

# Data Acquisition

## Room Automation

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## Description

Having a Room with its own security system as you need to set and confirm password in first time use then enter the password every time you need the door to open when you outside but if you inside you can simply press on leave key to have the door opened. The door is automatically closed after you enter and after your left so no need to worry about.

You can reset you password any time you won't without needing to restart the whole program

other feature is to have firefighting system working in any case as long as the system started.

No need to worry about adjust your fan or your lights as in this room we have temperature and ldr sensor to get the light level and the temperature then take a decision to open some LEDs up to 4 LEDs depending on light level and open fan in one of 3 level available in the fan.

In order to save electricity we used IR sensor to detect the presence in the room so the LEDs and fan work according to sensors reads

finally having 3 trials every time to enter the password you set or the thief buzzer will work and make noise and all features will stop except for firefighting system and if will be required to you to enter the password with the 3 trials again

## Added idea

Auto opening/closing door with motor and Leave button to open the door when you inside

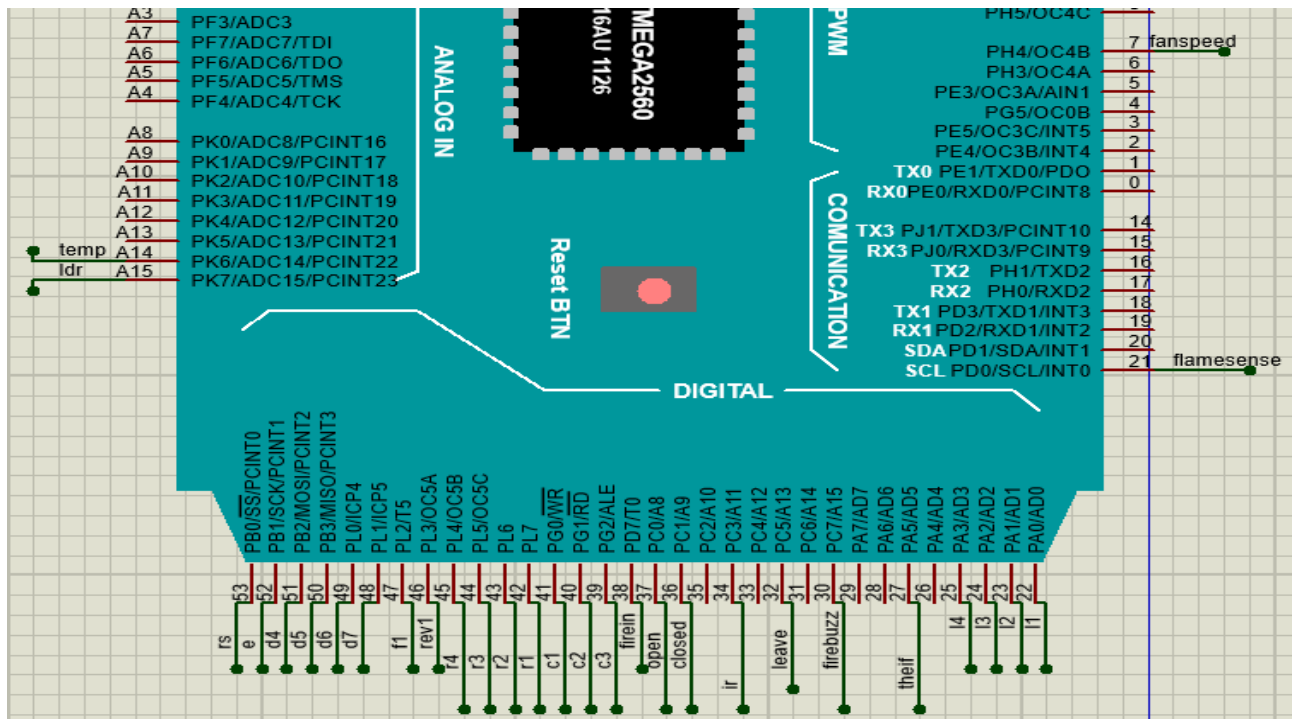
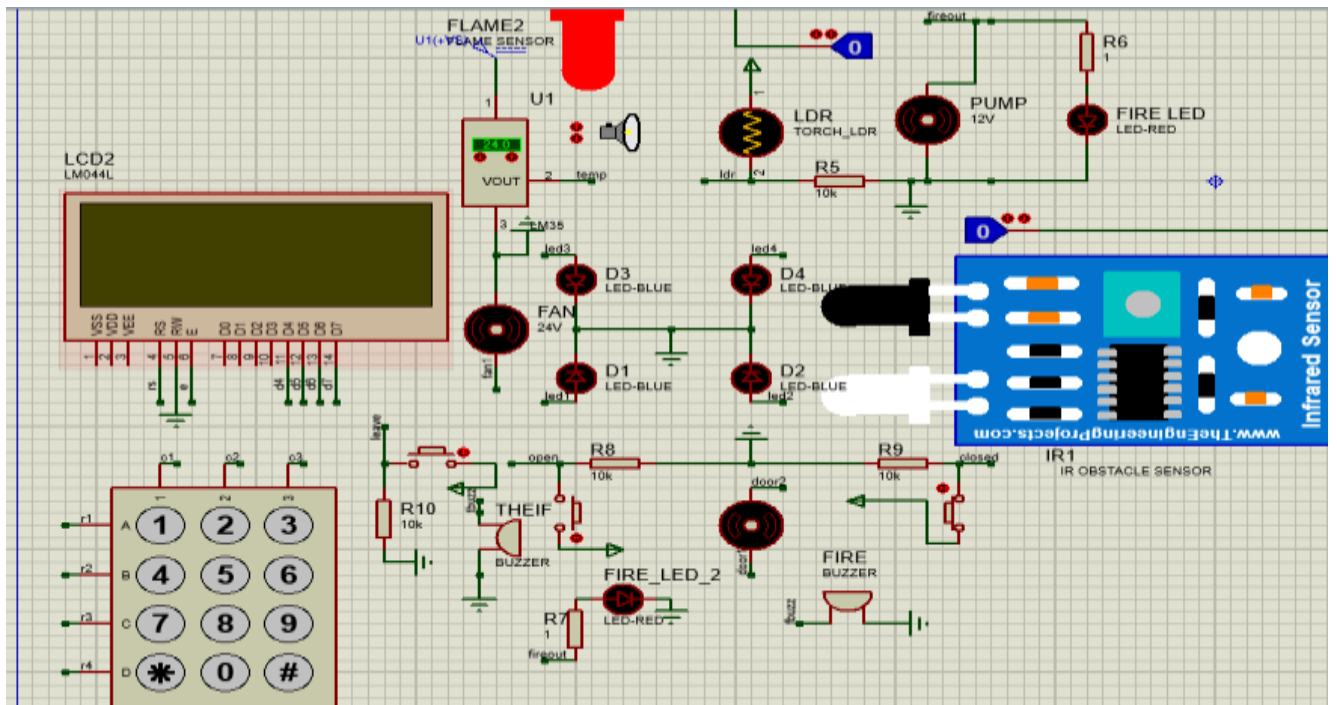
## Assumptions

