



Vehicle Theft Detection and Toll Collection System

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Abstract: Security is not the absence of danger but the presence of Technology. Vehicle robbery is trending upwards so, This proposed work aimed to design and develop a anti-theft system that involves Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technology in order to provide vehicle security. At the implementation of this system, when the vehicle is found to be robbed, the client receives a alert message along with the current location of the vehicle. So as the client can interact with the system by sending a stop message in order to stop the vehicle. Our next objective is to provide automated toll collection system which intern aid to achieve efficacious time utilization and simultaneous prevents traffic caused due to long queue at toll plaza using Radio Frequency Identification (RFID) technology. There by theft vehicles can also be detected using the concept of online toll payment. According to the parking law in India if the rules are violated we observe Regional Transport Office(RTO) lifts and takes off illegally parked vehicles. In order to overcome this, have included the concept where client receives the alert message as well as the current location. Vehicle loses power while driving so the self powering system is included which is beneficial to run further application like AC, radio etc... using Piezo electric plates.

Index Terms: GPS, GSM, RFID, RTO, Piezo Electric Plates.

I. INTRODUCTION

As per 2017 survey the total vehicles found to be registered is 29075605. India is likely to have 4 million vehicles by 2021. As the rate of vehicles climbed peak the problems regarding it also increased like robbery, pollution, time wastage, fuel wastage, power loss, accidents etc....

This proposed work is an attempt to overcome few of these problems like providing anti-theft system, automated toll collection system and self powering system.

These days vehicle robbery is the main concern, there are many systems like burglar alarm, automotive system is implemented using embedded systems, RFID tag and biometric identifications etc... The proposed system is more beneficial and advanced comparably This is to prevent theft in order to provide vehicle security [1].

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According to survey annual toll collection was 1500crores/year however at present, only 1200 crores/year of the toll value is being collected. The loss of 300 crores is due to human involvement. The key idea of this work is to automate the process of toll booths which is manual free. Moreover, the current toll plazas it requires more than 2 minutes for someone to complete the transaction process, but by automating it takes approximately 40-42 seconds or less for transaction [9]. This clearly shows the time consumption near toll booths can be reduced and fuel consumed while stopping and starting the vehicle again and again the vehicle also be reduced. We observed RTO picking up vehicle if it is illegally parked later the owner should enquire about the vehicle, find the vehicle and offence chick if there is any damages pay the respective fine. To get it back its a lengthy process to make it effortless the proposed system is helpful to overcome all the above problems.

II. LITERATURE SURVEY

1. IOT based vehicle theft detection

M. Poushya , K. Rupasri et.al [2018]

In the existing system ,the vehicle security is provided by sending an alert message when the vehicle is stolen using internet of things but the disadvantage of this system is it uses Wifi module whose network speed is not effective so as the cable network and the signal depends on the distance and the main drawback of the system is no further action taken to prevent the vehicle theft it only detects the theft.[1]

2. Automatic toll collection system using RFID

Satyasrikanth, Mahaveer Penna, Dileep Reddy Bolla et.al [2016]

This paper provides , the toll collection is automated using RFID technology with the help of sensor the with the help of sensor presence of vehicle is detected at toll booths as soon as sensor detects the vehicle, RFID circuit activates which in turn enables the RFID tag placed on the wind shield. The main disadvantage of this system is the distance between RFID tag and the reader is more. As the tag is placed on wind shield it gets ruined due to rainfall.[9]

3. Vehicle security system using Zigbee

N.M.Z Hashim , MH A Halim et.al

In this paper it describes vehicle theft security using zigbee technology. Zigbee is a wireless communication system which works on low power and low data. When the vehicle is stolen the buzzer activates through zigbee technology, if the buzzer fails alert message is sent to client using GSM module. The main disadvantage of this system is if the zigbee technology fails reinstallation is costly and the zigbee is not secure, compared to wifi based system.[13]

4. Power generation using piezoelectric materials

Nayan HR et.al [2016]

In the proposed work, the energy generated using piezo electric plate is stored in the battery and can be used for various application such as household, vehicles etc. It consists of high frequency response, it is simple to use because of their small dimension. The main advantage of this system is they are high temperature sensitive and the output varies according to the temperature and it is not suitable for measuring in static conditions[14]

