

DIGITALIZED VEHICLE IDENTIFICATION AND PAPERLESS DRIVERS

SARALA DEVI C S¹, SHARMILA G², TAMILARASI K³, IYSWARIYA A⁴

^{1,2,3}UG Scholar, Department of Electronics and Communication Engineering

⁴Assistant Professor, Department of Electronics and Communication Engineering
R.M.K Engineering College, Chennai, India.

Abstract - With rising road traffic and increasing count of vehicles day by day it becomes highly difficult to ensure the authorization of vehicles and drivers on road. Only about 10% of the vehicle are checked and ensured authorization. This causes unwanted threats, accidents and no proper regulation of vehicles on road. On the other side public is highly uncomfortable in carrying all documents related to their vehicles and a lot of their time is getting wasted in proving their identity as the vehicle owner. Also, in this technical world where technology is growing up day by day and scientific researches are presenting a new era of discoveries, we need security in all the areas. As theft activities are increasing around, we have need of more security in Automobiles/Vehicles. The main aim of this system is to use wireless technology to intimate the owner of the vehicle about each unauthorized attempt of entry to his/her vehicle and to avoid drivers carrying documents by using a centralized data server to ensure vehicles authenticity. This project is further enhanced by IoT Technology which will also help to find the exact location of the vehicle. This information can then be sent to the owner and cop via SMS.

Key Words: Wireless Technology, Vehicle Authenticity, IoT, SMS, Theft Alert.

1. INTRODUCTION

With rising road traffic and increasing count of vehicles day by day it becomes highly difficult to ensure the authorization of vehicles and drivers on road. It is even evident from the fact that the number of motor vehicles outnumbers the number of licensed drivers. With this tremendous increase in vehicle count, there is also increase in crimes and illegal activities in which these vehicles are used as part of or full means for the crime, needless to mention the vast amount of smuggling activities done using illegal vehicles. On the other hand, manual checking of vehicle related documents and owner verification is done in our country to ensure the authenticity of vehicles. But this process involves much labor, time and requires drivers to carry a pile of documents every time during ride. Missing those documents will lead to undesirable outcomes and unwanted stress and work. Also increasing vehicle theft is also a area which needs attention. Increasing vehicle count and value has led to this. But only about 10-20% of vehicle theft cases are solved. Stolen vehicle remains unfound because they might have been taken to another geographical location or mostly might be dismantled to various parts and sold. It is highly difficult to

find the vehicle in either case. So, to solve all these problems we have proposed an idea in which a vehicle can be uniquely identified by a wireless transceiver along with all its details to verify its authenticity. This idea is clubbed with IoT which can send alert SMS to cops and owner on spotting or signs of dismantling any stolen vehicle.

2. LITERATURE SURVEY

i. "Automatic Vehicle Identification (AVI) using UHF RFID" By Chong hua Li

He has developed an automatic car identification system where a RFID tag is attached to the vehicle. There are two gates that the vehicle must pass through. On crossing the first gate the vehicle tag reader obtains the information from the vehicle tag and transmits the information to the control center. Then suitable command is given from the command center to AVI which may then release the vehicle through the second gate or may intercept.

ii. "Automatic Vehicle Identification System based on Barcode and Optical Scanner - By Myung Ryul Choi, Jin-Sung Park, Sang Sun Lee, Seung-Ho Tak

They developed an Automatic Vehicle Identification System in which an invisible barcode is present in the car windshield and upon crossing a junction it would be read by an optical scanner. The invisible barcode here could only reflect light rays of a frequency. By this barcode scanning algorithm, they have obtained the vehicle information.

iii. "Computer Vision Based Vehicle Detection for Toll Collection System Using Embedded Linux" By Mr.Abhijeet Suryatali Mr.V.B.Dharmadhikari.

