

“SMART TOLL COLLECTION AND TOLL BOOTH MANAGEMENT SYSTEM”

Ms. Pranali Ramesh Sagare¹, Ms. Jyoti Lalaso Shinde², Ms. Jyoti Sanjay Patil³, Mr.Sachin S. Patil⁴

^{1, 2, 3} B.E. Students, ADCET, ASHTA, Maharashtra, India

⁴Assistant Professor, ADCET, ASHTA, Maharashtra, India

Abstract- Now days there is a huge rush in the toll plazas in order to pay the toll tax. Therefore in order to reduce the traffic jam and to save time & also to reduce the money loss. We have designed project for the automation in toll tax payment using RFID. We have made the automation of toll plaza using combination of microcontroller, RFID. This concept explains the implantation of automation in toll plaza which is a step towards improving the monitoring of vehicles, travelling in predetermine routes. The aim of our project is to design a system which automatically identifies an approaching vehicles and record vehicles number and time. If the vehicle belongs to the authorized person, it automatically opens the toll gate and a predetermined amount is automatically deducted from its account. This translates reduced Traffic congestion at toll plazas and helps in lower fuel consumption. This is very important advantage of this system.

Key Words: Smart Toll Booth, Toll collection system, RFID, Vehicle, Traffic etc.

I. INTRODUCTION

Electronic toll collection system allows the vehicle drives to pass the toll tax booths without stopping at the toll booth. The toll amount is deduced from the RFID card. This RFID cards is rechargeable and account is stopped on the records. Automatic Toll Tax systems have really helped a lot in reducing the heavy congestion caused in the metropolitan cities of today. It is one of the easiest methods used to organize the heavy flow of traffic. When the car moves through the toll gate on any road, it is indicated on the RFID reader that it has crossed the clearing. The need for manual toll based systems is completely reduced in this methods and the tolling system works through RFID. The system thus installed is quite expedient reducing the time and cost of travelers since the tag can be deciphered from a distance. As we all know that transportation is the backbone of any country's economy. Improvement in transportation systems result into the good lifestyle in which we achieve extraordinary freedom for movement, immense trade in manufactured goods and services, as well as higher rate of employment levels and social ability. In fact, the economic condition of a nation has been closely related to efficient ways of transportation. Increasing number of vehicles on the road, result into number of problems such as congestion, accident rate, air pollution and many others One of the important aspects of modern electronic technology is embedded systems based on micro controllers. The main aim of science has always been to make our lives easier. In

this project, we discuss an innovative concept of tool booth. Some of the issues faced by customer are:

Wastage of valuable time, Traffic jam and money loss, fuel loss. The necessity for vehicles to stop or slow down for toll fee payment results in traffic congestion and reduces fuel efficiency. Hence, a system that enables road users to pay the toll fees without stopping or slowing down was proposed and developed. Hardware and software designs were carried out to develop a RFID based highway toll collection system. This system has developed using a microcontroller. Different modules such as GSM module, Liquid Crystal Display (LCD) module.

The system has two parts, namely hardware and software. The hardware system consists of microcontroller, LCD , RFID, motor driver, and GSM. The software system consists of a Assembly based language is used .

This system consists of a microcontroller interfaced with RFID, Motor driver, Max 232 and LCD 16x2 display, forming the hardware unit and interfaced to the server making up the software unit. Two sensors are attached far from the toll plaza. When any vehicle crosses to first sensor which is RFID reader it check the balance and deduct require amount. If user balance is deducted online and web system sends signal back to the RFID card system, that the user has billed. On receiving this signal the system operates the motor to open the toll gate when vehicle passes to next sensor which is IR sensor.

II.METHODOLOGY

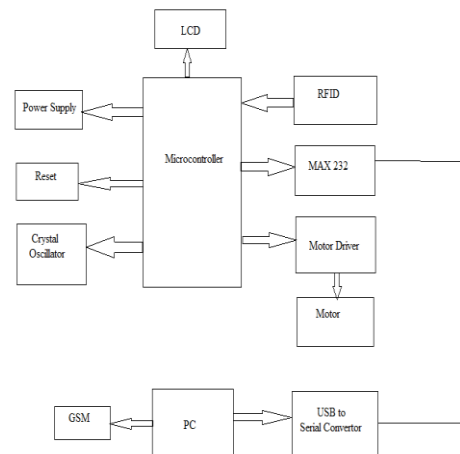


Fig 1. Block diagram of Smart Toll Collection and Toll Booth Management System

RFID card:

This is one of the most important part of the project .RFID cards are used for applications as access control in security system, cashless payment etc.