5. Online payment of toll and tracking of theft using number plate image

Prathibha, Sahayee Deenu et.al

In this existing system the image sensor is used to the number plate, to verify whether the toll tax is priority paid by the client or not the main disadvantage of this system is most of the time low resolution pictures are captured by image sensors and once the toll tax is paid the amount will not be refunded. [5]

6. Power generation using piezo electric materials

Ratnesh srivastav, Navneet T et.al

In the given paper energy is generated from the vibration created while walking. This system can be used for large loads. The dimensions of this system are very small. The main disadvantage of the system is high impedance cables are needed since the operation of device is with small electrical charges and this is for electrical interface. this system is not applicable if the relative humidity is more than 85% and less than 35%. [15]



Fig 2: A person comes in contact with car

If the person tries to unlock the car using authenticated or unauthenticated key or any other metal as shown in Fig 3. Then Inductive type proximity sensor detects the presence of metal this is because proximity sensor itself has a tendency to emit electromagnetic beam when the metal is in contact with this vibrational oscillations are created which results in imbalance of output voltages this activates metal sensor hence sensor will intimate the Micro controller.



Fig 3: Authenticated key is used

In both the cases controller acts as intermediate between the sensor and GPS, GSM module on the activation of sensor the controller receives memory and sends the alert messages to register number of client through GSM. Here the exact location of the vehicle also been sent to the client which has been tracked by GPS module. This work involves another way of vehicle security using RFID technology near the toll plaza. When the toll collection system is automatic. This RFID technology is used to automatically recognize the tag attached to the object. RFID consists of three components in the combination of two. A trans-receiver and antenna whose combination is RFID reader. A transponder and antenna which is combined to form RFID tag both tag and reader acts as receiver and transmitter.

III. METHODOLOGY

Block Diagram

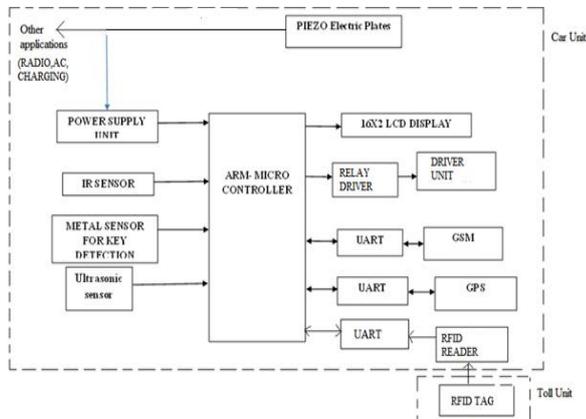


Fig 1: Block diagram of the vehicle anti theft and automatic toll collection system

B. Process Description

In this proposed work the anti-theft system works with the help of two sensor. Infrared ray sensor and Inductive type proximity sensor. Fig 1 represents the block diagram of anti theft and automatic toll collection system.

When the person comes in contact with the car, as shown in fig 2. The Infrared ray sensor will activate as it consists of emitter which simply an Infrared ray photodiode which acts as detector. The emitter continuously emits the radiation when these radiations falls on the person, these rays reflects back to the photodiode this causes proportional changes in resistance and output voltage thus the activated sensor will intimate the Microcontroller.



Fig 4: Toll collection system

Initially the reader emits radio signal which is received by the RFID tag, this RFID tag contain information which is electronically stored this information is sent back to the reader. The reader reads the information and every card consists of different data. Fig 4 shows the present toll booth. In this proposed work when the vehicle is theft the owner registers a complaint with unique.

RFID tag number at the RTO office and if the stolen vehicle passes by the toll plaza the tag fixed beneath the car is matched with the complaint registered unique ID which is read by RFID reader that is stored in the data base at the toll plazas then the stolen vehicle can be trapped.

As the title indicates the key theme of our project is to automate the toll collection. Automation means manual free operation this is also achieved by the RFID technology. RFID tag is placed beneath the car and reader on the speed breaker near the toll booth. When the vehicle with the tag cross the toll booth then the reader reads unique ID number then the toll tax will be automatically debited from the client account which is already linked to the ID number. This indeed helps in avoiding congestion and long queues at the toll booths which reduces time consumption.

Nowadays in metropolis cities the commonly found civil offense is parking violation. If the vehicles are parked in restricted areas then we get to see the RTO police who tows the vehicle this is shown in Fig 5 and then the fine which is thrice the parking charges should be paid.



