AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Electrical & Electronic Engineering

Course No : EEE 2212

Course Title: Measurement & Instrument Laboratory

Project Name: Security System Access using RFID & Password with Arduino

Date of Submission : 25.02.16

Submitted by:

Tajbid Nouas (14-01-05-029)

Md. Imtiaz Aziz(14-01-05-031)

Md. Rezaul Amin(14-01-05-040)

Asif Mahmud(13-02-05-148)

Submitted To:

Hasib Md. Abid Bin Farid
Assistant Professor

Ahsanullah University of Science and Technology,

B.Sc.in EEE(IUT), M.Sc in EEE(IUT)

INTRODUCTION:

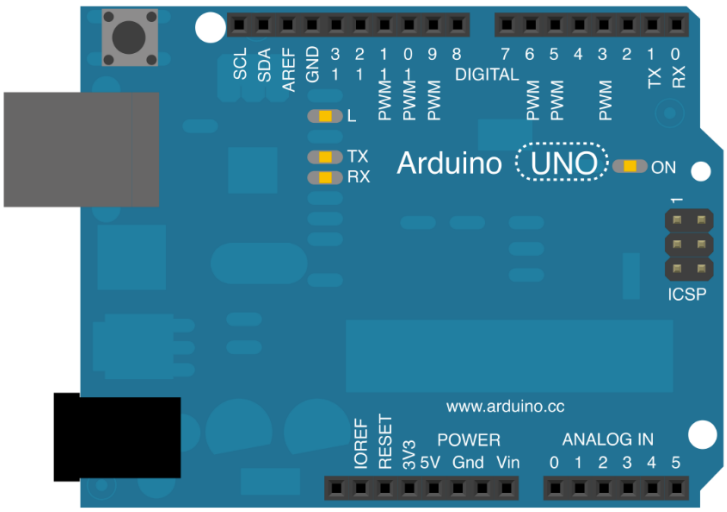
The aim of this project is to provide security system with RFID tags interfaced with Arduino board for offices, banks and industries. The security of any secure area is a priority for the authorities. For this reason, only the authorized person with a valid RFID tag is allowed into the secured premises.

In order to constructing a security system access using RFID and Arduino we need to work in three different fields. They are: HARDWARE, ARDUINO AND SOFTWARE.

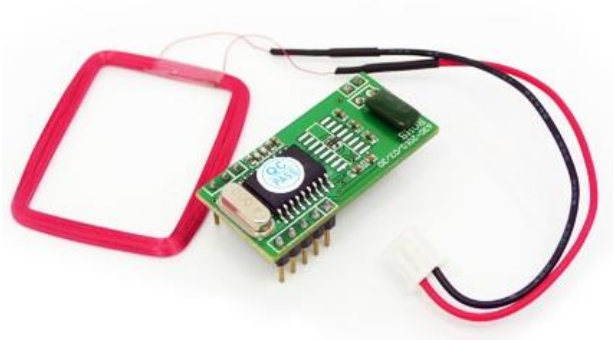
With the help of Arduino, we can design a comparator circuit. We may call it as hardware section. And with the help of Arduino software we can control the output of this project, we may call it as software section.

Equipments:

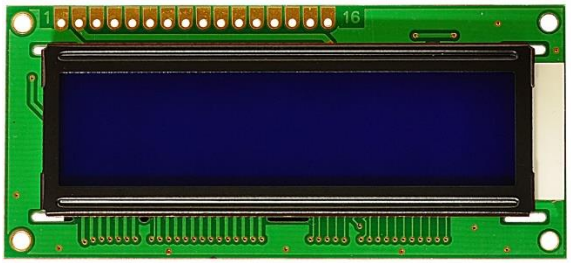
Arduino UNO



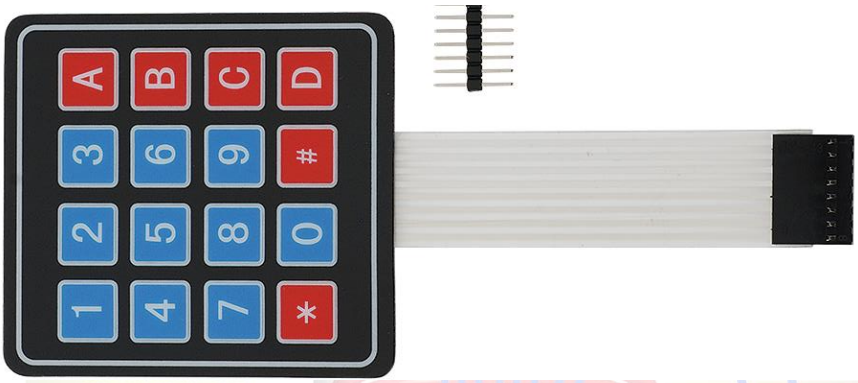
RFID Reader 125khz



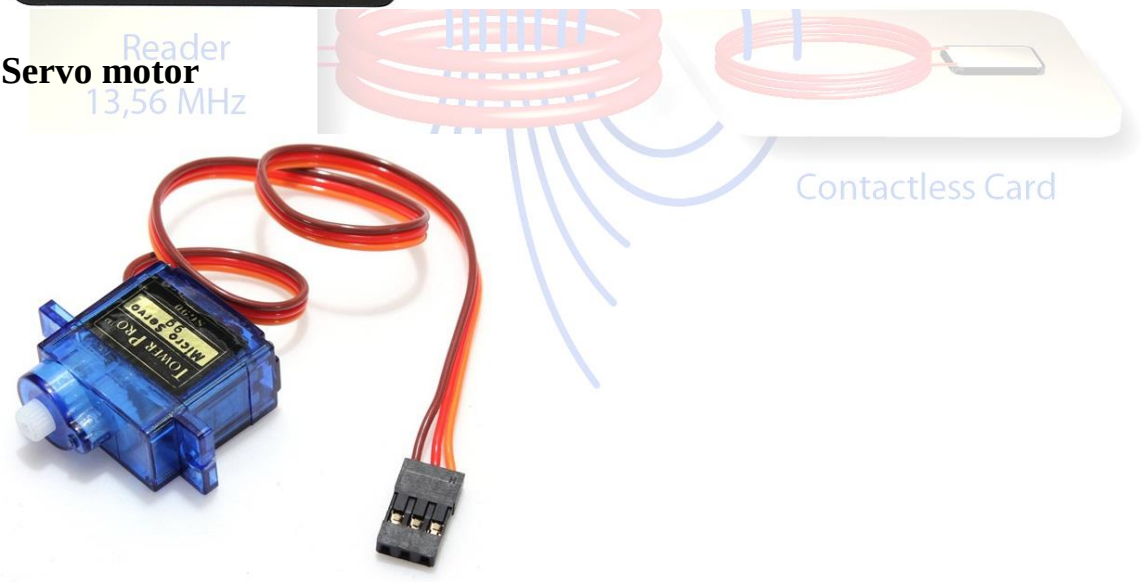
LCD display



Keypad



Servo motor



RADIO FREQUENCY IDENTIFICATION (RFID):

RFID can be read wirelessly and with no line of sight, contain more data than barcodes, and are stronger. As the frequency ranges used and standards required the increase in ubiquity of RFID tags, privacy became unease. The secure area can be attack that can go against one's privacy and it also describes contradict measures. The RFID technology did not stop at thing-

level tagging. The uses for RFID tags are so extensive. It turns out that printing tags may become a possible alternative to traditional production. RFID tags or simply "tags" are small transponders that respond to queries from a reader by wirelessly transmitting a serial number or alike identifier. They are greatly used to track items in production environment and to label items in supermarkets. They are usually thought of as a highly developed barcode. However, their possible region of use is much bigger. This project presents applications that are probable using RFID technology such as locate access control, location tracking, billing easily and others.

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders.

RFID (radio frequency identification) is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal, or person.

An alternative to bar code.

