

Unmanned Toll E-Ticketing System

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Abstract – Nowadays almost all highway toll plazas are manually operated, providing a receipt. We often encounter traffic jams on busy highways, due to the slow procedure. In our project, we introduce automatic process of toll collection that will surpass all these problems. Here, we propose an efficient technique called electronic toll collection using RFID modules that automatically collect the toll from vehicles when they cross the toll plaza. We also assume that the owner maintains a prepaid account. If the balance in the owner's account is insufficient or the vehicle is not registered, the toll gate remains closed and the vehicle owner will have to pay the toll tax through debit card. This will improve the security.

Number of vehicles and the number of times a vehicle is passing through the toll gate, get stored in the database. The security will be improved and it'll be possible to detect stolen vehicles. Since cars don't have to repeatedly stop at the toll booth, savings on fuel & reduction in accidents is ensured. There could be a number of toll booths around distinct places and can be integrated under the principle of IoT. There is a unique ID for all the vehicles. Vehicle theft can be prevented by anti-theft alarm. In the cases of Alcoholic detection, in addition to the gate being closed, information about the same will be sent to the concerned authority, as well. Through this process of toll collection, we'll save time, effort, and man power.

Key Words: automatic, toll plaza, electronic toll collection, RFID modules, anti-theft alarm, Alcoholic detection

1. INTRODUCTION

One of the issues we've been witnessing on a daily basis is about the toll plazas. The confusions and inefficient management of the whole toll system is becoming much evident. Times when traffic is immense and the passengers are urgent to reach the destination, the situation becomes a bit complicated. There would be just a few number of people to collect the toll and it becomes difficult for them to manage this big crowded vehicles all together. This may create problems like traffic jams, noise pollution, inefficient toll management and other problems. To surpass this problems and to have an efficient toll collection, there is a need to have a better idea of making the toll collection automatic. So we can propose a system

'Unmanned toll collecting system' where the efficiency is ensured to be improved than the existing systems.

Toll e-ticketing system, made automatic is the approach used for the vehicle when it reaches the toll plaza, this is detected by using a Sensor. RFID tags are used to read each vehicle with the help of RFID reader. The RFID readers read the signal and information about vehicles owners. These RF signals are received by an RF receiver at the toll plaza, which sends data to a computer's parallel port. Depending on this information, appropriate toll tax is deducted from the pre-paid account of the vehicle's owners. When a vehicle does not have an RFID module installed, a vehicle's ID number is not found in the database, or a driver has insufficient funds to pay toll. Existing automatic toll collection techniques incur power loss since the receiver is continuously turned on, even when no vehicle arrived at a toll plaza. In our technique, only the IR sensor is turned on to detect the arrival of vehicles. Only when a vehicle is detected, RFID reader reads the data.

As the toll collection is made automatic, it will be much efficient for both the passengers and the toll authority. In addition to the toll collection, our system aims to give a helping hand to the concerned authority by incorporating alcoholic detection and theft detection in the proposed system. If the vehicle owner is alcoholic, it gets stored in the owner's database and will be forwarded to the concerned authority for further actions. Same as in the case of theft. If the vehicle number is reported missing or any theft case is filed on a vehicle, the gate gets closed and a theft alarm gets activated and information is sent as in the previous case. Altogether, the proposed system serves its best to be an efficient toll collecting system and will lend a hand to serve the society as well.

2. SYSTEM DESIGN

Design & Development is a process with a series of intermediate stages, each one with its own significance towards a successful outcome.

BLOCK DIAGRAM

As shown in the block diagram, the basic design is done. We are using a Raspberry pi module, Arduino, two sensors – IR sensor and MQ3 alcoholic sensor. Lifi is also used. And

mainly, RFID modules are used. We are maintaining a Database, and we are using Mysql for that. For the gate movements, we are using a motor, as well.

As illustrated in the flow diagram Fig 4.1, initially, the user is supposed to register and create an account, submitting all the details that the admin asks for. The details entered are stored in the database under the corresponding column of the respective users(vehicle owners).

