

Security System for Vehicle using Number Plate Detection and RFID

Paras Goyal, Iqbal Singh
C-DAC, MOHALI

ABSTRACT

In this paper, vehicle number plate is captured by the camera. And then it compare with the database that is made in the MATLAB. During comparing it uses a edge detection and compares pixel to pixel templates that are already define in the program. And after matching the number plate it request for the RFID card. For this RF receiver is also interface with it and when RFID card is sweep on the RF receiver it detect its ID and match with the ID that is already stored in the database. Radio frequency identification (RFID), is a generic term for technology that radio waves is used to identify people automatically and objects. If the ID and the number are matches with the database then it show the message “authorized person” else “unauthorized person”. Both should be match with the database. If single one condition is true then it shows “unauthorized person”. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The developed system firstly detects the vehicle and then it capture the vehicle number plate. And Vehicle number plate is extracted by using the image segmentation and Optical character recognition technique which is used for the recognizing the character. and then resulting data is used to compare with the records on a database and data extracted from RFID. And in database there can be specific information like vehicle’s owner name, place of registration, or address, etc.

Keywords

MATLAB, RFID

1. INTRODUCTION

Automatic Number Plate Recognition system is using an image processing technique which is used for number (license) plate to identify the vehicle by capturing the image using camera and RFID. RFID card can be detected by the RF receiver. When the RF card is swiped on the RF receiver it detects its ID number. Then the data received from the RFID is matched with the database. If the vehicle number is authenticated number then it will show the message that is authorized person and if the number or RFID is not match with the database then it will show the message unauthorized person. The main objective is to design an automatic authorized vehicle identification system with the use of vehicle number plate. The developed system firstly detects the vehicle and after that captures the vehicle number plate. And Vehicle number plate region is extracted using the image segmentation and Optical character recognition technique which is used for the recognizing the character. and Then the resulting data will compare with the records of the database and data extracted from RFID. And in database there can be specific information like vehicle’s owner name, place of registration, or address etc. System is simulated and implemented in MATLAB, its response is tested on real image. And observed from pervious experiment that is developed successfully detects and recognize the vehicle number and allows the authenticated vehicle to pass through

the gate. The data of vehicles entering the premises would be also be registered. The vehicle which is authenticated first time will also get registered for future. The data extracted from by Optical Character Recognition System is then matched with the data extracted by the Radio Frequency Reader and also the number of times the vehicle has entered is registered. The system can be used on the entrance of restricted area like military zones, area around top government offices e.g. Parliament, Supreme Court etc. We can also use GSM modem in the future as the expansion to this project .In this if some vehicle number is not saved in the database and that vehicle approaches the gate , a message is send to the mobile of the owner and if he wants to open the gate for that vehicle ,he can do this with his mobile.

2. RELATED WORK

Most images you find on the Internet are JPEG-images which is the name for one of the most widely used compression and standard of the images. If you stored an image then you can usually see from the suffix that in what format it is stored. For example, an image named asimage.jpg then that is stored in JPEG format and we will see later on that we can load an image of this format into MATLAB.

Working formats in MATLAB: If an image is stored as a JPEG-image on your disc we first read it in MATLAB. and, in order to start working with an images, like perform a wavelet transform on an image, we must convert image format into a different format.

RFID

Radio frequency identification (RFID), is a generic term for technology that use radio waves to automatically identify people and objects. There are several ways of identification, but the most common way is to store a number that identifies a person and object, and perhaps other information or code on a microchip which is attached to an antenna (the chip and the antenna together are called an Radio frequency identification transponder or an Radio frequency identification tag). Antenna enables the chip to transmit the identification or code to a reader. Reader will converts the radio waves and then reflected it back from the RFID tag into digital information which can then be passed on to computers which can make use of it.

