

Smartoll

Automated Toll System Using Qr Code.

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Abstract:

The system is going to provide replacement of old traditional toll system i.e. queuing up to pay toll. Conventional tolling system requires the vehicle to stop at a toll gate and the toll fee is manually paid. This is a slow system as manual processing often leads to delay and vehicles have to wait near a toll gate area. The basic advantages of the system is travelling time is decreased, congestion free network, less emissions in toll area and no infrastructure cost is required. This gives a win - win condition for both toll authorities and toll customers.

Keywords: *congestion free network, less emissions in toll area.*

Introduction:

In our day to day life, we pay certain amount of tax through toll plaza to the government. The toll gates are mostly found on national highways and bridges etc., and we pay standing over a queue in the form of cash, although, the mobility of vehicles gets interrupted by this method which takes longer travel time, more consumption of fuel and also pollution level get increased. By **Automated toll system**, the registered user will be able to pay the toll amount through the application and will get register with the toll booth. By using this system user will get QR CODE by paying online, This system is designed in such a way that the user just have to scan the QR Code which will be provided to him/her and then pass through the toll gate. The user has to select the source and destination and have to pay all toll tax coming between the source and destination of his own. The user don't have to carry a handsome amount of cash with them, relates to security as well, this method also reduces the traffic congestion problems, reduces the travel time and reduces the fuel consumption. This system does not require any manual operation of toll barriers and collection of toll amounts, it is completely automated toll collection system.

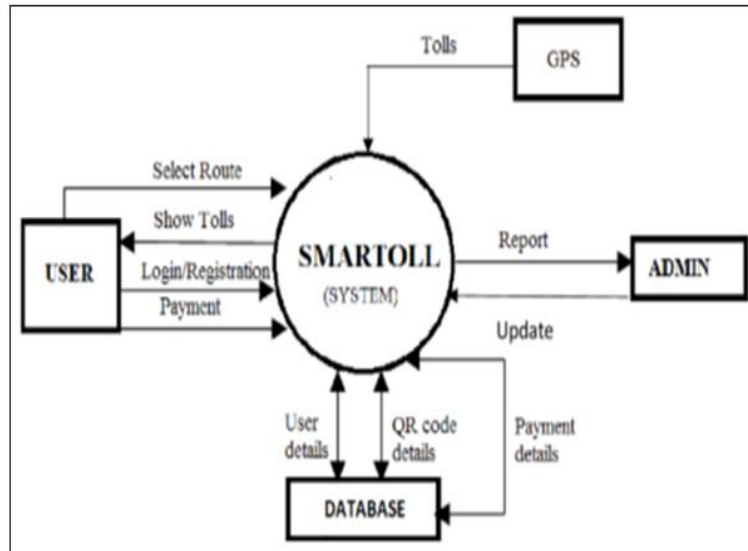


Fig.no-1 DFD diagram

Problem definition:

The amount of traffic in recent years has been steadily increasing due to the ever increasing number of vehicles. Every day; millions of commuters take to their own personal vehicles in place of public transport systems. This leads to steady increase in vehicle traffic in developing countries. The only possible solution is to build more number of wider roads. Often the government is in short of funds; hence “tolling systems” are used to collect funds as the vehicles use these toll roads.

Conventional tolling system requires the vehicle to stop at a toll gate and the toll fee is manually paid. This is a slow system as manual processing often leads to delay and vehicles have to wait near a toll gate area.

- Today’s toll paying system requires manual labor.
- Travelers’ have to wait in queue to pay toll.
- Travelers’ need to carry exact change.
- Excessive pollution near toll booths.
- Hand-to-Hand transaction of amount is more time consuming.

An improvement in the traditional system is the SMARTOLL (Automated Toll Collection System), which requires users to have an android application. As the vehicle passes the toll gate, the user has to scan the QR CODE and the toll amount is deducted from the prepaid account balance. This allows speeding up the toll collection

process up to a certain level. Our system aims to overcome the limitations of the today's toll system. Instead of a cash payment, our system uses a smart-phone based toll payment app.

Existing system:

Example 1:

One institute has designed, developed and manufactured two types of toll collection systems on highways: “closed system” (where the presence of the vehicles is registered at the entrance to the system, and the payment is performed at the exit), and “opened system” (the payment is performed on one spot regardless of the distance travelled).