Fig 5: RTO picking the vehicle

In order to overcome this paper proposes a system where ultrasonic sensor is used. The system sends the alert message to the registered phone number if the client's vehicle is towed. The mechanism behind this is ultrasonic sensor emits high frequency sound pulses at regular intervals. When these pulses strike on object then they reflects back, which itself measures the distance to the target when the distance increases then the reflection is broke. This intimates the controller and the location with alert message is sent to the client through GPS and GSM.

Power is required for all the above applications hence we included self-power system using piezoelectric plates. Whenever the force is exerted on series connected piezo electric plated which is placed inside the car where pressure is exerted this can be placed beneath the driver seat when the driver sits on the seat the pressure is applied this mechanical force is converted into the electrical energy which can be used for above applications such as charging the batteries and additional applications such as AC, heater, radio etc... Fig 6 shows the hardware of self powering system.



Fig 6: Piezoelectric plates

IV. RESULTS AND DISCUSSION

The below shown figures are the outcomes of the proposed work. Which includes anti theft and RFID based automatic toll collection system.

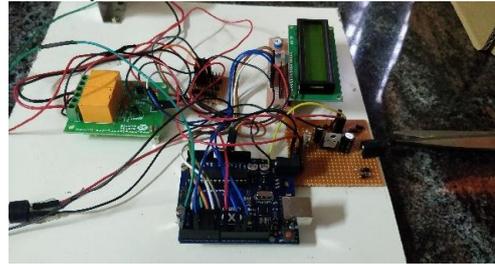


Fig 7: Toll unit

Fig 7 shows the hardware of toll unit. This system is basically to automate the toll collection process. Using RFID technology.



Fig 8: Vehicle unit

Fig 8 shows the hardware of vehicle unit. This includes anti theft system with infrared sensor, metal sensor and ultrasonic sensor.

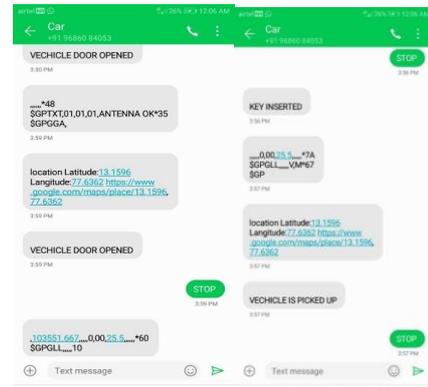


Fig 9: Message received from GSM module along with location

Fig 9 shows the alert messages received by the client from GSM and GPS. Whereas the client replies back to stop the vehicle.

A. Advantages

1. Labour cost is less.
2. Constant protection is provided to the vehicles.
3. The theft vehicle can be detected near the toll booth by registering a complaint.
4. The exact location of the vehicle can be tracked with the help of GPS module.
5. By manual free operation at toll booth the wastage of time and traffic can be prevented.
6. Life span of batteries can be improved by usage of self powering system.



B. Disadvantages

1. The implementation cost is high.
2. Piezo electric plates are high temperature sensitive.

C. Applications

1. Used in anti-theft system using GSM and GPS.
2. Detection of vehicle theft mechanism using Metal sensor.
3. Detecting the RTO police picking up the vehicle using ultrasonic sensor.
4. Used for Automated toll collection system.
5. Generating energy through piezo electric plates.

D. Future scope

This can also be used for non violation of traffic rules by providing speed calculators with RFID readers. Indeed police can easily catch a vehicle which exceeds the speed limit. This system can also be used for children tracking which is also a major concern nowadays. This can also be further developed by inter connecting a camera to a controller that takes photographs of the spot if there is any system GPS failure which makes things easier. System can be made much portable using Switched Multimega Bit Data Service (SMDS) and integrated circuits. Further the Mechanical and Electronics immobilization can be provided which includes wheel clamps, car boots etc....

V. CONCLUSION

Today the rate of vehicle theft is very high thus, with an increasing popularity the tracking of system is deployed. Vehicle theft although as intrusive as violent crimes causes greater loss to the country. Thus the proposed system provides vehicle safety and detects the theft efficiently and effectively. The intention of this framework is to provide the client with the real time information about the vehicle like the state of the vehicle and the location of the vehicle.

And the automatic toll collection system reduces the wastages of time and traffic congestion with the manual free operation at the toll booth which intern reduces the fuel consumption. With this we can trap the theft vehicle at the toll booth by registering a complaint. The power required for all this is provided with the self powering system. By proving a high security, far communication, manual fee operation and efficiency it is clear that the above proposed system is more efficient and effective than the manual system.

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