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A Survey on Vehicle Theft Detection Methods

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ABSTRACT: Smart road checking system is proposed to take of the manual road checking by the police. This system uses RFID tags and readers. As the vehicle moves through the RF Detector area, the RF Reader will read the vehicle UID by scanning the RF chip and the computing module will validate the vehicle CUID with pre-stored records and automatically sends the notification to the police records. Similar fashion of notification is maintained to track the stolen vehicle. So the department can take further actions on the system generated tracking of that vehicle. Once the registered vehicle is detected, that query related data will be discarded. For this purpose, as per the proposed system users have to register a report at police station. This will help police department to identify the stolen vehicle and to handover the vehicle to its owner safely, in minimum time.

KEYWORDS: RFID tag, RFID reader, Arduino microcontroller, Electric fuel injector circuit, Smart cart.

I. INTRODUCTION

With the increase in the number of vehicles on road, there has been a marked increase in the number of vehicle theft crimes [5]. In spite of several laws being in place and security measures taken by car manufacturers, thieves still find a way to remain one step ahead and vehicle theft is still among one of the most reported crimes worldwide [5]. Due to the expensive nature of motor vehicles, there is ample incentive for petty thieves to attempt thefts and a simple redecoration of the exterior makes it almost impossible to track the stolen vehicles. There are numerous technologies that can be used to prevent this. Use of microcontroller can be helpful. These can be used to fetch locations of the lost vehicle and capture the image of driver. Along with this, tracking of stolen vehicle and antitheft service can be provided. Proper GUI can be maintained for the ease of users. Automated number plate recognition system can also be used. It needs algorithms to identify the location of number plate from the frame and recognize the characters from it. There can be more efficient way for preventing vehicle from being stolen, by cutting the fuel supply to the engine and immobilising the vehicle. It can be done by using GSM based alert messages to immobilize and mobilize (as and when needed). GPS module will be the current location detector. This provides a reasonable protection against theft. Use of RFID can be a way to get real time traffic alerts. RFID tag and reader can be used to track every vehicle that passes on a particular path and can check for the RFID-tag –read belong to the stolen vehicle. RFID technology uses wireless propagation of electromagnetic wave signals over a certain frequency spectrum. They absorb enough electrical power for transmitting signals by harvesting RF power of receiver signals from their antenna that gets some energy from RFID reader or other sources. They are so tiny that can be used to place inside the vehicle.

II. RELATED WORK

Shruthi et al [4] discussed the system in which two microcontrollers are used one for sending the location co-ordinates and second for sending the mails.

The first microcontroller sends the co-ordinates through GSM module, once it receives the message "Locate" from the phone. The phone will receive the co-ordinates and its location can be displayed on the Google Map.

If the vehicle is moved from parked location "Vehicle Moved" message will be received. Then the second microcontroller will capture the image with camera fixed in the system and it will be mailed to the owner's mail id. If car owner verifies the unauthorised access "SOSALERT" message can be send by the owner to the system.

In response to that message the nearest police station will be sent message with vehicle details and the image captured.

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As the system captures the image and mails it to the car owner it becomes easy to find the thief and alert the police within a short time thus making it easy to track down the stolen vehicle. Whereas capturing the image and mailing it to the owner requires a fast internet connection, also the system uses GSM module that requires time to notify. Accessing the mail every time is not possible for the car owner. Moreover, the camera mounted in vehicle can be easily bypassed by removing it. Co-ordinates fetched are not always exact and the connectivity of the GSM is issue.

Kingshuk Mukherjee [5] proposed the system in which the vehicle location can be detected using the GPS module and if theft occurs vehicle can be immobilised by cutting down the supply of fuel using electric fuel injector, for transmitting the data GSM module is used.

When the owner wants to track the vehicle location, he can simply obtain its location on his smart phone by fetching it using GPS module, which is interfaced with Arduino microcontroller. Fig.1 shows the arrangement of the components-microcontrollers and GPS modules.

If theft occurs vehicle can be immobilized by receiving the message "Immobilized" using the immobilization circuitry which is SPDT, placed on the fuel injector line. The SPDT pin goes HIGH and the fuel supply will be cut off and to continue power supply again the "Mobilized" message will be sent. After receiving the message, the SPDT pin goes LOW and fuel injector will be complete, making the fuel flow through engine again.

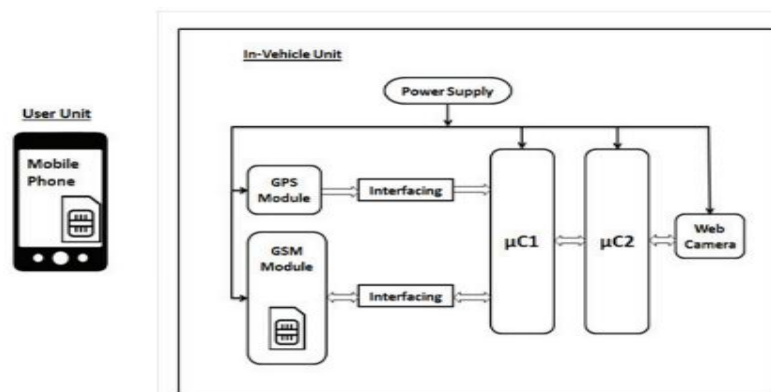


Fig 1: Block diagram of Antitheft Vehicle System

Once vehicle receives the "Immobilized" message, the circuit will cut down the fuel supply which leads to immobilising the vehicle in no time. There is no easy way to exploit the system, as the circuitry is placed near fuel injector. Electric fuel injector circuitry is complication in itself and interfacing immobilisation system with injector circuitry makes its more complicated. As the stolen vehicle is kept in shady area it is difficult to receive the message because connectivity is the issue.

