A Novel Methodology for Checking Driver Eligibility & Car Security Using Image Processing

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Abstract- **There has been rising interest for secure framework that should be tried and true and fast react for the commercial enterprises and organization. RFID (Radio Frequency Identification) is one of the reliable and quick method for recognize the material article. In the long-prior the standardized tags are best when contrasted with RFID due to their expense however now a day's RFID are effortlessly accessible and are more helpful to utilize. Research has rolled out some extraordinary improvements which make its programming a great deal shorter and less demanding is a result of supplanting microcontroller with Arduino. Arduino makes the circuit and programming a considerable measure simpler to get it. Paper is based upon security get to and Control framework utilizing RFID. The main aim of the project is to design and develop an advanced vehicle locking system is the real time environment. The user can send a status message from his cell phone and as soon as the car module gets the message, it will check for the user authentication. In this system we put forward the face detection technique because this kind of technique is effective and fast, and one alarm signal could be given to make to make an alarm or call the police.**

Index Terms- EM-18 Reader Module, RFID Tags, Arduino UNO board.

I. INTRODUCTION

Presently a days there is a tremendous surge in the toll courts keeping in mind the end goal to pay the toll charge. Accordingly keeping in mind the end goal to lessen the congested road and to spare time and additionally to decrease the cash loss of 300 centers/year. Electronic/mechanized toll gathering frameworks are exceptionally well known nowadays. They don't require manual accumulation and operation of toll hindrances. The insights about the vehicles and installment are put away in a RFID based framework. We have composed venture for the robotization in toll charge installment utilizing RFID. We have made the computerization of toll square utilizing mix of microcontroller, RFID and Load cell innovation. This report clarifies the implantation of mechanization in toll court which is a stage towards enhancing the observing of vehicles, going in foreordain courses. The point of our undertaking is to outline a framework, which naturally recognizes a drawing closer vehicles and record vehicles number and time. In the event that the vehicle has a place with the approved individual, it naturally opens the toll entryway and a foreordained sum is consequently deducted from its record. This means lessened Traffic clog at toll courts and aides in lower fuel utilization. This is vital favorable position of this framework. Low recurrence RFID work at 125 KHz recurrence with radio waves. There is a loop inside the RFID tag and when it is affected by an attractive field, it sends a 12 byte character code to RFID peruser for further preparing. The RFID tag is utilized as a special personality for record of a specific client. At the point when a vehicle drives through the toll square, its driver is provoked to output his RFID tag. On the off chance that the character (serial number of the tag, i.e., 12 byte information) is coordinated with the one as of now put away in the framework, the toll sum is deducted from his record. After this, the vehicle gets quick access to drive through. This RFID based toll framework likewise has some extra components. Another client can enlist him with the framework.

Additionally an old client can energize his record equalization. The sum for revive can be entered in the framework through a numeric keypad interfaced with AT89C51.In starting, the client is provoked to sweep his tag or ID. The serial code of the tag is distinguished by the peruser module and is sent to AT89C51 for correlation with put away information. On the off chance that the ID is coordinated by the

microcontroller, the toll sum (for this situation Rs.10) is deducted from client's equalization and client gets the opportunity to drive through the square. In actuality, if the tag is not recognized, a message ('Wrong ID') is shown on LCD screen. Another client needs to press the "*" switch to enlist himself after which his personality is confirmed with RFID tag. The new record is then put away by the microcontroller to allow future access. The framework likewise appears "Blunder" if the labels don't coordinate amid heck. On the off chance that adjust in client's record turns out to be under Rs.30, a notice message 'Low adjust' is shown on LCD. For this situation the client still gets the entrance through the framework. The framework likewise prompts the driver to revive the record. In the event that adjust comes to beneath Rs.10, 'Deficient equalization' is demonstrated on LCD screen. The client does not get access until he adds more adjust to his record. The revive sum is entered by utilizing a keypad. Delete can be utilized while pressing so as to enter the sum "*" catch on keypad. It additionally has a wellbeing highlight that if distinctive labels are looked over the peruser at the season of enlistment, LCD shows 'you have indicated diverse ID. At the point when a RFID label comes in this range, the peruser distinguishes it and sends a novel code of the tag serially. This serial code, comprising of 12 bytes, is gotten by the microcontroller. This code is the ID for the client and is put away as an exhibit in the microcontroller. In the event that the ID is coordinated with this code put away in exhibit of microcontroller, the client is conceded get to however the toll court