They have developed a model in which vehicles are identified by their unique number plate which is obtained by taking image of the passing vehicle by camera and extracting the number plate details from the captured image using image processing. From the obtained vehicle details appropriate toll amount will be charged.

iv. "Kingshuk Mukherjee Anti-Theft Vehicle Tracking and Immobilization System" By Kingshuk Mukherjee

Here the author has developed a system in which the owner can aware of his/her vehicle location by sending an SMS 'TRACK' to the GSM positioned in the vehicle. Upon receiving

the message, Aurdino in the vehicle will get the live location from the GPS module and will send the location as SMS to the owner. If the owner is suspicious of any theft, then he can send a message 'IMMOBILIZE' which will again be interpreted by Aurdino and will cut off the vehicle fuel injection circuitry.

3. PROPOSED MODEL

Our idea implemented has 2 functions

One is to identify a vehicle on road using wireless transceivers positioned in the vehicles that sends all details like vehicle plate number, owner details etc. Another wireless transceiver will be positioned in public places like tolls, traffic junctions etc.

When a vehicle passes these transceivers receives the transmitted signal from the vehicle and decodes the information, then sends it to a microcontroller which then accesses a server giving it its details as input, the server connects to a centralized database and verifies several details like registration date, authorized owner, Place of registration, Authorized to drive in that state, whether proper documents such as Insurance, Registration Certificate(RC), Fitness Certificate(FC) is obtained and if obtained is renewal required. If any of these verifications failed, then it would consider the vehicle as unauthorized vehicle and sends an alert message, this alert message is displayed on the LCD provided on the vehicle crossing and if needed would trigger an alarm on severe cases.

4. FLOWCHART

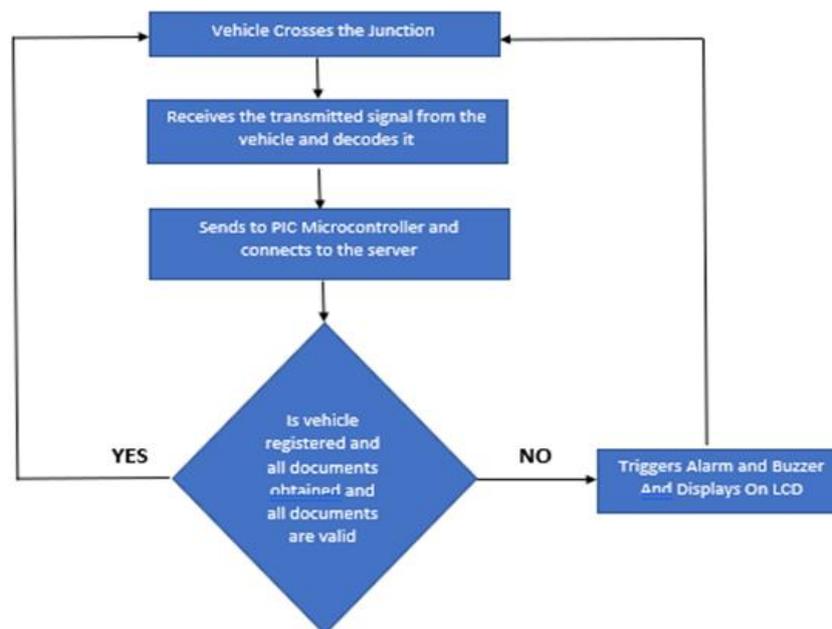


Fig -1: Flowchart – Vehicle Identification

Our motto here is also to spot any theft vehicles that travel on road. For this if any theft cases is filed against a vehicle then the database for that vehicle is updated stating that theft case is active along with the mobile number and name of the cop handling that case. On vehicle crossing the server also verifies whether any theft case against this vehicle is active, and if yes, it sends a message to the vehicle owner and the cop in charge that the vehicle is found crossing this spot along with IP address from where the vehicle data has been read. Based on the IP cop can easily track down the location where the vehicle is found, and an Alarm is also triggered to alert the nearby cops about this.