RFID is also called dedicated short range communication(DSRC)

Liquid Crystal Display(LCD):

Most common LCDs connected to the microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (and communicates directly with the LCD.

Servo motor:

Servo motors are self-contained electric devices that rotate or push parts of a machine with great precision. **Servo motor** is a special type of motor which is automatically operated up to certain limit for a given command with help of error-sensing feedback to correct the performance.

Keypad:

A keypad is a set of buttons or keys bearing digits, symbols and alphabetical letters placed in order on a pad, which can be used as an efficient input device. A keypad may be purely numeric. A keypad is often needed to provide input to an Arduino system. They are quite thin and can easily be mounted wherever they are needed.

Arduino:

Arduino hardware is an open-source circuit board with a microprocessor and input/output (I/O) pins for communication and controlling physical objects (LED, servos, buttons, etc.). The board will typically be powered via USB or an external power supply which in turn allows it to power other hardware and sensors.

An Arduino board consists of an Atmel 8-bit AVR microcontroller with complementary components that facilitate programming and incorporation into other circuits. An important aspect of the Arduino is its standard connectors, which lets users connect the CPU board to a variety of interchangeable add-on modules known as *shields*. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²C serial bus—so many shields can be stacked and used in parallel. Official Arduinos have used the mega AVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5-volt linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the Lily Pad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer.

Arduino Configuration:

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V

Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Troubleshooting:

When we using the device, and RFID card is shown and it is given serial number, if it matches it gives signal to servo motor to unlock and rotate. But during unmatched condition when it was not giving the serial number properly the password protected system does not work properly.

SOFTWARE:

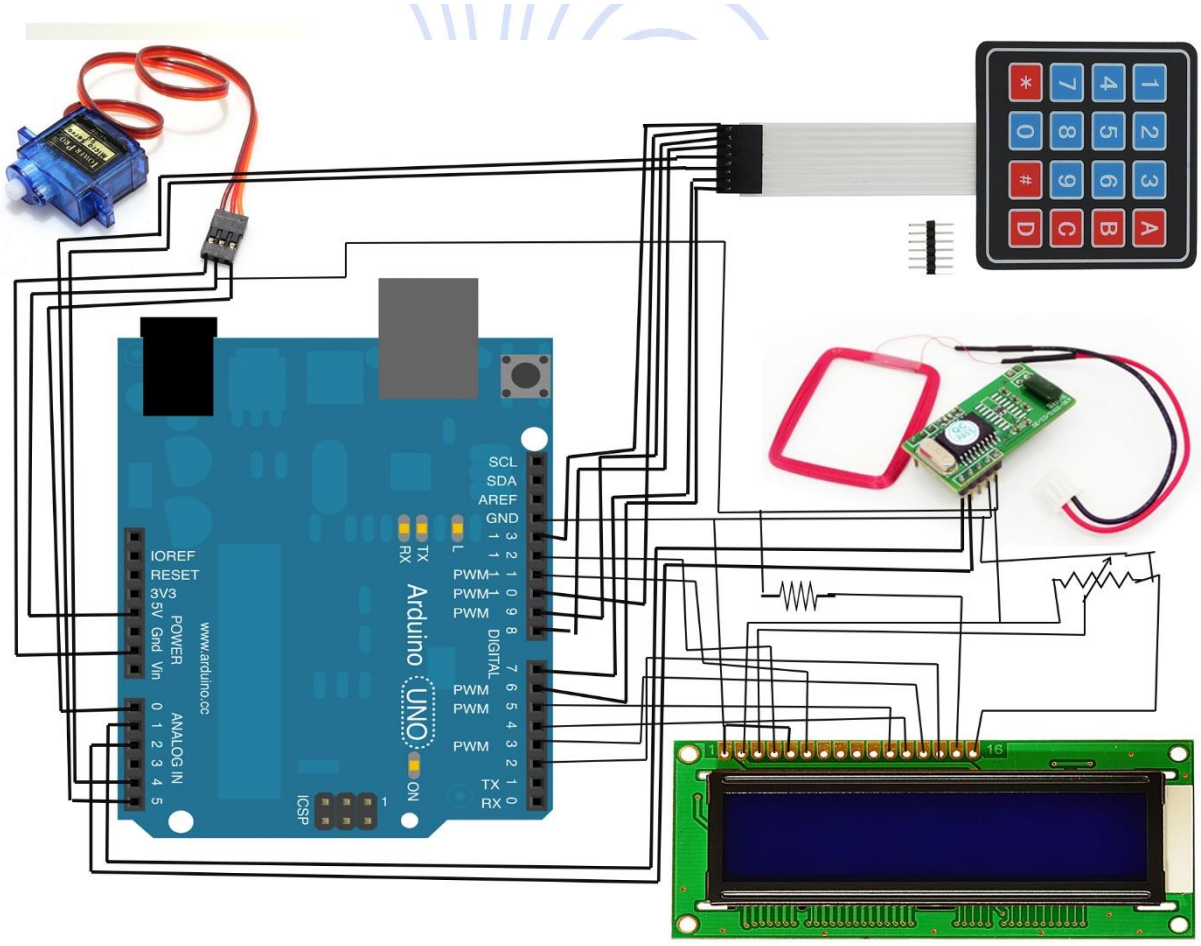
```
#include <SoftwareSerial.h>
#include <Servo.h>
#include <LiquidCrystal.h>
#include <Keypad.h>
#include<string.h>


SoftwareSerial RFID(A1,A2); // RX
and TX
Servo myservo;

int data1 = 0;

int ok = -1;

int yes = 13;

int no = 12;
int pos = 0;
int n=-1;
int p=-1;
int x=0;
char input_pass[5];
int test=1;

char user[2][8]=
{"USER1","USER2"};
char
user_pass[2][7]={"1234","5678"};

LiquidCrystal lcd(12, 11, 5, 4, 3,
2);
```