II. MOTIVATION

As of late we have seen the quantity of vehicle burglary and robbery vehicle offering have expanded far radically. In spite of the fact that some are at long last followed, numerous are never found. Vehicle securities have turned into an imperative issue in our nation. At the point when these vehicles are stollen then the numerous individuals bear an immense misfortune .Similarly at the toll square a considerable measure of time is spent to finish entire process.Sometimes we should be in a long line and after much time the procedure gets completed. So to spare time and things simple this thought rings a bell.

III. RELATED WORK

Many researchers have utilized RFID technology in developing access control system. Filipe [7] has developed an RFID based monitoring and access control system consisting of RFID terminal, camera, server and an alert device. Upon detecting a transponder, the terminal captures a photo and transmits the data including the UID and photo to the server through TCP/IP connection. The server searchers the database for this particular query and sends the results back to the terminal to allow or deny the access. The system also monitors illicit acts e.g., a person tries to enter when the door is open without completion of authentication process and turns on the alert device using web services. The performance of the system is tested by installing RFID kits with antennas covering a range of 10cm and satisfactory results are obtained. Xiang-Lei Meng [9] has described an RFID based embedded security authentication system with novel face recognition structure. The system comprises of two phases namely registration and recognition. In registration phase, ten pictures of user face with different emotions are collected and eigen information is obtained with an extraction algorithm. This information along with a UID is written on RFID tag. In recognition phase, a camera tracks the face and an extraction algorithm returns eigen information of the face in the picture. This information is then matched with the information already stored on the tag for authentication. The entire processing is done on embedded ARM11 processor, S3C6410 instead of computer terminal/server which has resulted in faster response time, about 57ms with authentication accuracy up to 86.5%. The performance of the system is compared with the existing database systems and is found to have far better response time with the same authentication accuracy. Dong-Liang Wu [10] has described an access control system based on RFID in conjunction with face recognition based on neural network. The system recognizes the face of person holding RFID card and denies the access if person is found to be unauthorized. Radial basis function neural network (RBFNN) has been used for learning the face of authorized persons. Principal component analysis (PCA) has been used for extracting the features from the image and linear discriminant analysis (LDA) for refining these

features. The network is trained with localized generalization error model (L-GEM) for enhancing its generalization capabilities. Experimental results have shown that proposed system can improve the security of RFID access control. Automatic identification and access control system has become necessary to overcome the security threats faced by many organizations in Pakistan these days. By installing the system at the entrance will only allow the authorized persons to enter the organization. The system can also be installed at various points inside the organization to track the person"s movement and to restrict their access to sensitive areas in the organization. In such a way, suspicious persons can be caught which will surely improve the security level in the organization. Radio frequency identification (RFID) is a wireless technology that can be used to develop the access control system. The literature has revealed the use of this technology to automate various processes ranging from industrial sector to home control [1]. Bo Yan [2] has reported the use of RFID technology to automate sight spot ticket management system. The system hardware consists of RFID electronic tickets, RFID readers, computer terminals, optical networks, computer servers and site controllers. Electronic ticket contains the S-DES encrypted form of data including scenic region number, scenic spot number, ticket type, ticket date, site number, serial number and check bit. The RFID reader at the site reads the data inside the e-ticket and transmits it to the computer terminal and servers though the network. The data is decrypted at the terminal and its authenticity is verified. The site controller then allows the right tourist to enter the spot. This system identification and authentication process is carried out at three sub-levels namely the sale subsystem, the decision sub-system and the management sub-system. All these processes communicate with each other through database information. G. Ostojic [3] has developed an automatic vehicle parking control system based on RFID technology in the city of Novi Sad, Republic of Serbia. The hardware of the system consists of RFID tag and reader operating at a frequency of 13.56MHz for authentication, inductive loop for metal detection, a capacity sensor for counting vehicles, Siemens MC 39i GPRS modem for communication between entrance and exit gates and FEC FC440

programmable logic controller (PLC) which is the heart of the system.