Considering the case where, when a vehicle is been stolen, there is a possibility where the thief may remove the transceiver from the vehicle to escape from the system identifying the vehicle and, he may dismantle the vehicle and sell it by parts. Our next function for this project addresses this use case. As specified earlier, a wireless transceiver is attached to the vehicle. Additionally, another wireless transceiver is located in the interior part of the vehicle like the engine. These both transceivers communicate continuously and could communicate in only certain distance of few centimeters indicating the presence of each other. When the thief tries to remove the transceiver either for the earlier or latter mentioned above cases, the interior transceiver ceases to detect the presence of the outer, the controller inside will understand it and will send a message to the vehicle owner along with the location obtained from the GPS module.

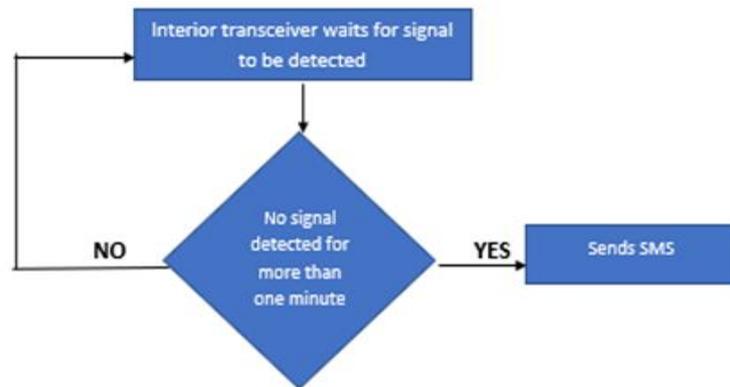


Fig -2: Vehicle Unit – Theft Prevention

5. DESIGN AND IMPLEMENTATION

- A. BLOCK DIAGRAMS
- B. HARDWARE IMPLEMENTATION
- C. SOFTWARE IMPLEMENTATION.
- D. RESULTS.