Rajeshwari et al [2], proposed an intelligent traffic control system.

A threefold system is presented here:

i) Traffic detection: The first part of the system contains automatic signal control system where each vehicle is equipped with RFID tag as shown in the fig. 2. When this vehicle comes in the range of the RFID reader, the tag will send signal to the RFID reader. The reader will then track how many vehicles have passed through a specific duration and will hence determine the traffic or the congestion volume.

ii) Emergency vehicle clearance: The second part of the system is for clearing the way for emergency vehicles such as ambulance or fire-brigades. As shown in fig. 4 each emergency vehicle contains Zigbee transmitter module and the Zigbee receiver. It tracks the emergency vehicle and makes the traffic light go green in case the signal shows red. When the signal turns green the emergency vehicle passes and as soon as it passes the lights again goes back to red.

iii) Tracking theft vehicle: Here the RFID reader deployed on the signals read the RFID tags of the vehicle. It compares it to the stolen vehicle. If it matches with the required vehicle, SMS is send using SIM300 GSM module to

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the police control room. The traffic signal then turns to red, so that the vehicle stops in the way and cannot go further. Fig. 3 shows the schema of this system. Hence the police can come and catch the vehicle.

The entire system is automated which helps in using the police force effectively. Human efforts are channelized. The system is a great help for people who are in need as it passes ambulance and fire-brigades, etc. The detection of the traffic and congestion can help people for deciding the route they want to take.

Since the system records each and every vehicle passing through. It increases the load on the system. With the increase in traffic the system over saturates. During tracking and clearing the way for the emergency vehicle all the information about the start and end point of the vehicle should be known. If the route of the ambulance changes or the starting point is not known, it can cause a problem to the system. The continuous switching of red and green light may lead to confusion and traffic congestion.

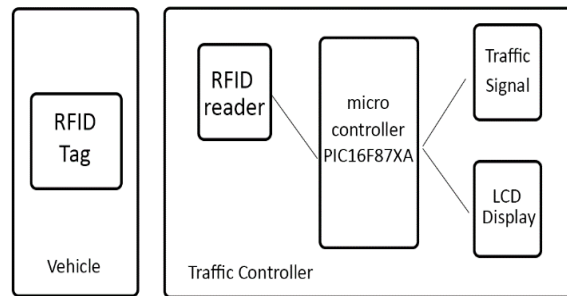


Fig 2: Block diagram of automatic signal control system.

Amirgaliyev Beibut et al [3], proposed number plate recognition system using algorithms which will identify the location of number plate in the frame, extract characters from it and recognise them. The algorithm is mainly divided in three sections-i) Plate area detectionii) Extraction of character iii) Optical Character Recognition

In Plate area detection the number plate image is cropped and given as output. The image is converted into grey scale image to further convert it into binary image which simplifies the working. The issue of blur image can be removed by smoothening.

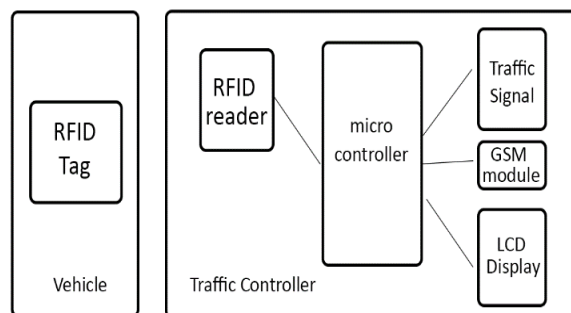


Fig 3: Block diagram of stolen vehicle detection.

In extraction of character it uses Vertical edge detection algorithm instead of horizontal. Sobel algorithm, i.e. it uses gradient magnitude and gradient directions to extract the characters. Along with this controlling of image is done and located horizontally only. The characters are divided into segments i.e. 49 parts using the binary format of the image. As the vertical edge detection is more efficient to fetch the character from the image using contouring, this resembles character. The format which is used in the paper i.e. grey scale format is the best format for image processing. Extraction of character is probability based so it is difficult to investigate the characters. Therefore, it becomes issue of concern to investigate number plates and font styles.