When the car stops on the inductive loop at the entrance, RFID tag is read by the reader. The data on the tag includes the unique identification number (UID), validity period and check bit for checking the parking status. This data is manipulated by PLC and access is granted for parking the vehicle if tagged information contains correct UID, validity period and parking status. After the vehicle has entered the parking lot, its parking status will be changed by the RFID reader/writer to prevent the entry of another vehicle on the same card. The same procedure is repeated when the vehicle is leaving the parking lot. Nova Ahmed [4] has described RFID based indoor guidance and monitoring system known as GuardianAngel in pervasive environment. The beauty of the system is that it can generate dynamic queries in real time through user interface. The environment in the system is equipped with RFID tags and is divided into various zones. The middleware of the system is divided into two layers namely guidance layer and monitoring layer. The guidance layer is provided with handheld RFID reader to provide locality information to the monitoring layer periodically. Thus monitoring layer has the information of the entire environment. Experimental results have shown that system is nearly 100% accurate in providing the zonal information thereby allowing the construction of very robust guidance and monitoring applications. Kuo-shien Huang [5] has described a business model based approach for utilizing RFID technology in automating the process according to enterprise strategic vision and goals. The author has built a business model for bike renting system and used RFID technology to implement the system. The conventional way of getting the bike on rent which includes the recording of customer data by pen and then inputting the data to the computer is replaced by providing a RFID card to the customer and fixing an RFID tag on the bike. The bike is tagged to keep track of its location from the renting store to the return store. The information is shared amongst the stores through web interface. In this way, successful RFID strategy is built and deployed.

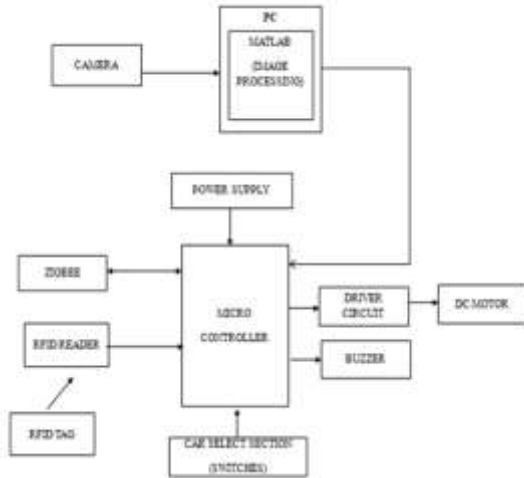IV. METHODOLOGY OF THE PROJECT

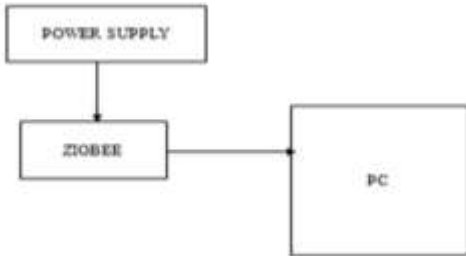Figure 1: Block Diagram for CAR UNIT

Figure 2: Check Post/Toll Gate Section

The real time extendable emergency system with microcomputer comprises image processing control unit and microprocessor to prevent the parked vehicle from theft. Face detection and recognition system use enhanced algorithm for authentication. The entire security system comprising each component is shown in Fig. 1. Bagavathy et al, (2011) realized the importance of using ARM processor in real time applications. Hence ATMEGA328 microprocessor is used as the control unit in the system. The passive infrared sensor attached to the seat of the driver activates the hidden camera fixed inside the vehicle through the ATMEGA328 microprocessor control of the microcomputer once the intruder enters the car. The camera acquires the image of the person inside the car fixed in an appropriate position in front of the driver seat. Once the image of the person is acquired, the system now tries to detect the face.