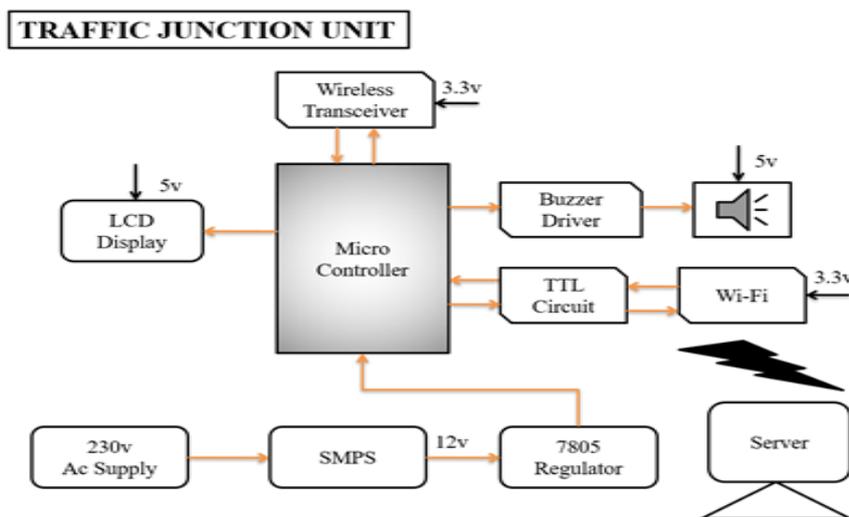


Fig -3 Block Diagram – Vehicle Identification

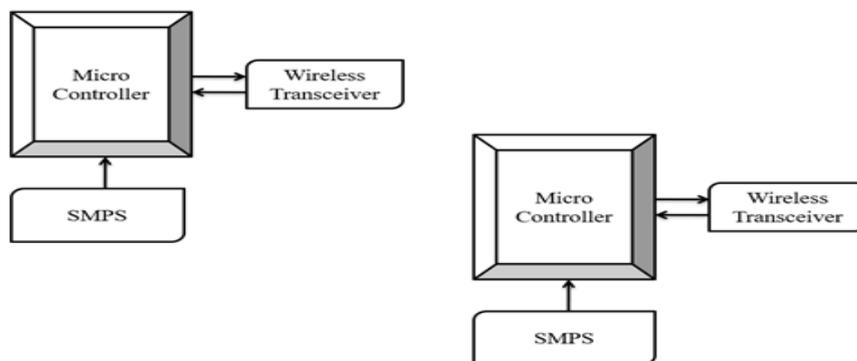


Fig -4 Block Diagram – Theft Prevention

B. HARDWARE IMPLEMENTATIONS

- 1) PIC MICROCONTROLLER
- 2) WIRELESS TRANSCEIVER
- 3) Wi-Fi ESP8266
- 4) GSM and GPS

1) PIC MICROCONTROLLER

PIC Micro Controllers are used for the implementation of this Project. PIC Micro Controller is suitable for this because of its variety of choices (8 bit or 32 bit), Affordability as it doesn't contribute much to a vehicles cost, smaller in size and low operating power. In this implementation the public junction is equipped with one micro controller which is interfaced with transceivers, LCD, Buzzers, WiFi.

Another 2 microcontrollers is present within the vehicle one exterior and the other interior. These are interfaces with a GPS and a GSM Module.

These micro controllers are used to process the information obtained from the receiver and retrieve information from the server or perform any possible action like displaying alert messages on LCD, triggering alarm, Or to send an SMS.

2) WIRELESS TRANSCEIVER

Wireless transceiver is the combination of a transmitter and receiver. Transmitters is programmed to transmit the vehicle related information on a specific frequency, On the other hand they should also transmit to the inner transceivers at regular time. So, to make this happen, the transceiver on the public junction will transmit a specific information like handshake to the vehicle that is crossing, if the vehicle detects this signal then it starts sending the vehicle related information or else it would communicate to the inner receiver. A Full Duplex wireless transceiver are used here as it should be able to transmit and receive at the same time.

3) Wi-Fi - ESP8266

Wi-Fi is used for the micro controller in the public junction to make access to the centralized server. UART serial connection is used to connect it to the existing microcontroller. ESP8266 is used here as it is highly const efficient and works with the power of 3.3V. Additionally when any theft vehicle is spotted the SMS is sent along with the IP of the vehicle. While each junction has varying IP's then it becomes easier to identify the location where the vehicle is been spotted.

4) GSM AND GPS MODULE.

GSM is used to communicate with the owner whenever required. GSM technology has advanced to a high extent that

GSM network is available almost everywhere and so using GSM mode of communication is preferred here. Here GSM TTL SIM900A module is used. This is connected only to the interior microcontroller of the vehicle as only it is responsible for sending SMS.

The GSM modem is used for communicating with the car whenever required. With the advancement in GSM technology, there is now GSM network availability almost everywhere. Because of the ubiquitous nature of the GSM network, it has been chosen as the communication medium. Among the available options for the modem, the GSM TTL SIM900A modem based on the SIM900A module has been used here.

GPS modem is used to find the exact coordinates of the vehicle. This also is interfaces with the interior micro controller. GPS responds with a location whenever the controller asks for it.

C. SOFTWARE IMPLEMENTATIONS.

The software modules cover the code dumped into the micro controller and the server and database connections and operations.

The code dumped into the micro controller runs in an infinite loop and it will go as follows.

In public junction:

1. IF INPUT DETECTED FROM RECEIVER.

- Decode the information.
- Establish connection with the server with suitable inputs

2. CHECK IF THE RESPONSE OF THE SERVER IS A SUCCESS MESSAGE

- If yes display Success.
- Else display the error message
- Trigger the Alarm

In Vehicle unit.

1) CHECK IF SIGNAL FROM PUBLIC JUNCTION IS DETECTED.

- If yes transmit vehicle information else transmit handshake signal.

