Smart Interceptors

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Abstract:
Traffic congestion issues have always been a problem in the transportation sector. In the present scenario, there is a need for an automated system that does multitasking in solving issues such as signal breaking avoidance, vehicle theft detection, and validation of expired documents. Manual methods are insignificant to penalize people for the blunder they have committed since they are so smart nowadays that they try to escape from the Police. Vehicle theft has increased exponentially which should be tracked and prevented. This proposed system depicts to solve issues in a comprehensive manner which can be a reliable, accurate method when compared to manual methods.

Keywords: Microcontroller P8V9V51RD2, Global System Monitoring (GSM), Global Positioning System(GPS), RFID, Kiel Software, Android Application.

I. INTRODUCTION

Developing countries like India needs a significant improvement in the transportation sector. India has the second-largest road network in the world comprising national highways, state highways, district, rural, and village roads. In this vibrant country, as the population is increasing day by day the number of vehicles is also increasing which leads to the number of traffic congestions due to which it has become a tedious job for RTO, police department to keep a track of each vehicle violating certain traffic rules manually and also these days, recovery of the stolen vehicle has proved to be the biggest challenge to RTO. Hence we need a technical method to avoid certain traffic congestions like signal breaking avoidance, validation of expired documents along with vehicle theft detection.

II. LITERATURE SURVEY

In [1] they have proposed a system that will monitor the traffic and vehicle data logger using RFID, GSM. A system utilizes adaptable components along with RFID transponders placed in the signal module where the GSM is used to inform the owner of the vehicle regarding the violations and instant deduction of the penalty amount is done. The disadvantage of the system is that the dynamic road section for estimation of unknown traffic was not proposed.

In [2] they have proposed a smart display controller using Micro Electro Mechanical Systems (MEMS) that is designed in such a way that it will suit the car's dashboard which will alert the driver of a future crash if it is encountered and warns the driver to limit his speed. The limitation of the system is that the success ratio was not as expected when implemented in real-time.

In [3] they have proposed a system a smart system that will detect vehicle theft using IOT and Wi-Fi, additionally enhancing vehicle security. An alert message is sent when the vehicle is stolen using IOT. The main disadvantage of the system is that the network speed is unpredictable in Wi-Fi and also the Arduino used cannot withstand higher loads leading to the spoilage of the demonstration.

In [4] it describes vehicle theft security using ZigBee technology. ZigBee is the most commonly used wireless communication system having less power and a low data rate. The main disadvantage of this system is if the ZigBee technology fails reinstallation is costly and the ZigBee is not secure, compared to Wi-Fi based system [3].

In [5] an antitheft system is used to cut off the fuel supply for the engine from the carburetor, GSM system, buzzer & GPS, 0SIM 808 modules, ATMega328 microcontroller are used in this system. The implementation drawback of this system is that the owner will cut down the ignition spark plug with the help of the relay after he finds a threat through SMS.

In [6] when an individual pass through the highway or traffic signal the images of the number plate are taken using the camera fixed at the signal module and the images are validated using image processing technique which will compare with the database and verifies if any pending penalty has to be paid or not. The limitation of the system is that the resolution of the images is low and also due to weather conditions the spoilage of the camera may occur. From the above survey conducted we can depict the outcome as:

- There is no comprehensive traffic management system that plays a vital role in building a mechanism for doing multiple task at a time.
- From the survey we have come to know that they have proposed many methodologies for smart traffic management.

III.METHODOLOGY

Normally, there are traffic signal lights programmed for particular time intervals. When the traffic signal is RED, and somebody tries to ignore the signal the card sensors are activated during the RED signal and the number gets registered in the NXP IC(MAX232) when the RFID tag is scanned and a message is sent to the control room. An immediate fining is done on spot who tries to ignore the traffic signal and the amount is deducted from their account. Along with this if any theft vehicles cross the traffic signal an immediate alert is sent to the police station later they can even
track the exact location of the vehicle using the theft tracking application and also an automatic deduction of the amount for those carrying expired documents can be detected when they cross along with the traffic signal.

The proposed methodology consists of two modules as follows:
1. Car module: This module consists of three unique RFID tags which serve the purpose of different objectives as proposed in this paper.
2. Signal module: This module consists of the microcontroller, RFID reader, LCD display, RED and GREEN LED, Relay, Buzzer, and GSM modem.

IV. WORKING

The proposed project is designed using an embedded technology along with Global Positioning System (GPS) and Global System for Mobile Communication (GSM). In this project, the P89V51RD2 microcontroller is used for interfacing the various hardware peripherals (car module and signal module). The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so a P89V51RD2 microcontroller is interfaced serially to a GSM Modem and GPS Receiver.

A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GSM modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. The hardware interfaces of the microcontroller are LCD, GSM modem, and GPS Receiver.

The design uses the RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels.

When the request by the user is sent to the number at the modem, the system automatically sends a return reply to that mobile indicating the position of the vehicle. If any vehicle violates the traffic rules like ignoring the traffic signal and not updating the documents, then the reader will read the data from the database and deduct the penalty amount automatically from the account and send the message to the user.

V. DESIGN FLOWCHART

Here the flowchart for implementation is designed using Kiel software to interface hardware and software. We have written the code using Embedded C language.

VI. RESULT

The below figures indicate the result obtained which indicates the message been sent to a particular user depicting the penalty for the violation been committed through GSM.
a) Signal breaking avoidance

Figure 4. Message sent to the user for violating traffic signal through GSM

b) Validation of expired documents

Figure 5. Message sent to the user indicating he/she has expired documents through GSM

c) Vehicle Theft Detection

Figure 6. Message sent to the owner indicating theft vehicle detected through GSM

The below Figure 7 and Figure 8 are the two android applications developed for this project. Figure 9 represents the latitude and longitude of the vehicle sent to the owner through SMS and Figure 10 represents the tracking of exact location of the vehicle.

VII. CONCLUSION

This project gives the basic idea of how traffic congestion problems along with vehicle theft detection can be done efficiently within a single module if it is implemented in real-time. Since our proposed module comprehensively depicts solving issues we can say that it can be a reliable, cost-effective, accurate system it is implemented in real-time by the idea suggested in this project.

VIII. REFERENCES


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