4.1 Image Processing
The microcomputer which contains the image processing unit embedded within it performs the face detection and authorizes the person. The processing of image involves two parts, face detection and face recognition.

4.1.1 Face Detection
The acquired image is processed to detect the face using the Viola Jones algorithm (Viola and Jones, 2002) which effectively uses the cascade object detection. The cascade detector detects the face of the acquired image and the face region is extracted. The authentication based security system has the database which stores the face images of the authorized persons under different environments. The face images are enhanced by normalizing them to remove the unwanted information due to illumination constraints while acquiring the image and are stored in the database. Now the task of face recognition must be performed with the detected faces.

4.1.2 Face Recognition
Face recognition can be performed with various algorithms which are feature based or model based. Mostly feature based algorithms are used in the security systems involved in real time. Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) algorithms are efficient in terms of extracting the features to perform recognition. Both algorithms are compared (S K Hese and M R Banwaskar, 2013) and they found to have similar features but Linear Discriminant Analysis (LDA) outperforms Principal Component Analysis (PCA) algorithm when large training sets are involved in recognition. Also, LDA discriminates most of the information present in the image efficiently by computing the intra class and inter class scatter matrices. Using the database which contains normalized face images, the recognition is performed in the vehicle security system through the LDA algorithm. LDA performs the feature extraction of the stored images in the database which are called the training images and the camera acquired face image which is called the test image. The test image is to be compared with the database images and the classifier used in the algorithm decides the image as known or unknown using the Euclidean distance and the threshold value.

The Euclidean distance is calculated between the corresponding weights of features and the image which produces minimum distance is best matched with the test image. The person is classified as known or authorized when the Euclidean distance is smaller than the threshold value and the person is classified as unknown or unauthorized when the distance value

exceeds the threshold. The steps performed in the image processing algorithm and authorization is shown in the Figure.

4..1.3Face Tracking

Once we get a positive feature classification result, we track the face during the upcoming frames so as to reduce the computation workload. The facial region's bounding box serves as input for our correlation tracker [4]. If the tracking fails, face detection and the consecutive steps are performed again. The correlation tracker returns the peak to side-lobe ratio, which is a value that measures the confidence of the tracker on whether the object is inside the target region or not. We use this ratio to decide whether our tracking is successful or not. In our test case, we choose ratio values of 8.0 and higher to accept tracker success.

Working

In RFID based toll deduction system a vehiclearrive in toll plaza range antenna send signals to tagand activate the tag, tag send back information toantenna. As data receive to antenna [9] it sends tocentral server database. Server checks information ofaccount consumer/driver, if account has credit morethan required tax then tax is subtract from account anddriver will pass the toll plaza. A transaction messagealso sends to consumer/driver that how much tax ispaid and remaining balance of account. Passing ofvehicle and transaction of tax is completed within shorttime.The central server stores all information oftransaction, which contain location of toll plaza, date,time and total amount payment of tax. If the credit ofaccount is low then system generatesindication for low balance. The speed limit for passingfrom toll plaza is not constant on every toll plazabecause some companies are set speed limit 86kilometers per hour (5 mph) and some companies setspeed limit to 48 kilometers per hour or low 8kilometers per hour. Video cameras are installed on thetoll plaza for the observation that any consumer cannotpass without having tag in vehicle. Anyconsumer/driver pass from toll plaza then cameracapture picture of number plate and send abuse noticeto the owner of vehicle through the email. Highlights the above discussed procedures with specifictag, camera and gate positions.
Vehicle Speed Control through RFID