2) CHECK IF SIGNAL RECEIVED FROM THE OUTER MICRO CONTROLLER

- If no, Obtain coordinates location from GPS.
- Send SMS to owner using GSM.

a) SQL

SQL is a language to operate databases; it includes database creation, deletion, fetching rows, modifying rows, etc. A centralized database is maintained to store all information of the vehicle that is registered in and out of the state. This database contains various data in terms of columns like registration date, authorized owner, Place of registration, authorized to drive in that state, whether proper documents such as Insurance, Registration Certificate (RC), Fitness Certificate (FC) is obtained and its expiry and issued dates. Along with that owner information and history of thefts and active theft cases against the vehicle and associated cop name and phone number.

Server queries the database whenever a vehicle passes using its unique information using Relational Database Management.

b) SERVER

Based on the request from the Wi-Fi powered micro controller, Server constructs a query to retrieve data about the vehicle. If no data is fetched or if any mandatory value is missing or found incorrect then it gives out suitable error messages.

D. RESULTS

This system is tested on several vehicles and everything seemed to work fine without any hinderance. The vehicle identification on the public junction took 20-30 seconds on an average, and proper result is displayed on the LCD within 1 minute of the vehicle arrival. Also, the vehicle theft alert system worked fine.

SMS is sent when a theft vehicle filed vehicle crosses the junction.

Figure 5 shows the SMS sent when theft vehicle is spotted.

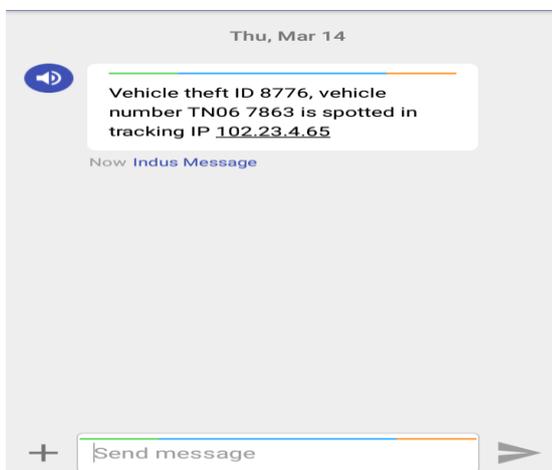


Fig -5: Result – Spotted Theft Vehicle

Also, SMS is also sent on removing the transceiver from the vehicle. The following figure shows SMS sent during theft.

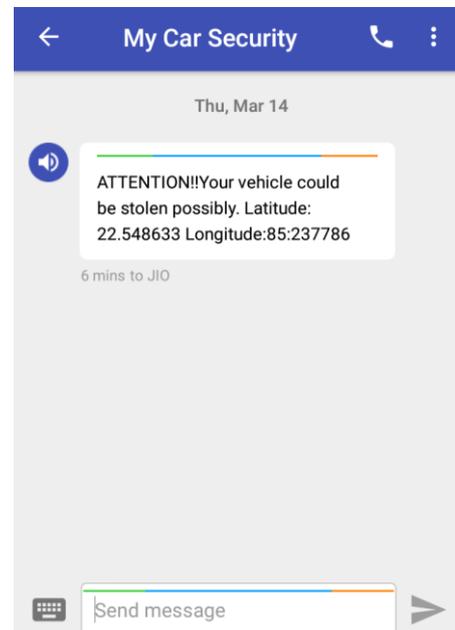


Fig -6: Result – Alert for Theft

6. CONCLUSION

With rapid growth of vehicle cost and count this system proposed high protection to vehicles and prevents theft related actions. Also, by this system drivers are relieved of their burden to carry documents wherever they travel, this also gives them an insight of renewing their document in proper dates without fail. Ample of time is saved both for the travelers and the police officers. This system reduces manual work and so it prevents cops from verifying each vehicle standing under hot sun. Also spotting and tracking theft vehicle has been made easy here. Due to this lot of illegal activities in the country can be controlled.

7. REFERENCES.

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