The whole system includes three levels:

1. Lane level.
2. Plaza level.
3. Central level.

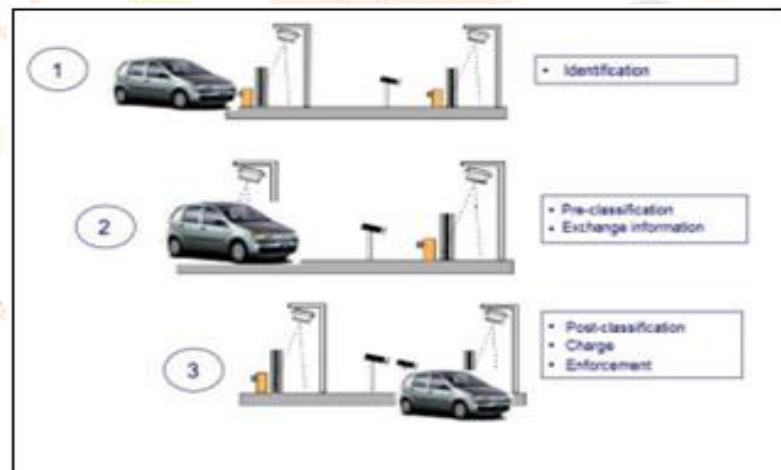


Fig.no-2 System Overview of “opened and closed system”

Example 2:

Electronic Toll Collection System is designed in such a way that as the vehicle approaches the toll plaza, the radio frequency field emitted from the antenna activates the transponder.

The transponder broadcasts the signal back to the lane antenna with some basic information. That information is transferred from the lane antenna to the central database.

If the account is in good standing then toll is deducted from the prepaid account of the traveller. If the toll lane has a gate, the gate opens. A green light indicates that the driver can proceed.

This entire process takes matter of seconds to complete. Electronic system records transaction including time, date, plaza and toll charge of each vehicle.

But this system uses RFID tags which means if RFID tags fails the whole system fails.

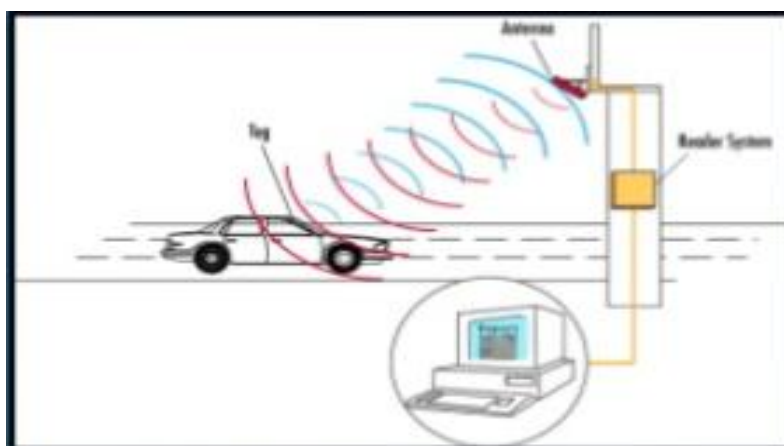


Fig.no-3 System overview of “Electronic Toll System”

An improvement in these above-mentioned systems is the SMARTOLL (Automated Toll Collection System), which requires users to have an android application. As the vehicle passes the toll gate, the user has to scan the QR CODE and the toll amount is deducted from the prepaid account balance. This allows speeding up the toll collection process up to a certain level. Our system aims to overcome the limitations of the today's toll system. Instead of a cash payment, our system uses a smart-phone based toll payment app. The gate opens and closes as the vehicle is fully passed through the toll gate which is recognized by the IR Scanners at both the entry and exit point of the toll gate.

Research Through Innovation

Purposed system:

The system is been developed in various environments such as php, android, python, etc. The idea is to use a mobile application to pay tolls between ones journey which will avoid traffic and also the pollution. Conventional tolling system requires the vehicle to stop at a toll gate and the toll fee is manually paid. This is a slow system as manual processing often leads to delay and vehicles have to wait near a toll gate area.