A technique is similar in theory to bar code of identification with using RFID the electrostatic or electromagnetic coupling in the RF portion of the electromagnetic spectrum which is used to transmit the signals. And radio frequency identification consists of an antenna and a transceiver, which is used to read the radio frequency and transfer the information or tag or code to the device that is an integrated circuit containing the RF circuitry and information will be transmitted. Radio frequency identification systems can be used anywhere, and can be used for clothing tags or missiles or pet tags or food and more RFID can be used anywhere where the unique identification system is required and There are tags and tags are used to carry information as simple as a pet

owners name and owners address, the cleaning instruction on a sweater complex instructions to the computer that is how to assemble the cars and many automobile manufacturers use RFID systems to move cars through an assembly line. Each stage of production have different tag and that tag is used by the computers and what is the next step of automated assembly is. An RFID system typically consists of a radio-enabled device that communicates with or "interrogates" a tag which is used to embedded with a single chip processor and an antenna.

The "interrogator" or RFID reader may be a fixed antenna or it can be portable, as like as a barcode scanner. Tags itself have an extension of the barcode labels and today you can see it everywhere, with the more intelligence. This system is more intelligent than the barcode tracking systems, and RFID system can be used to read the information on a tag without requiring line of sight or a particular orientation. RFID systems can be largely automated, and reducing the need of manual scanning.

In the back end of the system, a host computer stores all collected data within a database. Since RFID tags are used to carry the data, and tags can serve as the data transfer agents, synchronizing with the disparate information of the systems. Tags may carry a product's history and may interact to communicate with manufacturing production systems for increased automation and process error proofing.

One of the key differences between RFID and bar code technology is RFID eliminates the need for line-of-sight reading that bar coding depends And RFID scanning can also be done at greater distances than bar code scanning. RFID systems have a High frequency (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) for transmission and transmission ranges is more than 90 feet, and RFID system have a wavelengths 2.4 GHz range are absorbed by water (the human body) and therefore has limitations.