RFID reader:

A RFID reader is a device which is used to interrogate an RFID tag. It reads the unique number from the RFID cards and sends it to the microcontroller.

Microcontroller:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In System Programmable Flash memory. Microcontroller is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the Microcontroller. The controller here user will be of 8051 family. This unit requires +5VDC for it proper operation. Microcontroller is the CPU of our project. The various functions of microcontroller are:

- Reading the RFID card number from the RFID reader.
- Sending this data to the LCD so that the person operating this project should read various informative messages.

Sending the data to the motor or buzzer depending upon the RFID card number and balance inside the car.

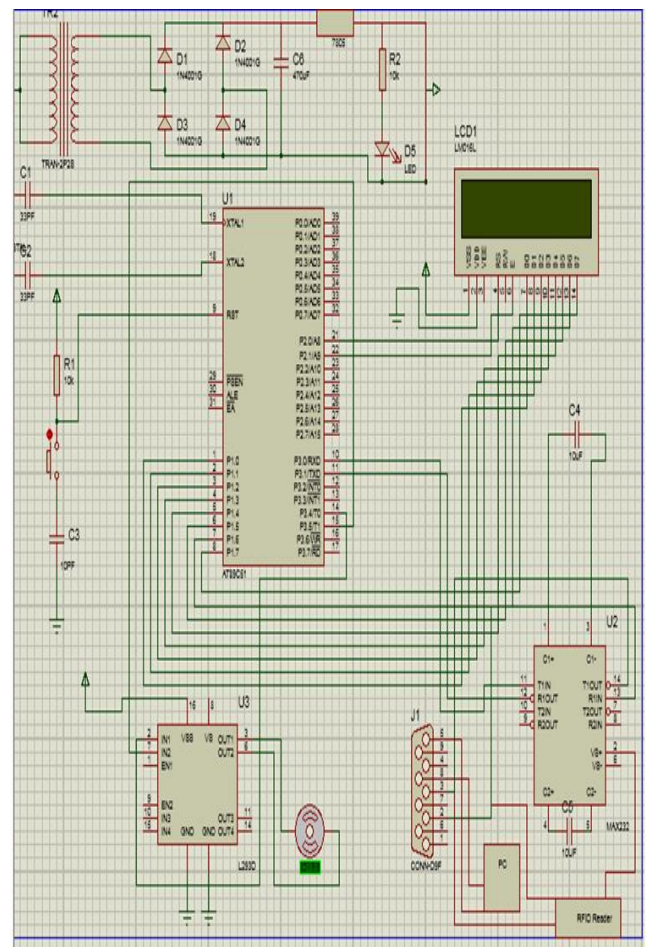
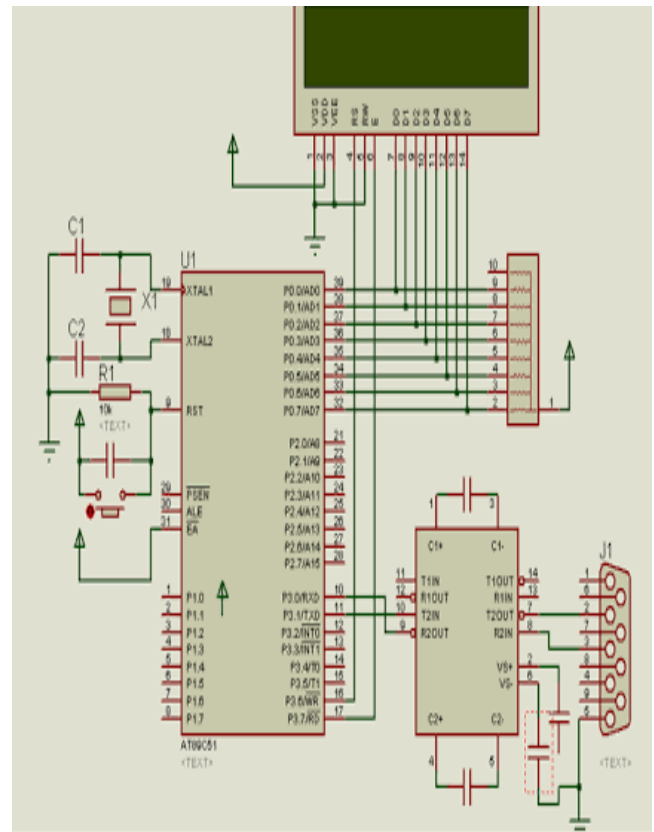
LCD: It is called Liquid Crystal Display. We are going to use 16x2 characters LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface. This unit requires +5VDC for it proper operation. This module is used for display the present status of the system.

