ELECTRONIC TURNPIKE AUTOMATION SYSTEM WITH PENALTY ANALYZER

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ABSTRACT - *There exists three systems for the collection of toll fare in India. The recently introduced Fastag system that uses RFID tags and sensors to enable frictionless travel across the toll plazas, faces several drawbacks. This project not only aims at overcoming those drawbacks but also introduces a more efficient system, that uses the available resources in the Fastag system for its implementation.*

1. INTRODUCTION

The amount of time spent in long queues to travel past the toll plazas in India is a never-ending drama. The NHAI planned to reduce this by introducing the Fastag system that uses RFID cards and sensors for its implementation. The RFID tag can be bought from 22 certified banks across India or through e-commerce websites. Further the account details of the user must be linked. A new digital wallet for a specific Fastag is assigned and the user can recharge it whenever required. However due to reasons like technical glitches, double deduction of money from user's wallet and theft of Fastag card, the Fastag has not proved itself to be a advantageous system replacing its predecessors.

By combining the available resources in Fastag system-RFID tag, RFID sensor, digital wallet and sources available in the toll plaza- camera, database; we can create a new system that provides a seamless experience for the commuters by removing the barrier, increasing the security and reducing the time spent in waiting in queues. For this, we compare the Fastag details with the number plate details of the vehicle using the concepts of digital image processing and introduce three cases of toll fare collection from the commuters:

1) If the details of the vehicle's number plate and Fastag match then the required toll fare can be deducted from the user's wallet. 2) If the details match but the commuter's wallet does not have the sufficient balance then a message will be sent to the commuter requesting him/her to recharge their wallet and once the recharge is complete, money can be deducted. 3) If the details of the number plate do not match with that of the Fastag then a notification will be sent to the nearby police station for suspect of theft.

By doing this the barrier in the conventional toll plazas are removed, and all that the driver has to do is travel through the toll plaza in a relatively lower speed- 5 or 10kmph.

2. DESIGN OF THE EXISTING FASTAG SYSTEM

When a vehicle with a Fastag attached on its windscreen arrives at the toll plaza, the RFID reader scans the 16 digit code to check for the details in the server, if the scanned Fastag is registered then the fare is deducted from the user's wallet and the barrier opens.
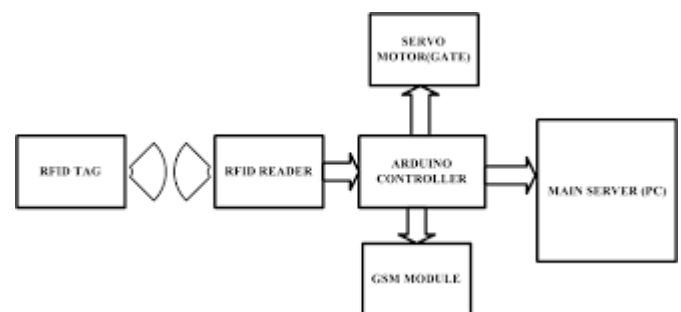

Fig- 1: Block diagram of the Exisitng Fastag system

3. PROPOSED ELECTRONIC TURNPIKE AUTOMATION SYSTEM:

The Fastag card containing the 16 digit code can be scanned by the available RFID sensor in the toll plaza and in order to increase security, by using the cameras available in the toll plaza, we can obtain the picture of the vehicle's number plate and use the concepts of digital image processing to improve the security. By using a suitable microcontroller we can access the database preloaded with the details of all vehicles across India- number plate, owner information etc. and can compare the details of the number plate with that of the data in the database. Template matching technique using SQL coding can be used for this purpose. Then the three cases under money deduction is followed. As soon as the money is

deducted from the user's wallet then the account of the user is immediately blocked for next 5 minutes.
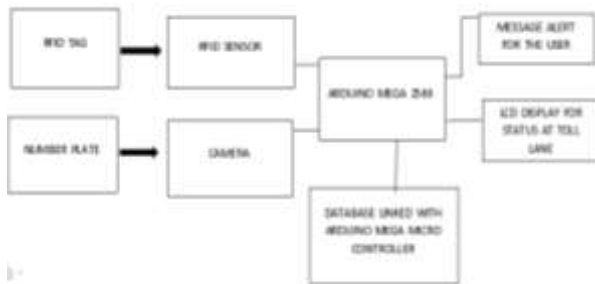

Fig. Working flow of the prototype

4. CONCLUSION

This system removes the regular barriers in the toll plazas and facilitates a smooth travel for the commuters. It ensures more security and removes the technical glitches in the Fastag system. The main advantage of this system is that the cost of implementation is very less as it uses the already available resources with less additional components.

REFERENCES

1. Receiver Autonomous Integrity Monitoring of GNSS Signals for Electronic Toll Collection-Daniel Salós, Anaïs Martineau, Christophe Macabiau, Bernard Bonhoure, and Damien Kubrak.
2. Antenna Array Synthesis for RFID-Based Electronic Toll Collection-Daniele Inserra, Member, IEEE, Wei Hu, and Guangjun Wen, Senior Member, IEEE.
3. Geolocation Process to Perform the Electronic Toll Collection Using the ITS-G5 Technology-Malalatiana Randriamasy, Adnane Cabani, Houcine Chafouk, Member, IEEE, and Guy Fremont
4. https://www.geeksforgeeks.org/digital-image-processing-basics/
5. https://en.wikipedia.org/wiki/MATLAB
6. https://en.wikipedia.org/wiki/Microsoft_Access
7. https://en.wikipedia.org/wiki/Electronic_toll_collection.
8. https://components101.com/wireless/rc522-rfid-module
9. https://en.wikipedia.org/wiki/Liquid-crystal_display
10. https://in.mathworks.com/matlabcentral/fileexchange/20061-template-matching
11. https://en.wikipedia.org/wiki/Template_matching
12. https://www.geeksforgeeks.org/sql-join-set-1-inner-left-right-and-full-joins/