IMPLEMENTATION OF RFID TECHNOLOGY FOR CONTROLLING CITY TRAFFIC AND IDENTIFICATION OF VEHICLE EMISSION

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Abstract- Traffic congestion and vehicle emission disorder in the cities is a common scenario in most of the traffic junction points that leads to disturbances, i.e., i) increased air pollution, ii) de prioritized vehicle movements like ambulances, iii) delay in toll collections, etc. Here the challenge is to identify the traffic density, vehicle emission quantity and road clearance to the prioritized vehicle to move in the required direction using automated traffic signal control. Based on the above challenges the main objectives of the project is To design a framework for a dynamic and automatic traffic light control system for the clearance of critical vehicles (like ambulance, etc) using RFID technology and develop a prototype system using sensors and embedded computing devices. To develop a mobile application for the inspection and notification of the data received from the Radio frequency identification (RFID) based embedded system attached to the vehicle to collect and transmit emission information. This application is also extended to collect the toll charges automatically at a particular junction point. Prototype of the system is developed to demonstrate the working principles mentioned in the proposed model and verified for all the functionalities.

Keywords- Radio frequency identification, Traffic Congestion, Vehicle Emission, Toll Checking.

I. INTRODUCTION

Indian metropolitan cities are always crowded with traffic. Here the challenge in these cities is to identify the traffic density, vehicle emission quantity and road clearance to the prioritized vehicle.

A. Traffic Density And Monitoring

The aim of the project is to solve traffic congestion. To solve this problem, we have designed prototype module for a dynamic and automatic traffic light control system using RFID technology.

B. Emission Identification And Notification

Though there have been lots of standards set to reduce vehicular gas emissions all over the world, deploying them has practical problems. Here a Emission identification and notification system is proposed. In this system, Radio frequency identification (RFID) technology and wireless communication method (RF) is adopted to collect and transmit emissions information of vehicles. So we need to install RF devices at the traffic lights so that reliable reading of emissions signals from a vehicle can be interrogated when the vehicles stop in front of the red light.

II. LITERATURE REVIEW

Several technologies have been proposed for congestion detection such as inductive loop, magnetometer, visual camera, radar etc. While inductive loops that can be placed on the roadbed work at
all traffic speeds and are effective at estimating traffic speeds, they have a few drawbacks like their maintenance and installation is quite difficult. Apart from this, they are susceptible to high error rate in detection and transmission of traffic information. Conventional traffic signals: The traffic signals that have been programmed are programmed with a fixed timer. Hence they do not consider the volume of the traffic on the street before taking a decision of green or red light. Hence if the volume of traffic is large, it may result in accumulation of traffic on the street and the junctions. Radars have also been widely used for this purpose. Basically radars detect the signals from the moving traffic and estimate the number of cars crossing it. From this data, approximately the volume of the vehicles on the street can be found out. There is a central processing unit which gives this data to the traffic signal which changes the interval of the red and green light appropriately. However the disadvantages of the radar are that they are very expensive and also there can be a problem of interference with other signals in the atmosphere. Also it becomes difficult for the radar to detect the signals from the cars which overlap (as in, are at the same position in parallel lanes). Another technology used in this field is a magnetometer. Magnetometer works on the same principle as radar and has almost the same disadvantages and advantages of radar. The detection principle used by a magnetometer is as that it detects the change in the earth’s magnetic field when a magnetic object like a car crosses it. There are many other traffic management systems which exist and have their own advantages and disadvantages. Each system can be very effective in some circumstances and not in others. Hence, even though so may systems exist we propose one more system which is discussed in the paper which has many other advantages apart from just traffic management.

III. PROPOSED PARADIGM

![Fig.1: Block diagram of Automatic Density Control System](image-url)
The sensed data is polled by the microcontroller and the decision making is done by the microcontroller. The sensed data is displayed on the LCD.

IV. WORKING

A. Traffic Density Monitoring and Signaling
Consider a traffic junction where three lights (green, yellow and red) are arranged. We have a pair of IR sensor and RFID reader across each road. When the vehicle crosses IR sensor the adjacent RFID reader connected to it will be activated and it starts counting the vehicles from that lane. Depending on the above process a digital data is sent to microcontroller whether it’s low or high and the microcontroller will allot the time for the traffic to pass on. For high density traffic there will be more allotment of time and for low density low time respectively. Program written to the microcontroller will make it to do the operation.

When the ambulance or police vehicle or fire engines comes in emergency then its RFID-TAG is sensed and priority is given to that road and its signal will be switched on to green for until the ambulance passes the signal. If two ambulance comes from other roads then priority is given to that ambulance based on, which is first sensed by the RFID reader near the signal.

Here we are considering fourth road as a TOLL. In order to achieve free moving of vehicles near toll gate, we are using RFID technology to automatically deduct amount from respective cards and sms will be sent to the registered mobile number.

B. Emission Identification and Notification
Each moving vehicle is embedded with a smoke sensor (CO and CO2), RFID TAG and a RF transmitter. The Sensor data is continuously received by the RF receiver interfaced to the microcontroller in the main unit. The main unit has RF Receiver, RFID Reader, Display, all interfaced to a Microcontroller. The sensor data is processed and compared with threshold data to check the fuel emission limit. If the limit in exceeded corresponding vehicle’s information is sent to the registered mobile number.
Flow chart:
IV. RESULTS

![Image of a traffic simulation showing signal light changes based on current vehicle traffic.](image)

*Fig.3 - Signal light is changing based on current vehicle traffic.*

![Image of a smartphone screen showing a TOLL alert message.](image)

*Fig.4 - Alert sms is sent to the registered mobile number.*

V. CONCLUSION

Using the method of density based control of traffic, we can save a considerable amount of time and also we can prevent excessive traffic jams thus leading to smooth traffic flow. Automatically amount will be deducted amount from respective cards at the TOLL and sms will be sent to the registered mobile number. WINS system will help to control the emission.

VI. ACKNOWLEDGMENT

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