



## ICNSCET19- International Conference on New Scientific Creations in Engineering and Technology

### Techno Tollbooth Using RFID Tags & GSM Technology

P.Priyadharshini<sup>1</sup>, P.Pavithra<sup>2</sup>, G.Safrena<sup>3</sup>, S.Dhivya<sup>4</sup>, K.Sangeetha<sup>5</sup>

<sup>1</sup>ECE, Nadar Saraswathi College Of Engineering & technology

<sup>2</sup>ECE, Nadar Saraswathi College Of Engineering & technology,

<sup>3</sup>ECE., Nadar Saraswathi College Of Engineering & Technology

<sup>4</sup>ECE, Nadar Saraswathi College Of Engineering & Technology

<sup>5</sup>ECE, Nadar Saraswathi College Of Engineering & Technology

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### Abstract

ATCS usually known as “Automated Toll Collection System” is a new technology for collecting toll in a faster and more efficient way. It is a great alternative to long waiting at manual toll plazas. In order to overcome the wastage of time and fuel at same time we have come up with a concept of RFID based automated toll collection system using Arduino. RFID stands for **Radio Frequency Identification**; these cards are unique identities provided to every vehicle by Registration Office at each city. Whenever a vehicle with such Unique ID reaches the toll plaza, the RFID card reader attached on the toll plaza gate reads the card and transfers the unique ID to **Arduino ATmega 328**. Accordingly, the processor works and deducts a fixed money from the prepaid card. If the card's ID is valid and has sufficient balance, the processor will command the DC motor to start and open the gate, letting the vehicle to pass. On passing from the gate the screen will show the deducted and current balance of the card. If the card is not valid or low in balance, it will prompt to move the vehicle to manual toll collection lane Furthermore, a message will be sent to the owner's registered mobile number with the same details along with the location of the toll booth.

**Keywords:** ATCS, RFID, ATmega328, Arduino, SIM900.

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### I. INTRODUCTION

While driving along Highway, we all encounter single or multiple booths in which we have to pay a fixed amount of money. These booths are known as toll booths. Toll is a kind of tax that we pay to the government for the maintenance of the highways.

#### Methods of toll collection :

There are basically three methods of toll collection:

#### 1. Manual Toll Collection:

This method is the most widely used method in India. In this, when the vehicle arrives at the toll booth the driver gives the money to the collector at the booth. The money of every vehicle is fixed.

## 2. Automatic Toll Collection:

Unlike manual collection method, it does not use any human. Instead, machine known as an Automated Coin Machine (ACM) is used. This machine accepts coins or tokens provided by agency operating the booth.

## 3. Electronic Toll Collection:

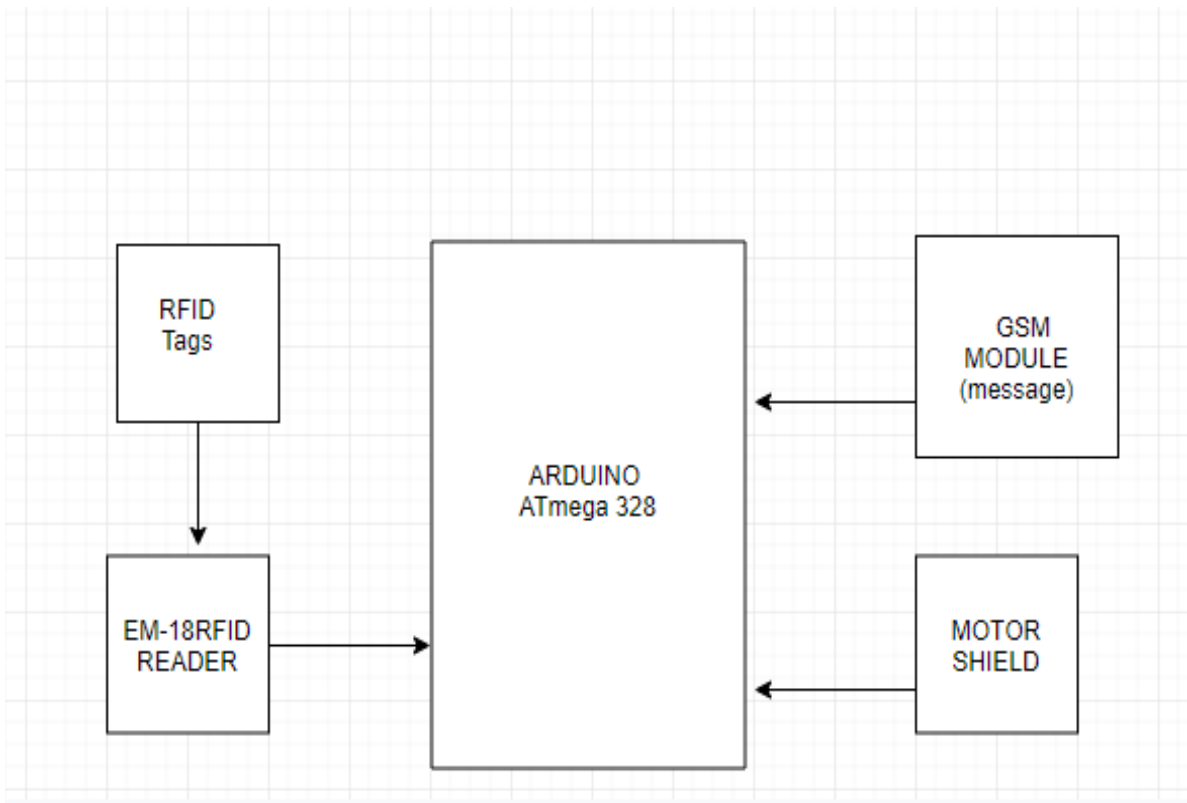
As the name suggests, the whole system is automatic and no human efforts are required. It is not a much familiar method in India but is commonly used in countries like USA. It uses a card or a tag to identify the vehicle and automatically deducts the amount from the bank account. It is much faster way.