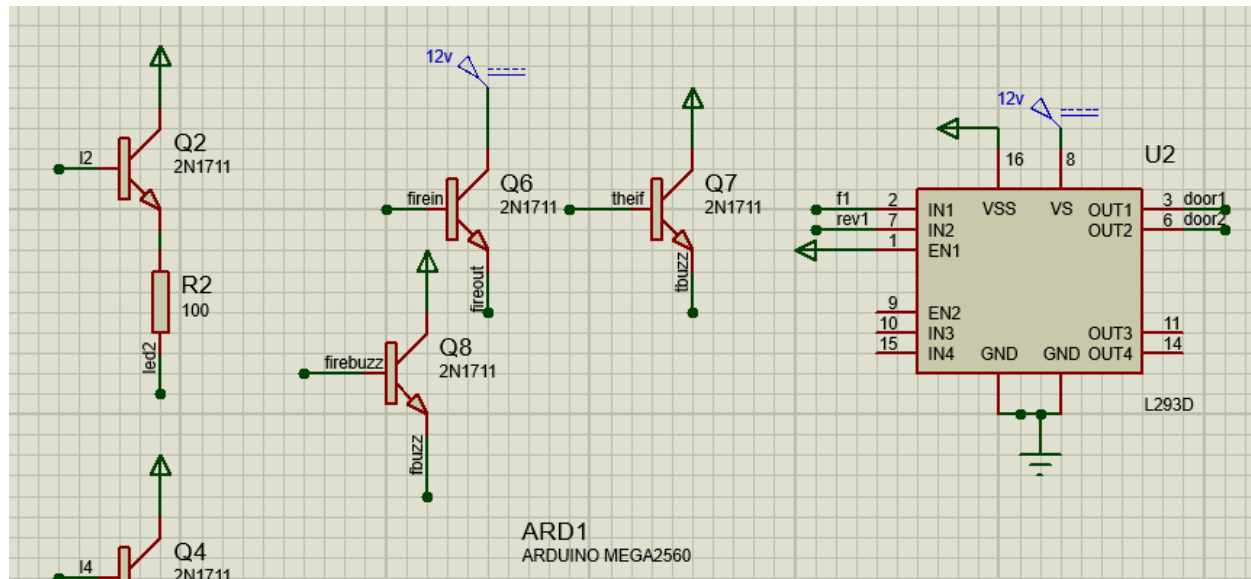
Room can have more than one inside it as long as the password entered correctly

Once you enter the password the door won't close till you enter the room and press the leave button to reopen the door

Firefighting system interrupt any running feature

## Proteus Screenshots





## Arduino code

Used 2 libraries and multi functions to make code easier in editing and understanding where the void loop is so small

Using # define for pins for easy edits

Using less global variables for less memory

## The code highlights

```
#include <Keypad.h>
```

```
#include<LiquidCrystal.h>
```

```
#define pins
```

```
void setup() {
```

```
  lcd.begin(20,4);
```

```
  pinMode for inputs and outputs
```

```
  //interrupt for fire to ignore any delay and work any time
```

```
  attachInterrupt(digitalPinToInterrupt(flamesense), fire , CHANGE);
```

```
  //set passcode for first time
```

```
  setpw();
```

```
  //enter passcode to enter
```

```
checkpw(); }
```

```
void loop() {
```

```
j=0; //counter of trials in checkflag()
```

```
//to reset pw later it already entered it correct
```

```
key = keypad.getKey();
```

```
if (key == '#')
```

```
{setpw(); }
```

```
//door auto opening and closing
```

```
door();
```

```
//check the presenct to actiate the ldr and temp sense options
```

```
ircheck(); }
```

### Full Code

```
#include <Keypad.h>
```

```
#include<LiquidCrystal.h>
```

```
//lcd
```

```
#define rs 53
```

```
#define e 52
```

```
#define d4 51
```

```
#define d5 50
```

```
#define d6 49
```

```
#define d7 48
```

```
LiquidCrystal lcd(rs,e,d4,d5,d6,d7);
```

```

//keypad

#define pwlength 8
int i=0,j=0,m=0,k=0;
char key;
boolean flag,xflag=false;
char password[pwlength+1],confirmpw[pwlength+1];
const byte ROWS = 4; //four rows
const byte COLS = 3; //three columns
char keys[ROWS][COLS] = {{ '1','2','3'},{ '4','5','6'},{ '7','8','9'},{ '*', '0', '#' }};
#define rd 45
#define rc 44
#define rb 43
#define ra 42
#define c1 41
#define c2 40
#define c3 39
byte rowPins[ROWS] = {ra, rb, rc, rd}; //connect to the row pinouts of the keypad
byte colPins[COLS] = {c1, c2, c3}; //connect to the column pinouts of the keypad
Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS );

//fire pins
#define firein 38
#define flamesense 21
#define firebuzz 30

//door pins