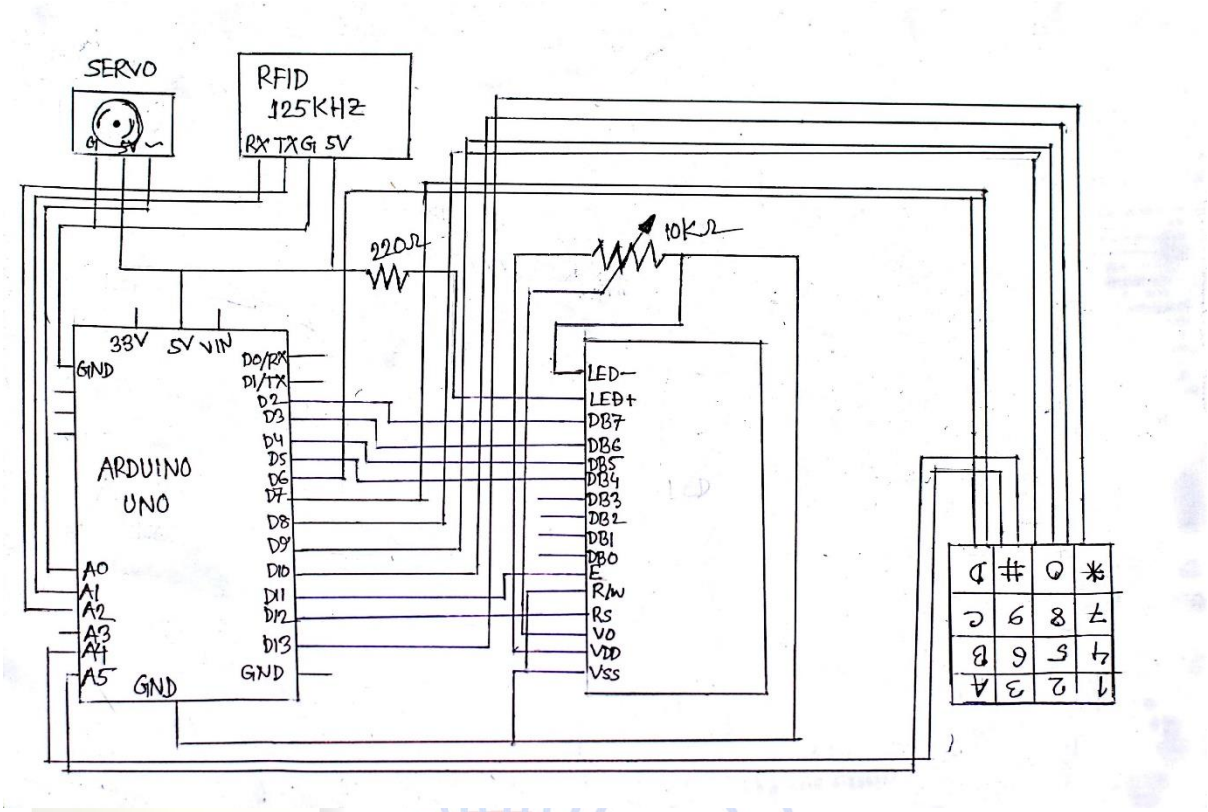
```
int tag1[14] =
{2,48,50,48,48,52,50,53,50,52,52,5
3,54,3};
int tag2[14] =
{2,48,50,48,48,52,50,66,49,57,49,5
4,48,3};
int newtag[14] = {
0,0,0,0,0,0,0,0,0,0,0,0,0,0}; //
used for read comparisons

const byte ROWS = 4;
const byte COLS = 4;
char keys[ROWS][COLS] = {
  {'1','2','3','A'},
  {'4','5','6','B'},
  {'7','8','9','C'},
  {'*','0','#','D'}
};
byte rowPins[ROWS] = {A5,A4,7,6};
//connect to row pinouts
byte colPins[COLS] = {13,10,9,8};

Keypad keypad = Keypad(
makeKeymap(keys),
colPins,rowPins,ROWS, COLS );



void setup()
{
  RFID.begin(9600);    // start
serial to RFID reader
  Serial.begin(9600);  // start
serial to PC
  pinMode(yes, OUTPUT); // for
status LEDs
  pinMode(no, OUTPUT);
myservo.attach(A0);
  lcd.begin(16, 2);
}

boolean comparetag(int aa[14], int
bb[14])
{
  boolean ff = false;
  int fg = 0;
  for (int cc = 0 ; cc < 14 ;
cc++)
  {
    if (aa[cc] == bb[cc])
    {
      fg++;
    }
  }
  if (fg == 14)
  {
    ff = true;
  }
  return ff;
}

void checkmytags() // compares
each tag against the tag just read
{
  ok = 0; // this variable helps
decision-making,
  // if it is 1 we have a match,
zero is a read but no match,
  // -1 is no read attempt made
  if (comparetag(newtag, tag1) ==
true)
  {
    n=0;
    ok++;
  }
  if (comparetag(newtag, tag2) ==
true)
  {
    n=1;
    ok++;}

}

void servo1() {

  for (pos = 0; pos <= 180; pos +=
1) { // goes from 0 degrees to 180
degrees

    // in steps of 1 degree

    myservo.write(pos);
// tell servo to go to position in
variable 'pos'

    delay(15);
// waits 15ms for the servo to
reach the position

  }
  for (pos = 180; pos >= 0; pos -=
1) { // goes from 180 degrees to 0
degrees
    myservo.write(pos);
// tell servo to go to position in
variable 'pos'
```

