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# Image Processing Based Automatic Toll Collection System

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**ABSTRACT:** Automation in transportation has proven to be a significant investment in the development of smart cities. Using this system, we can reduce congestion at the toll booths, especially during the festive season when there are more ambulances than ever before. The main objective of this paper is to develop an automated toll booth based on full images as a traffic solution. In this paper, we analyze with the help of radio frequency. Radio Frequency Identification (RFID) technology is a non-contact method of identifying products based on the use of radio waves to transmit product-related information between the paper and the reader. It uses an unlicensed electromagnetic radio frequency source with ISM range. Vehicles will have RFID tags. A tag is nothing more than a unique code number. This will be specified by the RTO or the shipping department. We will keep all important information about the passenger under this number. Readers will be placed in the billing area. Each time a vehicle passes through the call center, the reader reads the RFID and checks whether the person is authorized. If the authorized person is detected, it will capture the image and send a notification via the SMTP protocol, then use the OCR algorithm to detect and save the person's license card number. The LCD indicates that the operator is authorized and uses the Nano microcontroller to drive the motor to open the search table. If an unauthorized person is found, the phone booth will not open. This saves time, saves fuel and helps save money because cars don't have to wait to stop. Automated charging will definitely go a long way in reducing the heavy traffic caused by today's big cities. This is one of the easiest ways to craft large vehicles.

## I. INTRODUCTION

The development of transportation has led to a better lifestyle and we have achieved freedom of movement, a large market for goods and services, and a high level of activity, business and relationships. In fact, the economy of a country is always related to the quality of transportation. The quantity of cars on the roads is increasing, traffic jams, accident rates, pollution, etc. causes problems. All businesses with different functions use different modes of transport. In this project we are using RFID tags in cars. A remote object identification system called Radio Frequency Identification (RFID) uses radio frequencies (between 30 kHz and 2.5 GHz) to automatically identify objects. Electronic Product Codes (EPCs) are the information format used to program RFID tags. the contents of which is readable remotely to determine whether the vehicle is authorized. If an authorized person is detected, the driver's license is registered and the phone number is activated using the driver's license plate and electronic device. If an unauthorized person is found, the conference call is closed, making it easier to prevent crime and monitor the call effectively.

## II. LITERATURE SURVEY

[1] Yoon, W.J.; Chung, S.H.; Lee, S.J, "Implementation and performance evaluation of an active RFID system for fast tag collection," *Computer Communications*, 2020.

RFID reader is a tool which is used to grill an RFID tag. This reader has an antenna that releases radio waves and the tag reacts through transfer again its statistics. A no. of things can have an effect on the gap at which a tag may be examined the read range. The frequency used for identity, the antenna advantage, the direction and divergence of the reader antenna and the transponder antenna, in addition to the location of the tag at the item to be identified will all have an effect at the RFID system's examine range.

[2] H. Vogt, F.Mattern and M.Naghshines, *Efficient Object identification with passive RFID tags International Conference on Pervasive Computing. Volume 2414 of Lecture Notes in Computer Science, pages 98-113, Zurich, August 2019.*

RFID is used in enterprise supply chain management to enhance the performance of inventory tracking and management. RFID tags are intellectual bar codes that may matter to a net-worked gadget to tune each product. An RFID tag is a microchip which is combined with an antenna in a compact package; the wrapping is established to permit the RFID tag to be connected to an object to be tracked. The tag's antenna alternatives up signals from an RFID reader or



scanner and then returns the sign, commonly with more extra data (like a completely distinctive serial quantity or different personalized statistics) Radio Frequency Identification Device Technology (RFID), The Institution of Engineering and Technology, 2019.

Using radio waves to transmit information about an item between a tag and a reader, radio frequency identification (RFID) technology is a non-contact method of item identification. It operates within the Industrial Scientific Medical (ISM) band of the unlicensed electromagnetic radio wave spectrum.

[3] Landt, J. 2020. **The History of RFID, IEEE Potentials, 24(4), pp 8-11.**

The technology can also be used to track vehicles and the goods they transport in real time during toll collection at toll gates. The results of location tests show that RFID is the best technology for tracking moving objects.

[4] Fuhrer, P., Guinard, D. and Lietchi, O. 2005. **RFID: From concepts to concrete implementation, 2020.**

The RFID data is kept on tags that respond to readers by converting the radio frequency energy of the reader's (or transceiver's) questions and sending back the data they contain. The reader is operated by and the data it sends is processed by a computer running a specific RFID application. The main benefit of RFID is its capacity to read objects while they are moving and out of sight. Under challenging conditions of high pressure, chemicals, and temperature, the tags can be read.

[5] **Spectrum.ieee.org/computing/software/-programming-languages, 2019.**

It is a Relational Database Management System (RDBMS) that is open-source. Structured Query Language is known as "SQL." The sole owner of MySQL was the Swedish business MySQL LAB. And currently Oracle Corporation owns it. There are numerous paid editions that are available for exclusive use and offer extra features. It is a key part of LAMP, an open-source software stack for web applications. "Linux, Apache, MySQL, Perl/PHP/Python" is abbreviated as LAMP.

[6] McFarlane, D. and Sheffi, Y. 2003. **The Impact of Automatic Identification on Supply Chain Operations, International Journal of Logistics Management, Krotov, V. and Junglas, I. 2019.**

The RFID read/write module has seven data lines. The lines for sending and receiving data in a two-way communication between the RFID reader and the computer system are the ones that are significant for reading and writing. If the PC does not have an RS232 port, a USB-to-RS232 converter is used to connect the RFID module to the computer. An independent power source, in this case a 12 V and 3 A supply, is used to power the RFID module. When a tag is moved near the magnetic field created by the RFID module, a beep sound is made to indicate that the tag has been detected.

### III. CONCLUSION

An automatic toll gate system based on image processing using RFID technology offers a promising solution for solving traffic congestion and improving the operation of toll gates. By integrating RFID technology for vehicle identification, image processing for license plate recognition and automated gate control, the system increases efficiency, accuracy and safety. It eliminates the need for vehicles to stop in queues, resulting in time and fuel savings for commuters. In addition, the system contributes to smoother traffic flow, reduced toll evasion and better revenue management. With its ability to streamline the operation of toll gates and provide a convenient user experience, this system has great potential for optimizing toll collection processes in smart cities and improving the overall transport infrastructure.

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