```

```
#define f1 47
```

```
#define r1 46
```

```
#define opened 37
```

```
#define closed 36
```

```
#define leave 32
```

```
//ir sensor
```

```
#define ir 34
```

```
//temperature
```

```
#define temp A14
```

```
#define fanspeed 7
```

```
//ldr
```

```
#define ldr A15
```

```
#define led1 22
```

```
#define led2 23
```

```
#define led3 24
```

```
#define led4 25
```

```
#define thief 27
```

```
void setup() {
```

```
  lcd.begin(20,4);
```

```
//inputs
```

```
  pinMode(ir,INPUT);
```

```
  pinMode(flamesense,INPUT);
```

```
pinMode(opened,INPUT);
pinMode(closed,INPUT);
pinMode(leave,INPUT);

//outputs
pinMode(f1,OUTPUT);
pinMode(r1,OUTPUT);
pinMode(led1,OUTPUT);
pinMode(led2,OUTPUT);
pinMode(led3,OUTPUT);
pinMode(led4,OUTPUT);
pinMode(firein,OUTPUT);
pinMode(fanspeed,OUTPUT);
pinMode(theif,OUTPUT);
pinMode(firebuzz,OUTPUT);
//check all fire state first!
fire();
attachInterrupt(digitalPinToInterrupt(flamesense), fire , CHANGE);

//opening message
lcd.clear();
lcd.setCursor(0,0);lcd.print("Hello Sir");
lcd.setCursor(0,1);lcd.print("Room Automation");
lcd.setCursor(0,2);lcd.print("By 4715");
lcd.setCursor(0,3);lcd.print("Let's Start!");
delay(500);

//set passcode for first time
```



```
setpw();
```

```
//enter passcode to enter
```

```
checkpw();
```

```
delay(200);
```

```
lcd.clear();
```

```
//check fire as it used by interput
```

```
fire();
```

```
lcd.setCursor(5,3);lcd.print("Press# rest PW");
```

```
}
```

```
void loop() {
```

```
j=0; //counter of trials
```

```
//to reset pw later it already entered it correct
```

```
key = keypad.getKey();
```

```
if (key == '#')
```

```
{setpw();}
```

```
//door auto opening and closing
```

```
door();
```

```
//check the presenct to actiate the ldr and temp sense options
```

```
ircheck();
```

```
}
```

```
void ircheck(){
```

```
if (digitalRead(ir)){
```

```
lcd.setCursor(12,0);lcd.print(" Occpied");
```

```
tempcontrol();
```

```

    ldrcontrol();}

else {lcd.setCursor(12,0);lcd.print(" Empty ");analogWrite(fanspeed,0);
    ledoff();}

}

void fire(){
if(digitalRead(flamesense))

{digitalWrite(firein,HIGH);digitalWrite(firebuzz,HIGH);lcd.setCursor(0,3);lcd.print("fire ");}
else {digitalWrite(firein,LOW);digitalWrite(firebuzz,LOW);lcd.setCursor(0,3);lcd.print("safe
");}

}

void door(){
int closeread,openread,irread;
closeread=digitalRead(closed);openread=digitalRead(opened);irread=digitalRead(ir);
lcd.setCursor(0,0);lcd.print("Door ");

if (flag && closeread && !irread)                {digitalWrite(f1,HIGH);digitalWrite(r1,LOW);
lcd.setCursor(5,0);lcd.print("Opening");} //door opens after put password
if (flag && openread && !irread)                {digitalWrite(f1,LOW);digitalWrite(r1,LOW);
lcd.setCursor(5,0);lcd.print("Opened ");} //door full opened
if (flag && openread && irread)                {digitalWrite(f1,LOW);digitalWrite(r1,HIGH);
lcd.setCursor(5,0);lcd.print("Closing");} //get in so door closing
if (flag && closeread && irread && !digitalRead(leave))
{digitalWrite(f1,LOW);digitalWrite(r1,LOW);
lcd.setCursor(5,0);lcd.print("Closed ");} //door fully closed
if (closeread && irread &&
digitalRead(leave)){flag=false;digitalWrite(f1,HIGH);digitalWrite(r1,LOW);
lcd.setCursor(5,0);lcd.print("Opening");} //door opening to leave
if (!flag && openread && irread)                {digitalWrite(f1,LOW);digitalWrite(r1,LOW);