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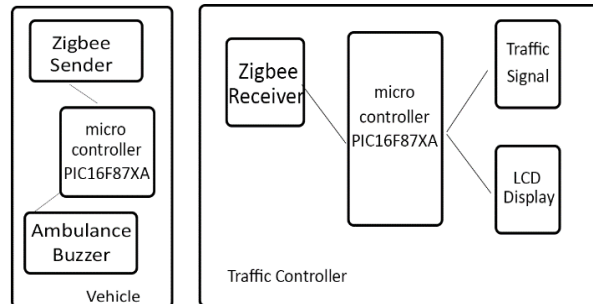


Fig 4: Block diagram of emergency vehicle clearance.

Yerlan Berdaliyev et al [1], in their paper "RFID-Cloud Smart Cart System", people frequently encounter the problem of queuing in super markets and in shopping centre. [6]. Smart cart systems and antitheft RFID gates focus on intellectual billing without relying on cashier. It used RFID tags and RFID reader instead of Barcode and reader.

- The system uses cloud to store the customer data (account details) and product purchased.
- User is facilitated to add or delete the product as per requirement.
- Once done with shopping user will click the submit button to upload the data to cloud. The overall cost of the products is withdrawn from his account which is connected with cloud.
- Once the payment is done successfully all the product details will be deleted from respective accounts.
- As cloud account, for the respective owners will have no items in it- means that owner have paid the amount and the RFID gates will open for exit.

Smart cart doesn't require large bandwidth that is why it is easy to process the transactions in no time. But it requires the bandwidth is a constrained because no transactions can be processed without internet connectivity. Accounts of customer must be registered with the cloud to precede the transaction.

III. CONCLUSION AND FUTURE WORK

With the increased requirement for reasonable protection against vehicle theft, solution to this should be economically efficient and effective enough to be implemented.

Among all the ways studied in this paper, method of immobilization of vehicle will be more effective. It can be a preventive measure for vehicle theft issue. Although image processing is used in various methods but it is having its own flaws (extraction of data from image). Also continuous data connectivity creates hurdle for interlinking of the system, fetching location using GPS and transferring the data using GSM module.

Comparing the other technique RFID proves itself to be technically sound for tracking vehicle.

Above all it will be better way to cut off the fuel supply and make the vehicle immobilize thus reducing the chances of being stolen.

REFERENCES

1. Yerlan Berdaliyev, Alex Pappachen James, "RFID-Cloud Smart Cart System", in Conference on Advances in Computing, Communications and Informatics (ICACCI), Jaipur India, DOI: 10.1109/ICACCI.2016.7732405, Sept. 21-24, 2016.
2. Rajeshwari S., Santhosh Hebbar, Varaprasad Golla, "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance and Stolen Vehicle Detection", in Journal of IEEE Sensors, DOI: 10.1109/JSEN.2014.2360288, 2014
3. Amirgaliyev Beibut, Kairanbay Magzhan, Kenshimov Chingiz, "Effective Algorithms and Methods for Automatic Number Plate Recognition", in Conference on Application of Information and Communication Technologies (AICT), DOI: 10.1109/ICAICT.2014.7035951, 2014.
4. Shruthi.K1, Ramaprasad.P, Ruschil Ray, Manjunath A. Naik, Shubham Pansari, "Design of an Anti-theft vehicle Tracking System with a Smartphone Application", in Conference on Information Processing (ICIP) at Vishwakarma Institute of Technology, DOI: 10.1109/INFOP.2015.7489483. Dec 16-19, 2015.



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5. Kingshuk Mukherjee, "Anti-Theft Vehicle Tracking and Immobilization", in Conference on Power, Control and Embedded Systems (ICPCES), DOI:10.1109/ICPCES.20s14.7062814, 2014.
6. R.R. Zhou and D. Soman, "Looking back: Exploring the psychology of queuing and the effect of the number of people behind", in Journal of Consumer Research, v. 29, (4), p. 517-530, 2003.
7. Gokulan B.P., Srinivasan D., "Distributed Geometric Fuzzy Multi-agent Urban Traffic Signal Control", IEEE Transactions on Intelligent Transportation Systems, vol.11, no.3, pp.714-727, 2010.
8. P. Chandrasekar and T. Sangeetha, "Smart shopping cart with automatic billing system through RFID and ZigBee", International Conference On Information Communication Embedded Systems, pages 1-4, 2014.
9. Moloo, R.K. ; Digumber, V.K. "Low-Cost Mobile GPS Tracking Solution", Published in , Business Computing and Global Informatization (BCGIN), 2011 International Conference on , DOI: 10.1109/BCGIN.2011.136, Publisher IEEE, pages 516-519, July 2011.
10. O. Aloquili, A. Elbanna and A. Al-Azizi, "Automatic vehicle location tracking system based on GIS environment", IET Software, vol. 3, issue 4, pp. 255-263, Aug. 2009.
11. Zhou Yi ,Wang Ding and Yu Yanfei, "On Dynamic Scheduling of Vehicles Based on GPS / GIS / RFID", IEEE International Symposium on IT in Medicine & Education, vol.1, pp. 1252-1256, Aug. 2009.
12. A. Chattaraj, S. Chakrabarti, S. Bansal, S. Halder and A. Chandra —An Intelligent Traffic Control System using RFID, IEEE Potentials, vol. 28, no. 3, pp. 40-43 May-Jun. 2009.