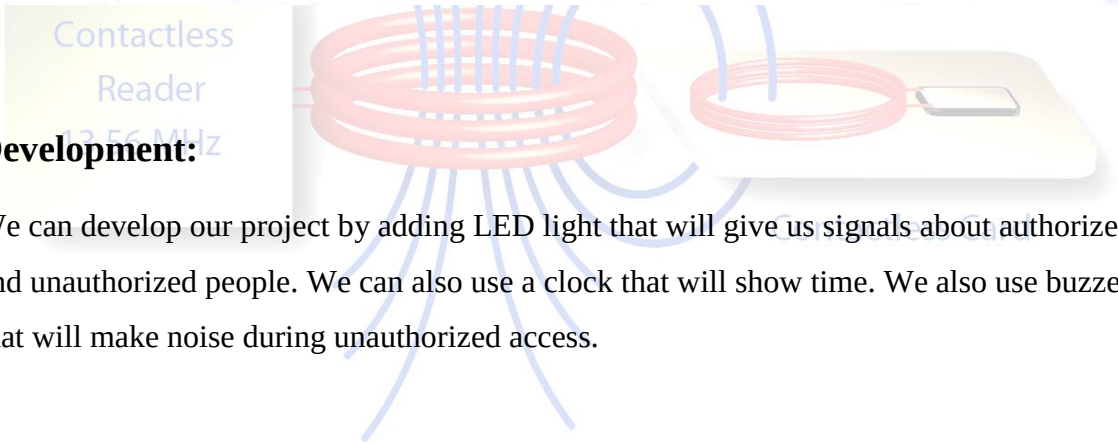
```
    delay(15);
// waits 15ms for the servo to
reach the position
  }
}
void lcd2()
{
  lcd.begin(16, 2);
  test=1;
lcd.print("WELCOME...");
}

void lcd3()
{ lcd.begin(16, 2);
lcd.print("Rejected");
}

void lcd4()
{
   lcd.begin(16, 2);
lcd.print(user[n]);
lcd.setCursor(1,2);
test=2;
lcd.print("Enter Password:");
delay(500);
}
void lcd8()
{
lcd.begin(16, 2);
lcd.setCursor(0,0);
lcd.print("Wrong Password");
test=1;
delay(3000);
}

void lcd9()
{
lcd.begin(16, 2);
lcd.setCursor(0,0);
test=1;
lcd.print("Congrats...");
}


void chackPass(){
  int i=0;
if(strcmp(user_pass[0],input_pass)
==0 && n==0 )
 {

    test=1;
    lcd9();
    servo1();
 }
 else
if(strcmp(user_pass[1],input_pass)
==0 && n==1 )
 {
   test=1;
    lcd9();
    servo1();
 }
 else {
 test=1;
  lcd8();
 }
}
void readTags()
{
  lcd2();
  ok = -1;
  if (RFID.available() > 0)
  {
    // read tag numbers
    delay(100); // needed to allow
time for the data to come in from
the serial buffer.

    for (int z = 0 ; z < 14 ; z++)
// read the rest of the tag
    {
      data1 = RFID.read();
      newtag[z] = data1;
    }
    RFID.flush(); // stops
multiple reads
// do the tags match up?
  checkmytags();
  }

  // now do something based on tag
type
  if (ok > 0) // if we had a match
  {
    Serial.println("Accepted");
    digitalWrite(yes, HIGH);
    lcd4();

digitalWrite(A0,LOW);
    delay(2000);
    digitalWrite(yes, LOW);
ok = -1;
}
```

```
  else if (ok == 0) // if we
didn't have a match
  {
    Serial.println("Rejected");
    digitalWrite(no, HIGH);
    lcd3();
    delay(1000);
    digitalWrite(no, LOW);
    ok = -1;
  }
}
void loop()
{
  if(test==1){
    readTags();
  }
if(test==2){

  char key = keypad.getKey();
  if (key){
    Serial.println(key);
     input_pass[x]=key;
      if(x==3){
         test=1;
    chackPass();
    x=0;
  }else{
    x++;
  }
  }
}
}
```

Circuit Diagram:







Development:

We can develop our project by adding LED light that will give us signals about authorized and unauthorized people. We can also use a clock that will show time. We also use buzzer that will make noise during unauthorized access.

Advantages:

This project has many advantages.

For protecting any important thing, to lock our home, entering offices, schools, colleges and universities we can use this device.

Besides by using RFID, public transportation authorities will be able to monitor ridership in real-time and will minimize delays by committing extra resources (buses or trains) to specific congested routes.

Disadvantages:

RFID technology is harder to understand. Possibility of unauthorized reading of passports and credit cards