## II.SYSTEM ARCHITECHTURE

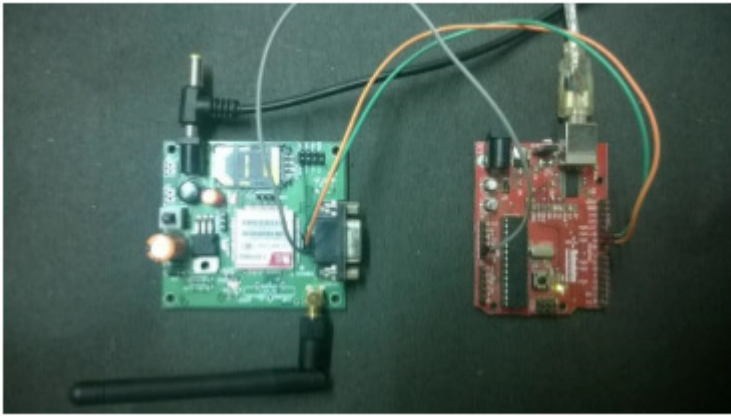
When the vehicle passes the tollbooth , it must be pay the amount to the toll. In our project it is done by automatically, that is the vehicle having a RFID Tag , and the Toll booth having EM 18 RFID Reader, it senses the vehicle and credit the payment from the respective account. And by using the GSM technology the message can be send to their mobile phone. it is credited amount and remaining balance. by Our project the wastage of time and more traffic will be avoided.

