence of an emergency vehicle makes the lights to turn to green if they are red [9]. But the system mainly focuses on the clearance of way to the emergency vehicles and the VIP vehicles.

The lane clearance for ambulance includes two units namely Ambulance clearance and the Junction unit. Ambulance unit comprises RFID reader, microcontroller interfaced with a transceiver. Similarly the junction unit interfaces the microcontroller with the transceiver. The received signal from the ambulance unit and the specific co-ordinate points which are already programmed, allows the traffic light in that particular lane to be green and simultaneously LCD indicates the arrival of the ambulance to the motorists in that lane. The limitation of this system is that the government ambulances does not have specific regular place from where they leave to pick the patients [11]. The vehicles are equipped with the RFID tag and the microcontroller. The communication is proceeded through the serial communication bus, UART [3]. Access points stores details about the pothole, gets the feedback from the vehicles, updates information in the database and simultaneously broadcasts the information to other vehicles. The mobile mode in the vehicles, senses potholes, if there is no prior information about that particular pothole. In turn this updates the database about the newly located pothole. But the system does not have any measures to locate the humps along with the potholes [1]. The pothole detection is carried over by the laser detector along with transmitting device to the vehicles under carriage [14]. The visual data which has been collected by the optical device identifies the presence of potholes. The optical device comprises light/optical part; video part and GPS control/total control part. The image processing technique called Gaussian Blur has been used to simplify the image. Since the pothole detection is based on the video data, the acquisition of clear data is challenging in the time of snow or fog [15].

3. PROPOSED WORK

From the above section, it can be noted that the existing technologies though manages traffic in many way, they are insufficient to take over the problems of congestion control, detection of stolen vehicle, paving way for the emergency vehicles and pothole detection. To overcome the above problems mentioned in the previous section, the proposed system handles traffic management, emergency

vehicle clearance and stolen vehicle detection along with the pothole detection. The proposed system comprises of three units namely Traffic junction unit, Ambulance unit and Vehicle unit. The RFID reader, RF receiver are interfaced with the microcontroller. Every individual vehicle is equipped with a RFID tag which has a unique number. The vehicles when come into the range of the RFID reader, RFID tag sends a signal to the RFID reader.

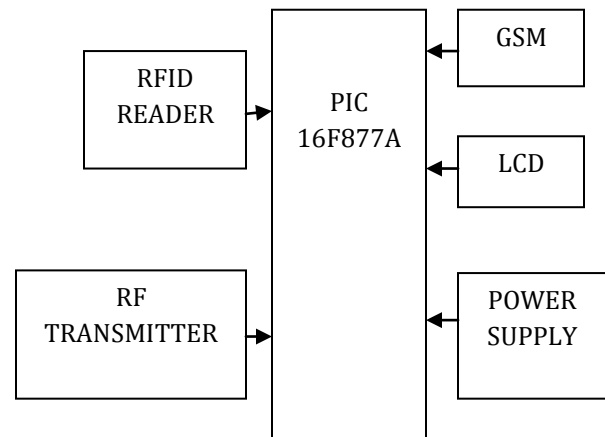


Fig-1: Block diagram of Traffic Control Section

Thus the number of vehicles that are crossing that particular RFID reader helps in determining the congestion volume in that lane. Depending upon the congestion volume, the traffic lights are turned ON.

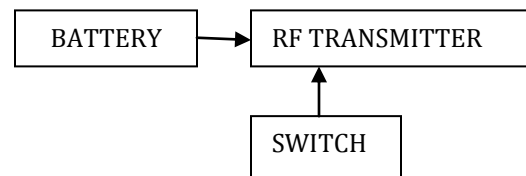


Fig-2: Block Diagram of Emergency Vehicle Section

Emergency vehicle clearance unit includes the RF transmitter. When the emergency vehicle starts in a need to reach the destination earlier, the switch which has been connected to the RF transmitter is turned ON which in turn makes the RF transmitter to send a signal to the RF receiver at the traffic junction.

