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AUTOMATIC TOLLGATE USING IMAGE SENSING AND RFID PROCESS

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Abstract:

The Automatic Toll Gate Systemoutlined and actualized in this paper is done such that it enhances programmed vehiclefollowing, time administration and furthermore the Toll impose installment. This paper clarifies the usage of a programmed Toll Gate which incorporates the following and checking of vehicles, going in city parkways. This Automatic toll door framework consequently distinguishes a moving toward vehicle and records the vehicle number and the time it goes in the database. On the off chance that the vehicle has a place with a formerly enrolled individual or gathering, it instantly opens the Toll Gate and a particular toll impose is consequently deducted from its record. Three strategies for money installment have been actualized, on the off chance that one fizzles the other strategy happens naturally. These techniques are profoundly secure. This is overseen adequately by Image Sensing and RFID strategies.

Keywords —— **Image Sensing, RFID, vehicle theft detection.**

I. INTRODUCTION

Since Transportation is the cornerstone of a country's economy, refinement in transportation systems result in a good lifestyle in which we achieve extraordinary freedom for travelling, massive trade in manufacturing goods and services, as well as social mobility.The increase in number of vehicles on the road, result into number of problems such as congestion, prolonged queues at tolls and air pollution. The Automatic Toll Gate determines if the vehicle is registered or not, and then informs the management center to check and process violations and debits.
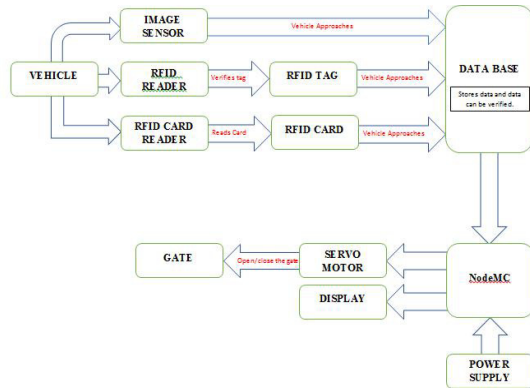
II. PROPOSED SYSTEM

This paper gives a simplified procedure to passengers to pay toll at toll booths by making

them automated. Three methods of cash payment have been implemented, in case one fails the other method takes place automatically. These methods are highly secure. The Benefits of this System are: Shorter queues at toll plazas, Faster and more efficient service, minimization of fuel wastage and reduced emissions. **Vehicle theftdetection, Signalbreaking avoidance, tracking over speed vehicles and vehicles that carry illegal goods** arethe features that makes this paper unique. Eliminating delay on highways and roadways, the system ensures that toll payment is made electronically in a hassle-free manner. This system is composed on board and road side unit, image sensor and other components. The center control system is consisted of large database and the information of enrolled vehicles and users. When the vehicle passes the toll station sensor detects

the vehicle, sends out the signal and the reader responds thus establishing two-way communication and data exchange. Center control system fetches the identify vehicle information like car's ID and car's module and compare these information to the database.

III. SYSTEM ARCHITECTURE

IV. HARDWARE AND SOFTWARE

IMAGE SENSOR

The Image Processing System is composed by the camera (CCD), image card and computer processing system. The image incepted by CCD, after APD conversion, will be transmitted to the computer system for image pretreatment and identification, the content of identification generally include license plate numbers, car models or colors.

SERVO MOTOR

A servomotor is a rotary actuator or linearactuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It is used for the opening and closing of toll gates.

NODE MCU

Node MCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi Soc from Espressif Systems, and hardware which

is based on the ESP-12 module. NodeUSB is an open Iot platform about the size of a standard USB stick. It was designed to leverage NodeMCU (Lua) for easy programming and has the extra feature of USB capability. It is ideal for Plug-n-Play solutions, allowing easy prototyping for developers.

RFID TAGS AND READER

The RFID reader is a Radio frequency device that operates at 125 KHz. It reads the data from the passive RFID tag placed in the vehicle and converts the data into digital Weigand format. The Weigand format data can be read using the Microcontroller program and sent to the PC via the RS232 port. An RFID tag is a microchip combined with an antenna in a compact package; the packaging is structured to allow the RFID tag to be attached to an object to be tracked.
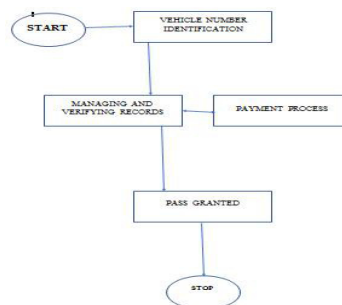
ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. You can tell your Arduino what to do by writing code in the Arduino programming language and using the Arduino development environment.

MICROSOFT SQL DATABASE

SQL is a domain-specific language used in programming and designed for managing data held in a relational database management system, or for stream processing in a relational data stream management system. The vehicle details, payment and transaction details are stored in the database.

V.FLOW DIAGRAM

VI. MODULES

The modules implemented in this paper are as follows:

- Image Sensing
- RFID Tag Reader
- RFID Card Reader
- Manual Process

IMAGE SENSING: Image sensing is basedon the process of capturing a picture of the vehicle. When a vehicle passes through a tollgate the image sensor captures the picture of the vehicle and stores in the database. It then verifies the vehicle number and the vehicle. If the vehicle doesn't match with the number plate it gives an alert to the police. It is also useful to the police department as the process of vehicle theft identification is simplified as it gives the entire data of the vehicle including the time and location.If in case the number plate is not clear or visible, it will move on to the RFID process.The payment is done using the RFID prepaid card.

RFID TAG READER: The RFID peruseris a Radio recurrence gadget . It peruses the information from the uninvolved RFID label put in the vehicle and proselytes the information into advanced organization. This information can be perused utilizing theMicrocontroller program and sent to the PC. A RFID tag is a microchip joined with a radio wire in a smaller bundle; the bundling is organized to permit the RFID tag to be connected to a question be followed. In the event that on the off chance that the RFID tag has been lost the procedure proceeds onward to RFID card peruser.

RFID CARD READER: RFID cardperuser is a gadget that is set in the tollgate. The driver can swipe the RFID prepaid card to pass the tollgate. The toll sum is paid through the RFID prepaid card. A RFID transponder is an extraordinary sort of radio transmitter and recipient. It is actuated when it gets a flag of a particular kind. RFID transponders are available in savvy cards and Radio Frequency Identification labels.

MANUAL PROCESS: When the all thethree methods fail this process takes place. This process is done to avoid/eliminate the traffic congestion in tollgates.

VII. CONCLUSION

In this paper, solutions to the Electronic toll collection system and vehicle theft system have been designed. This system is capable of eliminating congestion in toll plazas, especially during those seasons when trafficseems to be higher than normal. In addition we are not only helping the vehicle ownersand system administrators, the police department is also benefitted as vehicle theft detection and tracking of over speeding vehicles are done with ease. It not only improves the technology level, but also the passage ability of expressway.

VIII. FUTURE WORKS

To develop a dynamic system for Toll Collection conversion: In the currentresearch, the number of automatic toll lanes and their time of implementation are determined based on the delays at the toll lane and the value of the benefits. Thus an algorithm or a method can be developed to decide upon the ideal number of toll lanes as compared to the manual lanes and also consider the lane type that needs to be converted in order to improvise the benefits and reduce the delays at the toll plaza.

To Add on accidental benefits: Fusingbenefits like reduction in incidents at the toll plaza due

to the automatic toll implementation would give
a more comprehensive benefit model.

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