The details are stored in distinct user accounts that once they create it, details can be updated when and where they pass through the toll. Once the user is about to get checked into the toll, the sensor senses if the pressure is asserted into the particular part of the toll path through which the vehicle enters. If the asserted pressure is detected, then the power gets on and RFID receiver gets ON, to receive the signals. In the other case, the power doesn't get ON as there are no vehicles passing through the toll gate. When the vehicle is checked into the toll system, with the unique identification number in the RFID tag gets read and checks if the user already has an account or not. If not, the user is asked to create an account. Otherwise the existing account is verified.

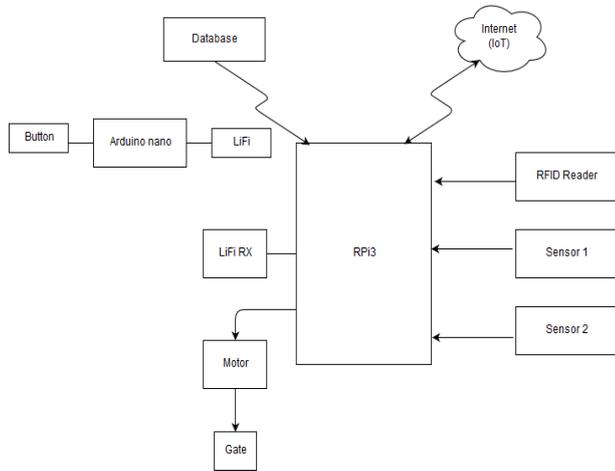


Figure 1. Block Diagram of proposed system

3. WORKING AND EXPERIMENTATION

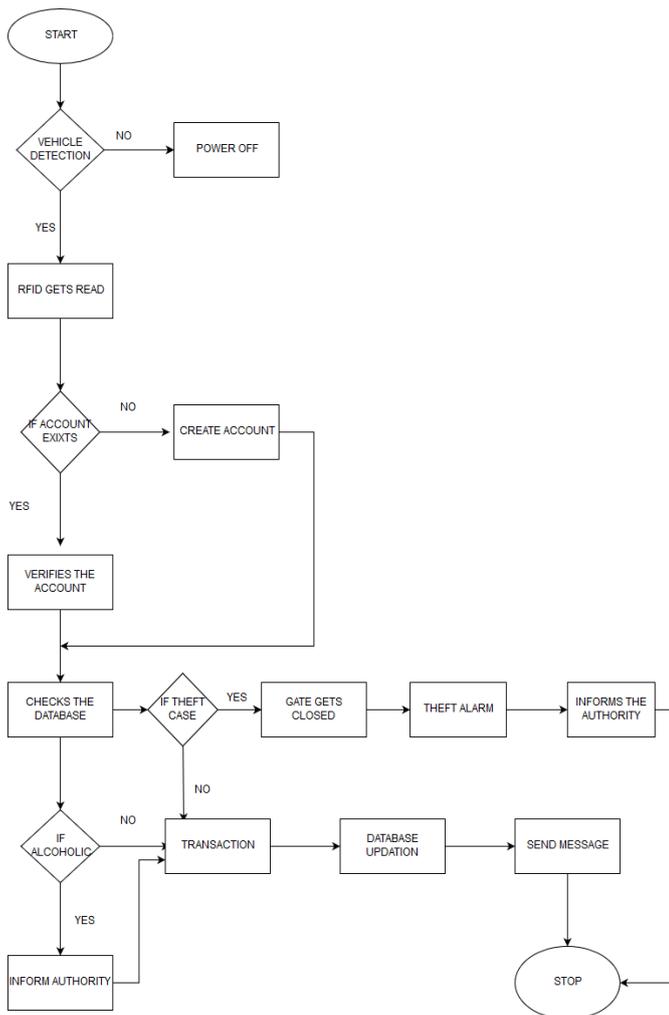


Figure 2. – Flow Chart of the Proposed System

From the database, the user /vehicle information is retrieved and then, from a prepaid account of the user, the toll tax is automatically deducted from the account balance. If at all the balance is insufficient, or user has not registered yet, they are provided with an option to pay the amount using their debit cards. They'll get the bill receipt, as well. This is the worst case, as we intend to have this system fully functioned if all the vehicles in the manufacturing period itself is to be equipped with RFID modules needed for this system. The amount deducted, balance amount and other details get updated in the database and get stored. These information can be used for later use of verification purposes.