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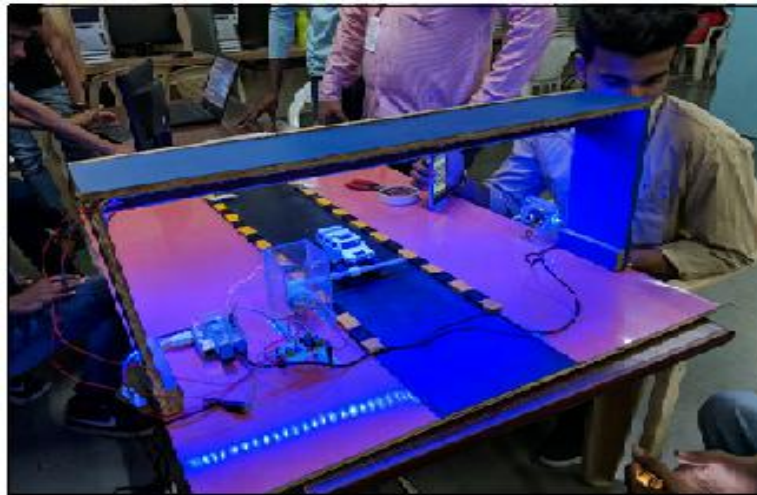


Fig.no-4

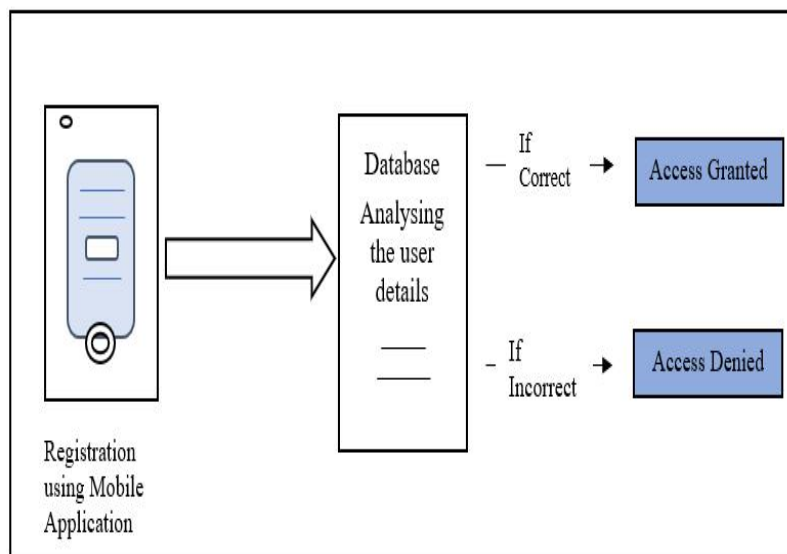


Fig.no-5 Registration for Toll Payment via Mobile Application.

Aim & objective of the system:

The system is going to provide replacement of old traditional toll system i.e. queuing up to pay toll.

Advantages:

- Reduction in waiting time at toll queue.
The waiting time at the toll is the major issue. The main reason is number of increasing vehicles day-to-day. Due to our system waiting time is reduced.
- Faster and more efficient services :There is no requirement of human resources except for maintenance of the devices and since using machines there is less chance of error which occur due to humans
- Reduces manual labour and delays occurring while paying amounts.
Human error while taking and giving money is reduced due to our system.
- Reduce pollution problem near toll booth.
Since our system is totally online and the payment does not require to be done at the toll thus the pollution is reduced.
- Easy to use and simple to carry app in mobile devices.
- Reduces illegal toll gate entry.
- Avoid financial loss.

Requirements:

The Software Requirements Specification is produced at the culmination of the analysis task. The function and performance allocated to software as part of system engineering are refined by establishing a complete information description. a detailed functional and behavioural description, an indication of performance requirements and design constraints appropriate validation criteria and other data pertinent to requirements.

Internet Facility

Our application requires Internet because it is a request response type application. When user search toll the request goes to server and server response the tolls between the route and also for the login and registration and for payment. When user scan the code at toll booth the microcontroller must connected to internet to update the Qrcode.

Hardware Requirement

The minimum hardware required for the development of the project is as follows-

- ✚ QR Code Scanner
- ✚ Wi-fi Module.
- ✚ Microcontroller

- ✚ Smart Phone.
- ✚ Server (Recommended).
- ✚ Core i3 or Higher.
- ✚ RAM (1GB) or Higher.
- ✚ HDD (100GB).

This all are the minimum hardware requirement required for our project. We want to make our project to be used in any type of computer therefore we have taken minimum configuration to a large extent 4GB ram is used so that we can execute our project in a least possible ram 5GB hard disk is used because project takes less space to be executed or stored. Therefore, minimum hard disk used. Other enhancement are according to the needs.

Software Requirement

Various software's are needed in this project for its development.

- Windows 7 or higher.
- Android Studio/ Eclipse.

Future scope: Busy highways where traffic jam is a regular scenario due to manual toll collection process, our proposed system will reduce the wait time. We can give a static QR code which can be attached to vehicles, when vehicle pass from the toll booth the scanner automatically scan that QR code and open the gate.