## III.SYSTEM DESIGN

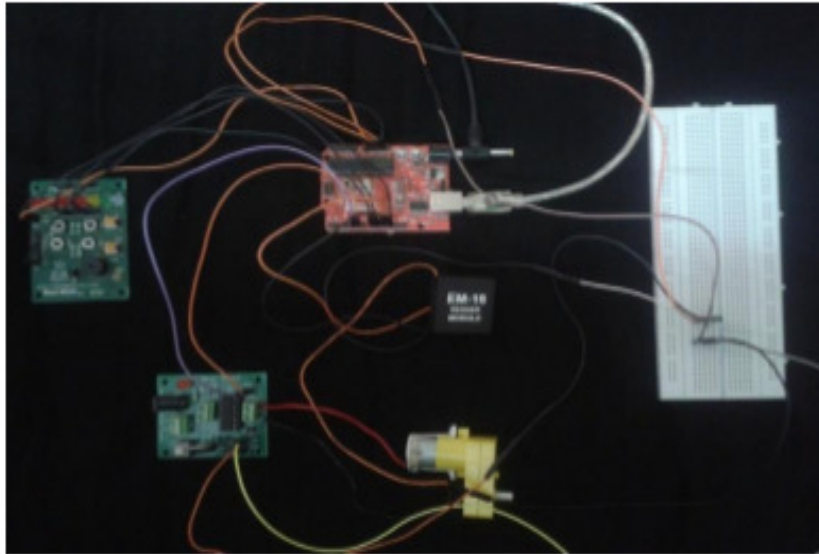
The basic methodology used in this project is integration of small Embedded C codes for each hardware to form a large working code for a working model of ATCS(Automated Toll Collection System). Embedded C is a very similar language to C and C++ with few of its libraries and function name being different it serves as an easy and simple language to make embedded systems work according to the coders need. The basic methodology governing this project is the principle behind working of RFID tags i.e. identification of products on which RFID tag is put, without requiring any line of sight transponder and RFID reader. In a RFID module the basic transponder has all the information, the transponder is also called RFID tag, the stored information can be in binary bit or lot of binary bits, for example: personal information, medical information, or any type of information, stored digitally. On coming in range of the reader the RFID tag i.e. a passive tag communicated with the transceiver. Since the passive RFID tags are powerless they take power from Electromagnetic field coming from RFID reader. Usually the most important component of any tag is the chip or microchip. When tag reaches the reader's RF field, it draws so much power that it can easily access internal memory, and transfer the information



**GSM with AT mega 328:**



## ARDUINO, EM-18, Basic Shield & Motor Shield Interfaced:



### IV.RESULT

A simple and handy program was written to state as to how much balance the IDs are given so that when detected a certain decided amount is to be deducted each time. The money deduction program worked perfectly



Fig 4.3 Money Deduction Output

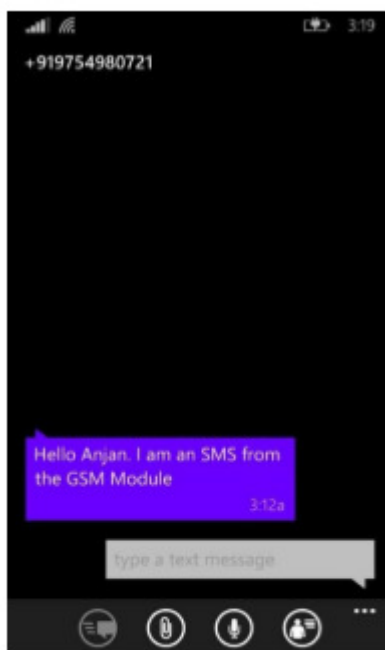
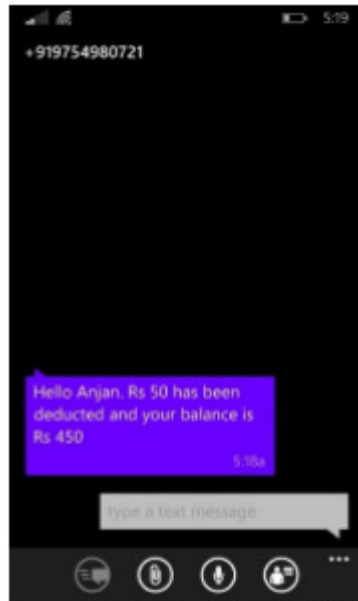


Fig 4.5 Received Test Message



**Fig 4.6 Money Deduction Message**

## **V.CONCLUSION:**

The toll collection system works as proposed; when a vehicle approaches the toll booth and reaches the EM 18 card reader, it reads the card as it matches the same frequency range i.e. 125 KHz. The data thus stored in the card i.e. the unique ID is sent to the Arduino where it processes as to what needs to be done. If the program contains the ID read from the card, it gives an output that it is valid/ correct and hence forwards the command to the LEDs and Buzzer to work accordingly i.e. to blink twice and buzz simultaneously. After this is done the Arduino commands the motor to start for a certain time so as to open the toll gate or barrier in a way that the vehicle containing the card could pass easily. After a delay of nearly 5 seconds the toll gate automatically closes so that no other vehicle could pass.

The Arduino further commands the GSM Sim900 Module to forward a message meant only for that registered user suggesting that a certain amount has been deducted and notifying that this much amount is left in their balance for toll. This ends the procedure. If the card is read and the Arduino rejects the card displaying it as invalid/incorrect, a command is sent to the LEDs and the buzzer to beep for a long duration and hence not opening the gate.

## **VI.REFERENCES:**

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