4. RESULTS

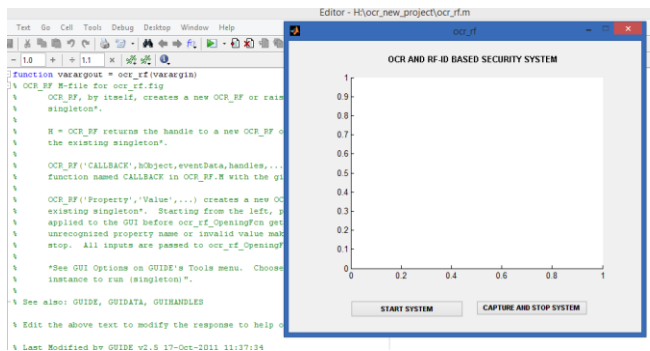


Figure 1: After running the code in MATLAB

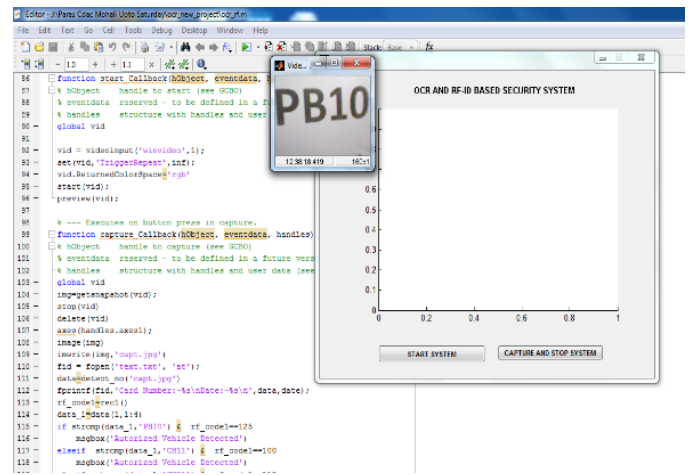


Figure 2: Capturing the image

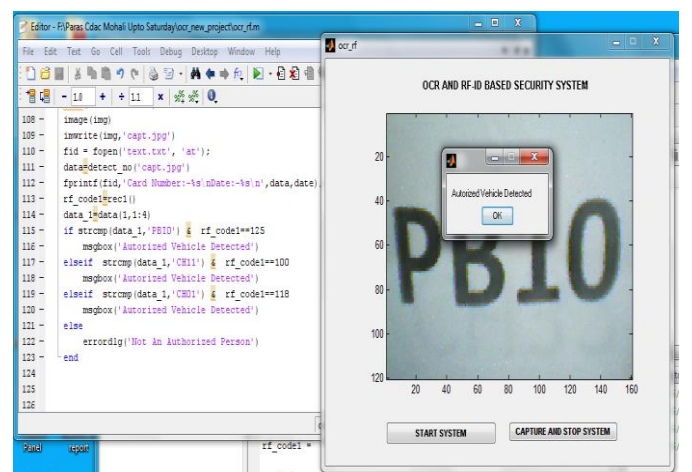


Figure 3: After scanning RFID authorized message shown

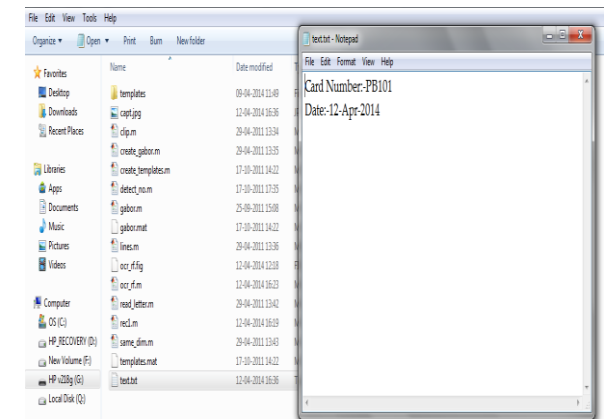


Figure 4: Number stored in the database

5. CONCLUSION

The automatic vehicle identification system using vehicle license plate is presented. The system use series of image processing techniques for identifying the vehicle from the database stored in the PC. The system is implemented in MATLAB and it performance is tested on real image. The MATLAB results shows that the system robustly detect and recognize the vehicle using license plate against different lightening conditions and can be implemented on the entrance of a highly restricted areas. The implementation works quite well and thus there is still room for improvement. The camera used in this project is

sensitive to vibration and fast changing targets due to the shutter long time. The system speed and robustness can be increase if high resolution camera is used. The OCR methods used in this project for the recognition is sensitive to misalignment and to the sizes, affine transformation can be used to improve the OCR recognition from different angles and size. The statistical analysis can also be used to define the probability of detection and recognition of the vehicle number plate.

RFID information can be accurately collected in 5 meters, and the infrared remote control password can be accurately conducted in the 9 meters distance at night. These schemes are able to get rid of Denial of Service attacks and eavesdroppers [15][16]. Moreover, compared with GIS/GPS vehicle management system [14], its low cost and high security performs better. Accurate, High-performance and security are the features of this system, applicable to Military Intelligence, and can be used in high standard of residential and company, etc. Shortcomings and inadequacies are as follows:

1. The short message reminder depends on the condition of GSM network.
2. The fingerprint error rate is about 6% because pressure and angle may be different when used.
3. The infrared remote control will be interrupted in sunlight during the daytime, so shading method must be carried out on the receiver and the direction of the remote control must be aimed at the receiver, the offset angle must be less than 15 ° to normal use, and that is not penetrable. So improvements will be done in the future to solve these problems, The remote control technology will be replaced by RFID remote. This system for the intelligent community, have a certain anti-theft vehicle access-practical value.