RFID can also be implemented in vehicles tocontrol the speed of the car. Such system can be namedas automatic vehicle speed control system. The vehiclewill be equipped with a radio frequency (RF) readerwhich will detect RF transmitters located on the speedlimit signs posted on the side of road. The vehicle will then automatically adjust isspeed so as to obey the speed limit for that particularstretch of road. This project can be considered scalableto implement in motor vehicles used today, anoverview of system

Reducing Car Theft

RFID can provide an effective deterrent againstcar [5] theft. A solution for this type I characterized bythe following:Attaching a tag to vehicle to be monitored fortheft. Reading the tag ID at the vulnerable points (for Example, at exit points, during starting of the ignitionof an automobile, and so on).An application for this is automotive anti-theftimmobilization. In this commercially deployed solution,an embedded reader located inside the car (for example,in the steering wheel) becomes activated when a driverturns the ignition key. This reader then attempts to readthe valid unique code from a tag in its vicinity.

Comparison with Previous Mechanisms

So many new projects is done through the usingof RFID and so many manual systems are nowautomated by using the technology of RFID. Inprevious work of RFID is that make manual system toautomate for time saving and keep record up to date.For example Student attendance system, studentsattend the class then their attendance is counted indatabase and their timing of arrival and leaving. Inprevious toll deduction system only simple way tax isdeducted from the account. But further implementationor scaling of project of toll deduction system is stop theanti-theft of vehicle and control the speed of vehicle byusing RFID technology. Also keep stop violation ofrules if any vehicle did not have tag then camera take snapshot of vehicle and send alert to next station of toll plaza to catch the vehicle.

APPLICATIONS

1. This project can be used in Toll collection plaza on Highway.

2. Can be used in octrai collection booths for faster access.
3. Makes travelling more convenient, reduces travel times especially during festive seasons when traffic tends to be heavier than normal.
4. Increase highway capacity. Processes 250 – 300% more vehicles per lane, reducing delays and traffic congestion.

CONCLUSION

The improvement of RFID based toll finding framework is demonstrated that RFID innovation have great results in actualizing in various applications however the standard organization have add to the system of uses. In this toll derivation framework RFID is utilized allowed recurrence groups by utilizing high power levels, then framework will be fruitful. The organizations which have authorizations from the powers since tag is utilize the financial balance and enlistment quantities of vehicles. For this application aloof tag are superior to dynamic label in view of minimal effort furthermore radio signs ecological elements. For the future work RFID speed controlled framework vehicle can be spare from the mischance because of fast. A few works will be done auto directing arrangement of vehicle which can be controlled by utilizing RFID innovation introduced on the complete track. This will be useful if transport driver have significant issue of heart assault or other infection all of a sudden then control exchange to programmed RFID correspondence framework. In this project, by using image processing or recognition techniques we can avoid vehicle theft and protect the usage of unauthenticated users. Secured and safety environment system for the investigators can easily find out the hijackers image. We can predict the theft by using this system in our day to day life.

REFERENCES

[1] FBI uniform crime reports: Motor vehicle theft data in 2016. 2016.
[2] Guido Borghi, Marco Venturelli, Roberto Vezzani, and Rita Cucchiara. Poseidon: Face-from-depth for driver pose estimation. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2017.
[3] Corinna Cortes and Vladimir Vapnik. Support-vector networks. Machine Learning, 20(3):273–297, Sep 1995.
[4] Martin Danelljan, Gustav Hager, Fahad Khan, and Michael Felsberg. ¨ Accurate scale estimation for robust visual tracking. In British Machine Vision Conference, Nottingham, September 1-5, 2014. BMVA Press, 2014.
[5] Katerine Diaz-Chito, Aura Hernandez-Sabat ´e, and Antonio M L ´opez. ´A reduced feature set for driver head pose estimation. Applied Soft Computing, 45:98–107, 2016. [6] E. Garcia. Cosine similarity tutorial. In Minerazzi Tutorial Section, 04 October, 2015.