

## Automatic Toll Collection And Anti Theft Alert System Using Rfid & Microcontroller

G.Naga Swetha<sup>1</sup>, G.Jayasree<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Electronics and Communication Engineering, Madanapalle Institute of Technology & Science, Madanapalle, Andhra Pradesh, India.

<sup>2</sup>Student(M.E), 14691D6803, Madanapalle Institute of Technology & Science, Madanapalle, Andhra Pradesh, India.

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**Abstract:** The computerized toll gathering framework utilizing latent Radio Frequency Identification (RFID) tag rises as a persuading answer for the manual toll gathering technique utilized at tollgates. Time and productivity are a matter of need of present day. With a specific end goal to defeat the real issues of vehicle blockage and time utilization RFID innovation is utilized. RFID peruser settled at tollgate outline (or even a hand held peruser at manual path, on the off chance that RFID labeled vehicle enters manual toll paying path) peruses the label joined to windshield of vehicle. The article recognition sensor in the peruse identifies the methodology of the approaching vehicle's tag and toll reasoning happens through a prepaid card doled out to the concerned RFID tag that has a place with the proprietors' record. This makes tollgate exchange more helpful for the open use.

**Keywords:** RFID card reader, RFID tags, GSM, ARM 7.

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### I. Introduction

The principle thought behind actualizing RFID based toll accumulation system is to mechanize the toll gathering process their by diminishing the long lines at toll stalls utilizing the RFID labels introduced on the vehicle. This framework is utilized by vehicle proprietors, framework chairman. Other general favorable circumstances for the drivers incorporate fuel investment funds and decreased portable discharges by lessening or taking out deceleration, holding up time and speeding up. In the interim, for the toll powers additionally get the advantages specified below. The advantages for the drivers include:

- Less or shorter lines at toll squares by expanding toll corner administration turnaround rates.
- Quicker and more effective administration (no trading toll charges by hand)
- The capacity to make installments by keeping a parity on the card itself
- The utilization of postpaid toll articulations (no compelling reason to ask for receipts)
- Brought down toll gathering costs
- Better review control by unified client account and
- Extended limit without building more frameworks.

### Existing System

The current framework goes for toll collection system is manual which requires man power and maintenance cost. It is a slow process why because every vehicle should pass to nearer the administrator to give their toll tax. Of course there is some advantage of uses of debit cards but it is not automation and requires more time which causes the passengers stay in a long queue and also more strain for the administration department for counting of amount and giving exact change.

### Proposed System

This anticipates managing of toll collection system accurately. In this we are using the RFID cards or tags for each vehicle which includes the vehicle owner name, vehicle number, bank details of owner, owner's mobile number. The RFID toll collection system is placed at every toll gate which consists of RFID reader, faring system, and GSM. In this system whenever the vehicle came nearer to the toll gate, the RFID tag can be detected or scanned by the RFID reader and then the faring system will checks the remaining details such as available balance are there or not and faring the toll tax amount. Then after GSM can send the message to the particular person and updating the details to the server. This system also includes the finding the theft vehicle and sending the SMS through GSM.

## II. Implementation

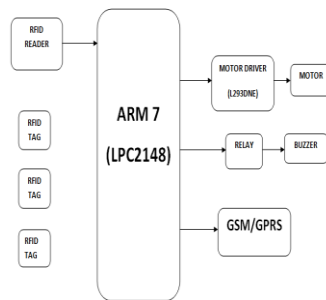


Fig 1. Implementation of RFID based toll collection system

Fig 1 illustrates the design and implementation of RFID based toll collection system. The proposed framework mostly goes for building up a framework to manage toll collection system accurately. In this framework every vehicle have one RFID tag, and whenever vehicle reaches to the toll gate RFID reader will scans the tag and checks the balance details whether required balance is there or not. If enough balance is present, then the toll tax amount is deducted and toll gate is opened up to small interval of a time. If there is sufficient balance, it doesn't open the toll gate. If the vehicle is theft one, then buzzer will be on in order to acknowledge the people by sending SMS through the GSM. After all the process is over, then the updating of toll gate system data to the server is done through GSM. The actual framework of this concept is like as shown in the figure below



Fig 2: The proposed framework

In this proposed framework we are utilizing RFID system, GSM, and ARM7 microcontroller. The main hardware components are:

- 1) ARM7 micro controller
- 2) RFID system
- 3) GSM

### ARM7 micro controller

“ARM” is the abbreviation of “Advanced RISC Machines”. It is a widespread processor cores in the world. It is especially used in portable devices due to reasonable performance and low power consumption. ARM is a family of RISC architectures. The fig. of ARM is shown in the fig9. The ASK 16/32-bit ARM7TDMI-S microcontroller training board is very specifically designed to help students to meet their required skills in the area of embedded systems.

### LPC2148 Chip Features

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory.
- 128-bit wide interface/accelerator enables high-speed 60 MHz operation.
- In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase in 400 ms and programming 256 bytes in 1 ms.
- Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution.
- USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM.
- Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only).
- Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.

- Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.
- Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus (400 kbit/s),
- SPI and SSP with buffering and variable data length capabilities.

**RFID system**

The RFID system consists of RFID reader and RFID tag. The RFID tag is for identification of vehicles and owner’s details. While the RFID reader is for scanning the each vehicle and informing the information about the vehicle and bank details of that vehicle owner to the controller. The below fig shows the RFID reader module which is used in this project.



**Fig 2:** RFID reader module.

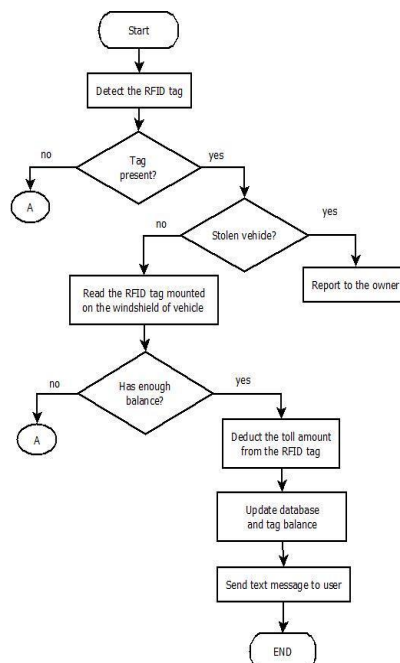
RF transmit frequency	125KHz
Supported standards	EM4001 64-bit RFID tag compatible
Communications Interface	TTL Serial Interface, Weigand output
Communications Protocol	Specific ASCII
Communications Parameter	9600 bps, 8,N,1
Power Supply	4.6V-5.5V DC +/- 10% regulated
Current Consumption	50mA<10mA at power down mode
Reading Distance	Up to 100mm depending on tag
Antenna	Integrated
Size(L*W*H)	32*32*8mm

**Table 1:**Features of RFID chip EM-18

**GSM**

It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. The use of GSM to send information about the theft vehicle as well as updating the toll collection system data to web server using GPRS.

**Functioning of automatic RFID based toll collection system & theft recognition system:**



### III. Results

**Users Page - GPRS LOGGER**

Logout [Logout](#)

[ipgms@gmail.com](#)

PHONE NO: 2018-01-01 00:00:00

DD TITLE: 2018-01-01 22:58:58

DEVICE NAME: ipgms

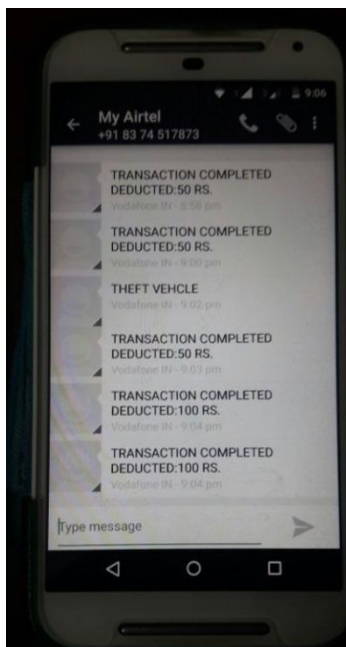
Save Data Refresh

\*\*\*\*Data Time Start:2018-01-01 11:29:21\*\*\*\*

S.NO	DATE	Dest1	Dest2	Dest3	Dest4	Dest5
0	2018-01-01 11:42:19	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
1	2018-01-01 18:05:54	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
2	2018-01-01 18:06:21	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
3	2018-01-01 19:19:50	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
4	2018-01-01 19:20:03	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
5	2018-01-01 19:23:15	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
6	2018-01-01 19:24:04	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
7	2018-01-01 20:47:49	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
8	2018-01-01 20:48:50	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
9	2018-01-01 20:53:47	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
10	2018-01-12 15:47:49	YES:MO AF196	0	ACC:MO 1240X0001	0	YES:TYPE 3:WHEELER
11	2018-01-12 15:48:22	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
12	2018-01-20 22:29:27	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
13	2018-01-20 22:29:55	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER
14	2018-01-30 20:55:21	YES:MO 1233	0	ACC:MO 1240X0001	0	YES:TYPE 4:WHEELER

### Hardware Results





#### **IV. Conclusion**

The electronic toll accumulation framework in interstate based on RFID, an outline plan was advanced. It has qualities of minimal effort, high security, far correspondence separation and high productivity, and so forth. It not just can enhance innovation level of charge; additionally enhance section capacity of interstate. Electronic toll accumulation framework is a powerful measure to lessen administration expenses and charges, in the meantime, extraordinarily decrease clamor and toxin emanation of toll station. In the configuration of the proposed Electronic toll accumulation (And so on) framework, continuous toll accumulation and hostile to burglary arrangement framework have been planned. This diminishes the physical work and defers that regularly happen on streets. This arrangement of gathering tolls is eco-accommodating furthermore brings about expanded toll path limit. Likewise an against burglary arrangement framework module which counteracts going of any defaulter vehicle is executed, hence guaranteeing security on the roadways.

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