```

```

lcd.setCursor(5,0);lcd.print("Opened ");} // door fully open to leave
if (!flag && openread && !irread)          {digitalWrite(f1,LOW);digitalWrite(r1,HIGH);
lcd.setCursor(5,0);lcd.print("Closing");} //door closing after left
if (!flag && closeread && !irread)          {digitalWrite(f1,LOW);digitalWrite(r1,LOW);
lcd.setCursor(5,0);lcd.print("Locked "); delay(500);
checkpw();} //door is fully closed and u left
}

```

```

void tempcontrol(){
  int thespeed,thetemp;
  thetemp=(analogRead(temp)/2)-1;
  lcd.setCursor(0,1);lcd.print("TEMP ");
  lcd.setCursor(5,1);lcd.print(thetemp);
  if (thetemp<25){thespeed=0;lcd.setCursor(7,1);lcd.print(" Fan Stop");}
  else if (thetemp<30 && thetemp>24){thespeed=195;lcd.setCursor(7,1);lcd.print(" Fan LOW
");}
  else if (thetemp<35 && thetemp>29){thespeed=225;lcd.setCursor(7,1);lcd.print(" Fan Mid
");}
  else {thespeed=255;lcd.setCursor(7,1);lcd.print(" Fan HIGH");}
  analogWrite(fanspeed,thespeed);
}

```

```

void ldrcontrol(){
  int lightlevel;
  lightlevel=(analogRead(ldr)*10/1023);
  if (lightlevel == 10){lightlevel=9;}
  lcd.setCursor(0,2);lcd.print("Light Level ");
  lcd.setCursor(12,2);lcd.print(lightlevel);
}

```

```

    if
(lightlevel<2){digitalWrite(led1,HIGH);digitalWrite(led2,HIGH);digitalWrite(led3,HIGH);digitalWrite(led4,HIGH);

    lcd.setCursor(14,2);lcd.print(" 4 LED");}

    else if (lightlevel<4 &&
lightlevel>1){digitalWrite(led1,LOW);digitalWrite(led2,HIGH);digitalWrite(led3,HIGH);digitalWrite(led4,HIGH);

    lcd.setCursor(14,2);lcd.print(" 3 LED");}

    else if (lightlevel<6 &&
lightlevel>3){digitalWrite(led1,LOW);digitalWrite(led2,LOW);digitalWrite(led3,HIGH);digitalWrite(led4,HIGH);

    lcd.setCursor(14,2);lcd.print(" 2 LED");}

    else if (lightlevel<8 &&
lightlevel>5){digitalWrite(led1,LOW);digitalWrite(led2,LOW);digitalWrite(led3,LOW);digitalWrite(led4,HIGH);

    lcd.setCursor(14,2);lcd.print(" 1 LED");}

    else {ledoff();lcd.setCursor(14,2);lcd.print(" 0 LED");}}

void
ledoff(){digitalWrite(led1,LOW);digitalWrite(led2,LOW);digitalWrite(led3,LOW);digitalWrite(led4,LOW);

}