Power Supply: This unit will supply the various voltage requirements of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier. It will convert 230VAC into desired 5V/12V DC.

Motor driver: Motor driver is an IC which is used to drive the motor.

DC Motor: Motor is used to open the gate.

II. Proteus Simulation



IV. Flowchart

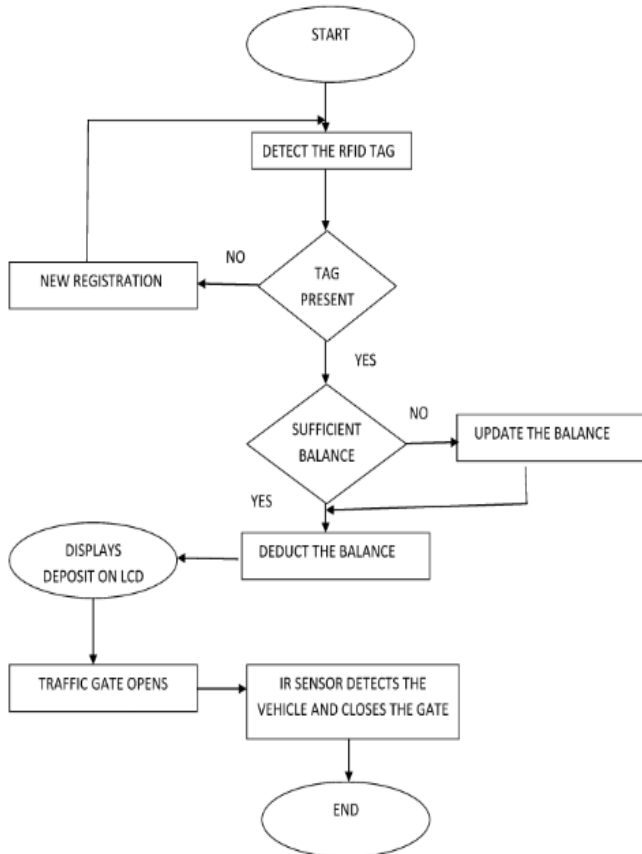


Fig.2 Flowchart of Smart Toll Collection System

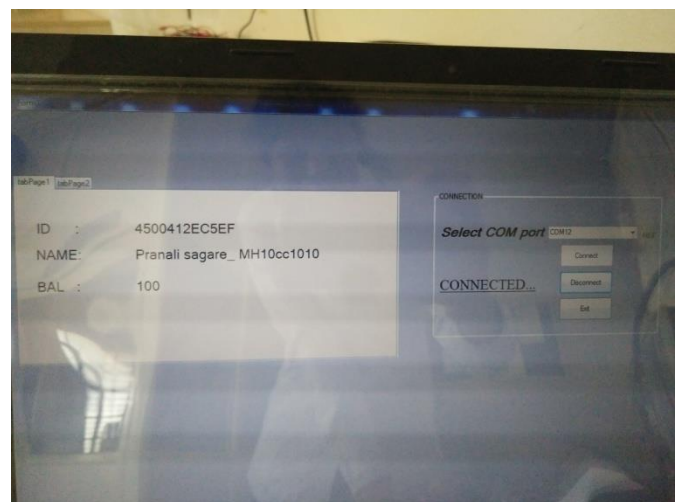
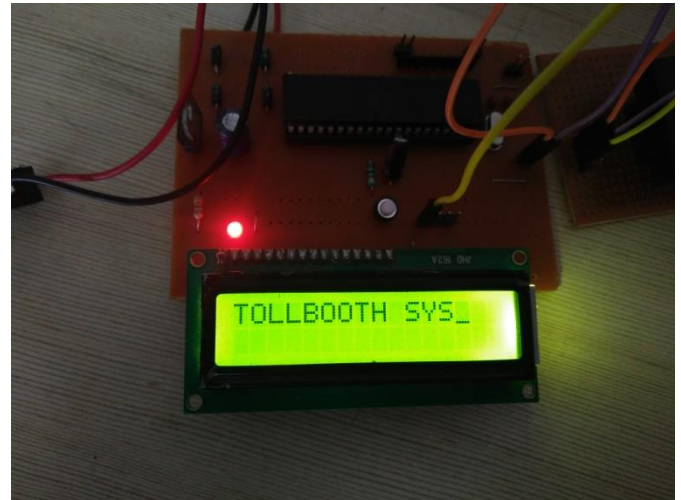
Whenever any person buys a vehicle, first he/she need to do her vehicle registered at the RTO office. RTO people will assign a number plate to it along with it they will give a RFID enabled tag. This card will have a unique ID feasible to use with that vehicle only. They will also create an account for that particular smart card and maintain transaction history in database. Owner of the vehicle needs to deposit some minimum amount to this account.