If in future some higher functionality scanner is introduced then we can directly scan the number plate of vehicles instead of QR code which will require even lesser time and payment will be deducted from the user's bank account linked with that vehicle.

The ability to make payments from your bank account itself. Overall lowered toll collection costs. By full automation it will be more efficient usage and provide quick service.

Results and reports:

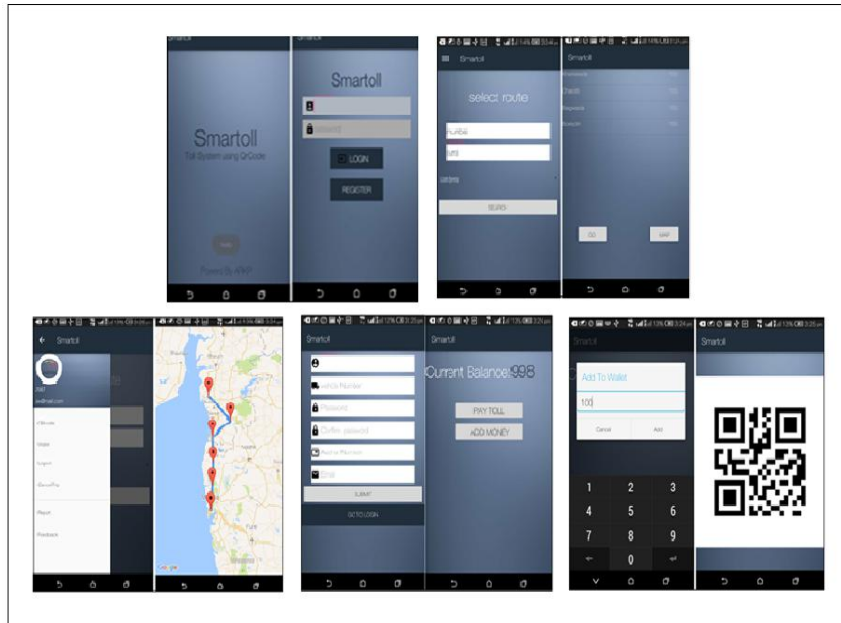


Fig.no-6

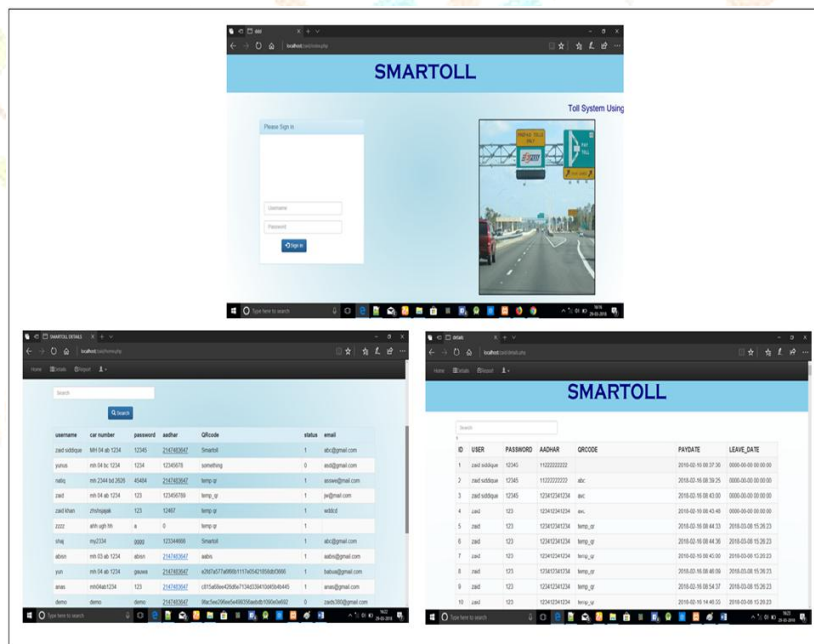


Fig.no-7

Conclusion :

Implementation of Smart toll (Automated Toll System Using QR Code), gives many advantages, such as no waiting time of the vehicles, no traffic congestion, assured and accurate collection of toll amount, free from cash, minimum emissions which are harmful for living. This paper investigates how to use GUI for collection of toll, the real time management and monitoring is done. It has expanded capacity for vehicle

without building the big infrastructures. It has improved efficiency and reliability of toll plazas and traffic abilities of Highways.

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