```

```

void setpw(){

    lcd.clear();

    lcd.setCursor(0,0);lcd.print("Set Password...");

    lcd.setCursor(0,1);lcd.print("3 Till 8 numbers");

    lcd.setCursor(0,3);lcd.print("confirm # , delete *");

    flag=true;

    m=0;

    k=0;

    while (k<pwlength){

    key = keypad.getKey();

```

```

if (key && key!='*' && key!='#'){
k++;
m++;
password[k]= key;
lcd.setCursor(k,2);lcd.print(password[k]);}
else if (key == '#' && k>2){k=pwlength;}
else if (key == '*' && k>0){lcd.setCursor(k,2);lcd.print(" ");k--;m--;}
}
delay(200);
confirmpww();
}

```

```

void confirmpww(){
lcd.clear();
lcd.setCursor(0,0);lcd.print("Confirm Password...");
lcd.setCursor(0,1);lcd.print("3 Till 8 numbers");
lcd.setCursor(0,3);lcd.print("confirm # , delete *");
k=0;
while (k<pwlength){
key = keypad.getKey();
if (key && key!='*' && key!='#'){
k++;
confirmpw[k]= key;
lcd.setCursor(k,2);lcd.print(confirmpw[k]);}
if (key == '#' && k>2){if (m != k){flag=false;}k=pwlength;}
else if (key == '*' && k>0){lcd.setCursor(k,2);lcd.print(" ");k--;}}
k=0;

```

```
while (k<m){k++; if (confrmpw[k] != password[k]){flag=false;}}
```

```
if (flag == false){
```

```
    delay(200);
```

```
    lcd.clear();
```

```
    lcd.setCursor(0,0);lcd.print("Wrong confirmation...");
```

```
    lcd.setCursor(0,1);lcd.print("Reseting Again...");
```

```
    delay(200);
```

```
    setpw();}
```

```
}
```

```
void checkpw(){
```

```
    delay(200);
```

```
    lcd.clear();
```

```
    lcd.setCursor(0,0);lcd.print("Enter Password...");
```

```
    lcd.setCursor(0,1);lcd.print("3 trials ,confirm #");
```

```
    lcd.setCursor(0,3);lcd.print("      delete *");
```

```
    k=0;
```

```
    flag=true;
```

```
    while (k<pwlength){
```

```
        key = keypad.getKey();
```

```
        if (key && key!='*' && key!='#'){
```

```
            k++;
```

```
            password[k]= key;
```

```
            lcd.setCursor(k,2);lcd.print(password[k]);}
```

```
        if (key == '#' && k>2){if (m != k){flag=false;}k=pwlength;}
```

```
        else if (key == '*' && k>0){lcd.setCursor(k,2);lcd.print(" ");k--;}}
```

```
        k=0;
```

```
while (k<m){k++;if (password[k] != confirmpw[k]){flag=false;}}  
checkflag();  
}
```

```
void checkflag(){  
    if(!flag){  
        j++;  
        delay(200);  
        lcd.clear();  
        lcd.setCursor(0,0);lcd.print("Wrong Password...");  
        lcd.setCursor(0,1);lcd.print("trial ");  
        lcd.setCursor(6,1);lcd.print(j);  
        lcd.setCursor(7,1);lcd.print(" failed");  
        delay(200);  
        lcd.clear();  
        if(j>2){theifmode();}  
        checkpw();  
        lcd.clear();  
        fire();}  
}
```

```
void theifmode(){  
    lcd.clear();  
    digitalWrite(theif,HIGH);  
    lcd.setCursor(0,0);lcd.print("3 Times Wrong...");  
    lcd.setCursor(0,1);lcd.print("Theif mode door locked");  
    lcd.setCursor(0,2);lcd.print("Calling owner...");  
    lcd.setCursor(0,3);lcd.print("SEE you 4715");
```

```
delay(3000);  
j=0;  
digitalWrite(theif,LOW);  
checkpw();  
}
```