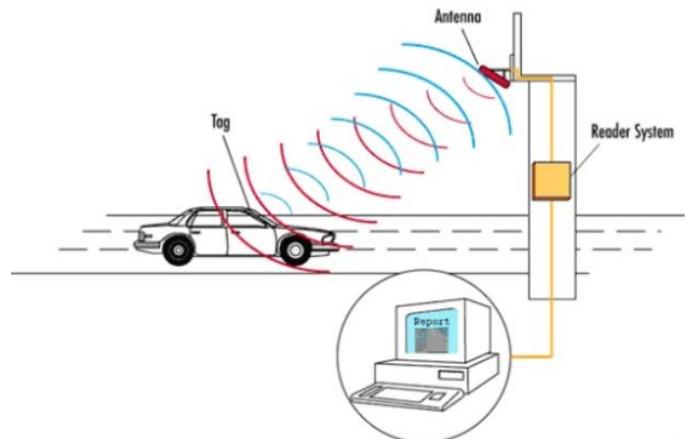


Figure 3. -Working of Unmanned Toll

In addition to just toll collection details, the system is equipped with alcoholic sensors and theft alarm. By checking the database, if the owner of the vehicle is alcoholic, then that information is updated into the user's account in the database. So, the concerned authority can take appropriate actions by checking these information. In the case of theft cases, it is checked if the vehicle number

is reported as missing or any similar cases. Then the toll gate gets closed and a theft alarm gets activated and passes information to the nearby authority concerned. As the primary concern of toll plazas are to collect the toll, the user gets an SMS regarding the transaction, as a final phase of the proposed system.

4. RESULT

Our project has been completed, with the following results, with the prototype as could be seen in the picture .

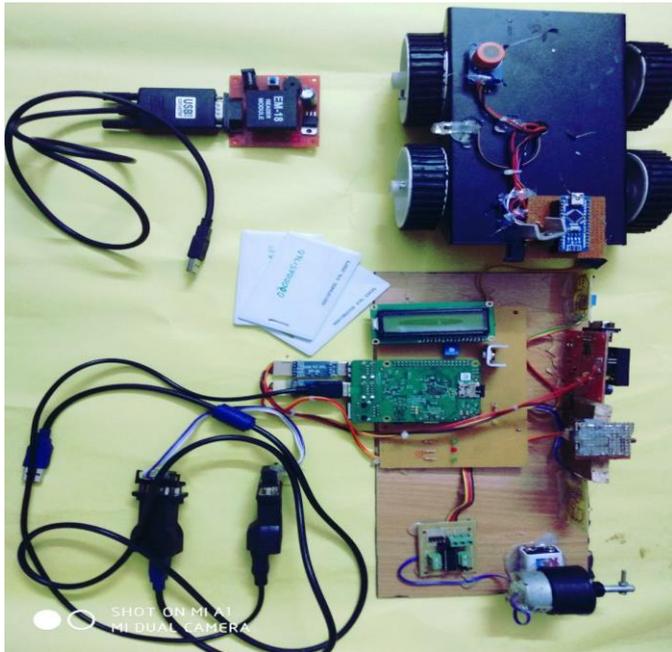


Figure 4. -Prototype of Unmanned Toll E-Ticketing System

5. CONCLUSION

Unmanned Toll E-Ticketing System is a solution to the confusions and inefficient management of the whole toll system. We have used an innovative approach where a traveler will be able to pay the toll tax while in motion using RFID communication technology. Through this process of toll collection, we will save time, effort, and man power. How many vehicles passing through the toll gate stored in a database. In addition to the toll collection, our system aims to give a helping hand to the concerned authority by incorporating alcoholic detection and theft detection in the proposed system. Hence serves the society.

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