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**MINI Project**

National Institute of Technology

Electronic Toll Collection System

**September-October’17**

# OVERVIEW

Developed an Automatic Toll collection system using ATMEL 8051 Microcontroller and RFID. Each user will be given an RFID tag which is linked to the bank account. Whenever the car passes through the RFID reader toll will be deduced immediately without any manual operation and the gates will be opened.

# GOALS

1. Automatic collection of toll tax.
2. Free flow of traffic.
3. Time saving.
4. Record maintenance.
5. Problems with pursuing toll evaders.

# Components Used

AT89S52 microcontroller, Crystal oscillator, 16X2 char LCD, Servo motor, RFID reader & tags, Capacitors – 22pF, Resistors.

## Working

The main objective of this project is collecting toll and reduce traffic and improve service. The RFID card will be given to the user which contains the digital code, which have the corresponding details stored in the centralized database system which can be accessed in the relevant office as and when required. The microcontroller reads the RFID card number from the RFID reader. It sends this data to the LCD so that the person operating this product reads the balance of the card. Microcontroller sends the data to the motor depending upon the RFID card number. When vehicle owner keeps his tag before reader it immediately works on the tag information and content of data and everything is displayed. Tags having correct information can pay money and gate works, opens or closes with in time. Tags with any defaults or insufficient balance are invalid and gate doesn’t open.

Whenever any person buys a vehicle, first he/she need to get his/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, the RFID circuit will 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.

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.

## 

## Block Daigram

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## 

## 

## 

## Code

#include<at89x52.h>

#include<string.h>

#define LCD P0

//SFR register to adress the bits

sbit rs=P1^0;//RESET

sbit rw=P1^1;//READ/WRITE

sbit en=P1^2;//ENABLE

sbit in1=P2^0;

sbit in2=P2^1;

void delay(unsigned int ms) //function for delay

{

unsigned int i,j;

for(i=0;i<=ms;i++)

for(j=0;j<=750;j++);

}

void lcd\_cmd(unsigned char a) //fucntion to command the lcd

{

LCD =a;

rs=0;

rw=0;

en=1;

delay(1);

en=0;

}

void lcd\_init(void)

{

delay(1);

lcd\_cmd(0x38);

lcd\_cmd(0x0c);

lcd\_cmd(0x01);

lcd\_cmd(0x06);

lcd\_cmd(0x80);

}

void lcd\_clear(void)

{

lcd\_cmd(0x01);

lcd\_cmd(0x80);

}

void lcd\_data(unsigned char ch) //convert the integer value to writting format

{

LCD=(int)ch;

rs=1;

rw=0;

en=1;

delay(1);

en=0;

}

void lcd\_print(char s[]) //fucntion to print a string

{

int i=0;

for(i=0;s[i]!='\0';i++)

lcd\_data(s[i]);

delay(50);

}

/\*void lcd\_print1(char s[]) //function to print the string on the lcd

{

int i=0;

for(i=12;s[i]!='\0';i++)

lcd\_data(s[i]);

delay(50);

} \*/

void uart\_init(void) //UART Function

{

SCON=0x50;//MODE 1..8 BIT DATA,..1 STOP BIT,..1 START BIT

TMOD=0x20;//TIMER 1....MODE 2...8 BIT AUTO RELOAD

TL1 = 0xFD;

TH1=0xFD;//BAUD RATE 9600

TR1 = 1;

}

void number(int a)

{

int r=a;

int i;

if (r==0)

lcd\_data(48);

else{

while(r)

{

char c[17];

for(i=0;r!=0;i++)

{

c[i]=(char)((r%10)+48); // converting number to character

r=r/10; //

}

for(i=i-1;i!=-1;i--)

lcd\_data(c[i]); // display the frequency on lcd

}

}

}

unsigned int b1=60,b2=40,b3=20,b4=0; // balance in each rfid card

void main()

{

unsigned char k,RF[12];

lcd\_init();

lcd\_print("LCD is ready");

delay(500);

lcd\_clear();

uart\_init();

lcd\_print("UART is ready");

delay(500);

lcd\_clear();

lcd\_cmd(0x81);

lcd\_print("Automatic Toll");

lcd\_cmd(0xc2);

lcd\_print("Gate System");

delay(500);

P1=0x07;

P3=0x11; //motor change

P2=0x00;

while(1)

{

lcd\_clear();

lcd\_cmd(0x82);

lcd\_print("Place the tag");

lcd\_cmd(0xc2);

lcd\_print("before reader");

delay(5);

for(k=0;k<12;k++)

{

while(!RI);

RF[k]=SBUF;

RI=0;

}

lcd\_clear();

lcd\_print(RF);

delay(500);

if(RF[6]=='6')

{

if(b1>=20){

b1=b1-20;

in1=0;

in2=1;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE OPENED");

delay(50);

lcd\_clear();

lcd\_print("Balance is");

lcd\_cmd(0xc2);

number(b1);

delay(500);

in1=1;

in2=0;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE CLOSED");

delay(500);}

else

{

lcd\_clear();

delay(500);

lcd\_print("LOW BALANCE");

}

}

else if(RF[8]=='u')

{

if(b2>=20){

b2=b2-20;

in1=0;

in2=1;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE OPENED");

delay(50);

lcd\_clear();

lcd\_print("Balance is");

lcd\_cmd(0xc2);

number(b2);

delay(500);

in1=1;

in2=0;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE CLOSED");

delay(500);}

else

{

lcd\_clear();

delay(500);

lcd\_print("LOW BALANCE");

}

}

else if(RF[9]=='s')

{

if(b3>=20){

b3=b3-20;

in1=0;

in2=1;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE OPENED");

delay(50);

lcd\_clear();

lcd\_print("Balance is");

lcd\_cmd(0xc2);

number(b3);

delay(500);

in1=1;

in2=0;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE CLOSED");

delay(500);}

else

{

lcd\_clear();

delay(500);

lcd\_print("LOW BALANCE");

}

}

else if(RF[6]=='5')

{

if(b4>=20){

b4=b4-20;

in1=0;

in2=1;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE OPENED");

delay(50);

lcd\_clear();

lcd\_print("Balance is");

lcd\_cmd(0xc2);

number(b4);

delay(500);

in1=1;

in2=0;

delay(40);

in1=0;

in2=0;

lcd\_clear();

lcd\_print("GATE CLOSED");

delay(500);}

else

{

lcd\_clear();

delay(500);

lcd\_print("LOW BALANCE");

}

}

else

{

delay(10);

lcd\_clear();

lcd\_print("INVALID CARD");

delay(500);

}

}

}