Every time a registered vehicle approaches the toll booth, first the Infrared sensors will detect the presence of the vehicle which in turn activate the RFID circuit to read the RFID enable smart card fixed on the windscreen of the vehicle. Transaction will begin, depending upon the balance available toll will be deducted directly or the vehicle will be directed towards another lane to pay tax manually. The software further updates the details in the Centralized database server. It also triggers mechanism to generate the bill and will be sent to user as a text message. On the other hand, whenever any vehicle owner registers a complaint at the RTO office regarding theft of the vehicle respective entry is made in the database. Now any vehicle arriving at toll booth with same ID as already present in stolen vehicle category will be easily identified as the ID assigned with it is unique.

All the toll plazas will be connected to each other along with the centralized server in the form of LAN. Updates of

any sort of transaction will be immediately updated to local database and centralized server.

V.RESULT:



VI.ADVANTAGES:

- Eliminate delay on toll roads
- Save time and effort.
- Traffic jams are avoided

VII.APPLICATION:

- Automates the entire toll booth collection and monitoring.
- Online transaction.
- Security



She is student of “B.E (E & Tc), Departments of Electronics & Telecommunication Engineering, Annasaheb Dange College of engineering and technology Ashta, Maharashtra, India “

VIII.CONCLUSION:

The Electronic Toll Collection system in expressway based on RFID, a design scheme was put forward. It is low cost, high security, far communication and efficiency, etc. It not improve the passage ability of expressway but also improve the technology level of charge. Electronic toll collection system using RFID is an effective measure to reduce management costs and fees, at the same time, greatly reduce noise and pollutant emission of toll station. In the design of the proposed Electronic toll collection (ETC) system, real time toll collection and anti-theft solution system have been designed. This reduces the manual labour and delays that often occur on roads. This system of collecting tolls.



she is student of “B.E (E & Tc), Departments of Electronics & Telecommunication Engineering, Annasaheb Dange College of engineering and technology Ashta, Maharashtra, India”.

Is eco-friendly and also results in increased toll lane capacity. Also an anti-theft solution system module which prevents passing of any defaulter vehicle is implemented, thus assuring security on the roadways.



Mr.Sachin S. Patil is working as an assistant professor in department of E&Tc Engineering of Annasaheb Dange college of engineering and technology, Ashta. He stood 5th rank at the time of BE in SUK Exam. He has 10 years of teaching experience. He has attended 12 STTP, 11 Workshops, 5 national conferences, 4 international conferences. He has published 13 papers in international journals. He got young instigator award at international conference at Nagpur.

IX. FUTURE SCOPE:

The process of biopsy can be accompanied by using a breathing analyzer. This would facilitate in the easy detection of the position of cancerous or malignant tissues. It is a compact device as well as secure device. It is also portable in nature. It can also be used in the future for bio-feedback control and robotic application.

X. REFERENCES

1.Tri B. Joewonoa Bekt, A. Effendib Hansen S.A. Gultomb Ranto P. Rajagukgukc , “Influence of Personal Banking Behavior on the Usage of the Electronic Card for Toll Road Payment”, Transportation Research Procedia ,Elsevier, Volume 25, 2017, Pages 4454-4471.

2. Brijesh Kumar , Chaurasia Shekhar Verma, “Secure pay while on move toll collection using VANET” , Computer Standards & Interfaces , Elsevier , Volume 36, Issue 2, February 2014, Pages 403-411.

BIOGRAPHIES



She is student of B.E (E & Tc), Departments of Electronics & Telecommunication Engineering, Annasaheb Dange College of engineering and technology Ashta, Maharashtra, India “