Radio frequency identification security and privacy are stimulating research areas that involve rich interplay among many disciplines, like signal processing, and hardware design, supply-chain, logistics, privacy rights and cryptography. There is remain connections to be explored between the work surveyed here and other areas of study. And we can conclude by highlighting a few of these. Majority of the articles treated in this survey explore security and privacy as a matter between Radio frequency identification tags and readers. Tags and readers lie at the fringes of a full-blown Radio frequency identification system. the heart will reside a massive infrastructure of servers and with software. And many of the attendant data-security problems are like authenticating readers to servers involve already familiar data-security protocols. But the very massive scale for the Radio frequency identification-is related to data flows and cross-organizational information sharing will introduce new data-securing problems. And we have define the key-management and PIN distribution for tags as one such potential problem. And other challenges will arise from the fluidity of changes in tag ownership. Sensors are small hardware devices and similar in flavor to Radio frequency identification tags. While Radio frequency identification tags emit identifiers, and sensors emit information about their climate, like temperature and humidity. Sensors are typically containing batteries, and so that are larger in size and more expensive than passive Rf identification tags. Between active Rf identification tags and sensors, thus, there is little difference but nomenclature. Like, some commercially available active Radio frequency identification devices are designed to secure port containers. And They are emit identifiers, and also check whether or not a container has

been opened. And Give such examples, there is surprisingly little overlap between the literature on sensor security and that on RFID security. And boundaries between wireless-device types will inevitably blur, and as the evidenced by the dual role of reader and tag played by NFC devices. Another important aspect of Radio frequency identification security that of user perception of security and privacy in Radio frequency identification systems. As users cannot see Radio Frequency emissions. Radio Frequency emissions form their impressions based on physical cues and industry explanations. Radio frequency identification also will come to secure ever more varied forms of physical access and logical access. For engineer usable RFID systems and permit informed policy decisions, and it is important to understand how RFID works.

6. ACKNOWLEDGEMENTS

We would like to extend a special thanks to C-DAC Mohali for providing us means to carry out our research work in meticulous way. We are also grateful to MHRD, Govt of India for providing us a platform to do our research work.

7. REFERENCES

- [1] Optasia Systems Pte Ltd, “The World Leader in License Plate Recognition Technology” Sourced from: www.singaporegateway.com/optasia, Accessed 22 November 2008.
- [2] J. W. Hsieh, S. H. Yu, and Y. S. Chen. Morphology “Based license plate detection from complex scenes” *16th International Conference on Pattern Recognition (ICPR’02)*, pp. 79–179, 2002.
- [3] V. Kasmat, and S. Ganesan, “An efficient Implementation of the Hough transform for detecting Vehicle license plates using DSP’s,” *IEEE \ International Conference on Real-Time Technology And Application Symposium, Chicago, USA*, pp. 58-59, 2005.
- [4] S.H. Park, K.I. Kim, K. Jung and H.J. Kim, “Locating Car license plate using Neural Network,” *Electronic Letters*, Vol. 35, No. 17, pp. 1474.
- [5] K.K. KIM, K.I., KIM, J.B. KIM, and H.J. KIM, “Learning-Based Approach for License Plate Recognition” *Proceeding of IEEE Signal Processing Society Workshop*, Vol. 2, pp.614-623, 2000.
- [6] RFID Journal. *Online publication. Referenced 2005* at <http://www.rfidjournal.com>
- [7] Alien Technology Corporation achieves “Another step Toward Pervasive, economic RFID with announcement Of 12.9 cent RFID labels”, 13 September 2005. *Alien Technology Press Release. Referenced 2005* at <http://www.alientechnology.com>.
- [8] Boycott Benetton web site, 2005. Referenced 2005 at <http://www.boycottbenetton.com>
- [9] ECRYPT (“European network for excellence in Cryptology”), *stream cipher project Web page*, 2005.
- [10] Texas Instruments gen 2 inlay data sheet, 2005. Referenced 2005 at <http://www.ti.com/rfid/docs/manuals/pdfSpecs/epcinlay.pdf>.