WEEK 7

DISPLAY THE NUMBER OF STUDENTS IN A CLASSROOM AT ANY TIME OF THE DAY

Aim : To display the number of students in a classroom at any time of the day using Arduino Uno.
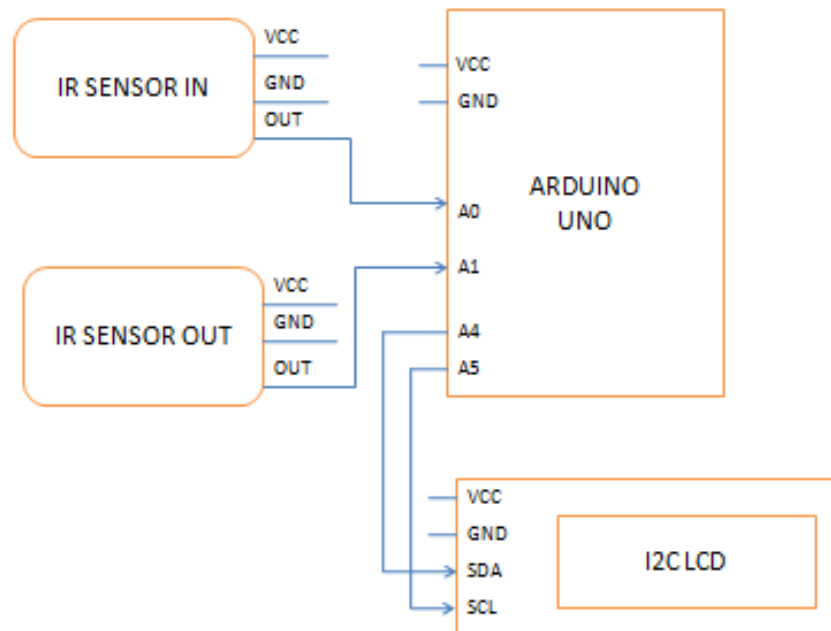
Hardware Required
- Arduino UNO
- IR Sensor module- 2 No's
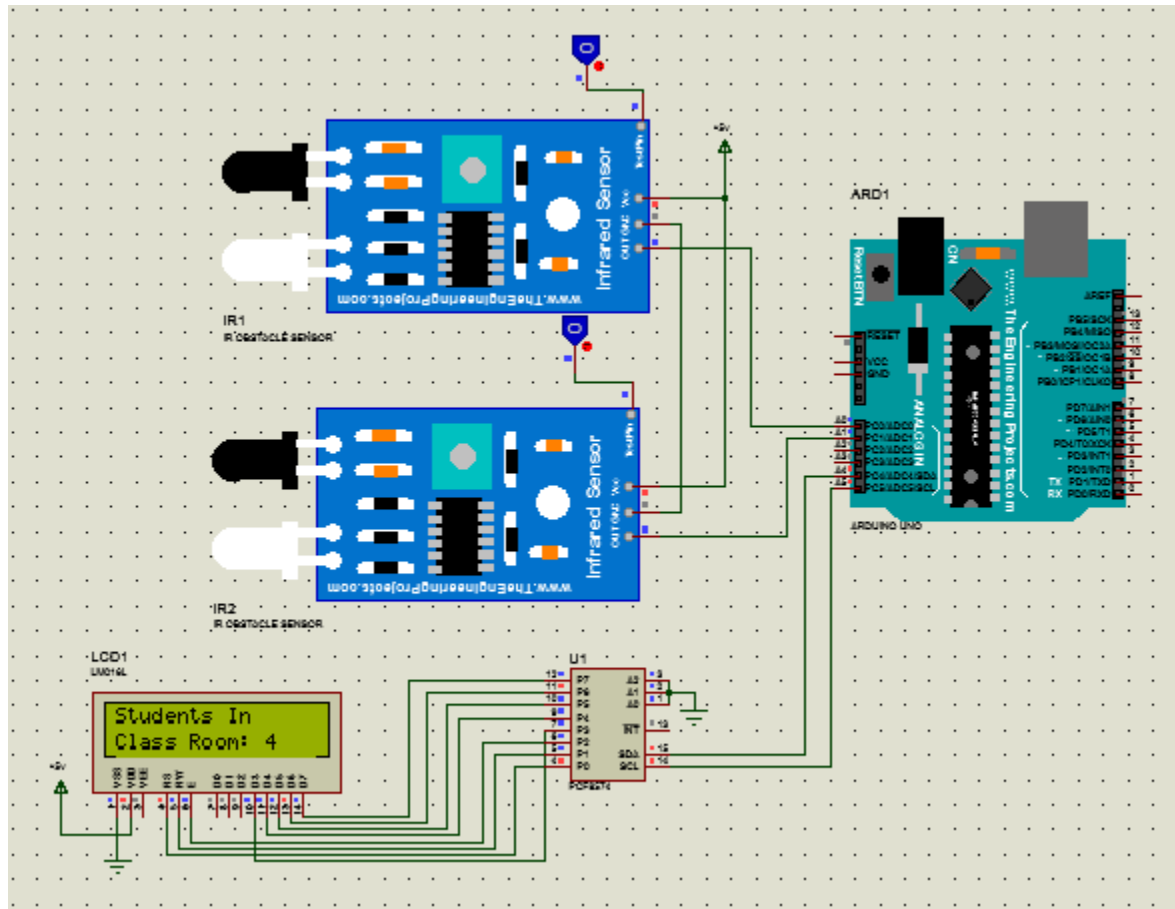- 16x2 LCD display
- Bread Board
- Connecting Wires

Software Required
- Proteus for simulation
- Arduino IDE

Block Diagram

Schematic Diagram

Program

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3f,16,2);
#define in A0
#define out A1
int count=0;
void IN()
{
 count++;
 lcd.print("Students In");
 lcd.setCursor(0,1);
 lcd.print("Class Room");
 lcd.setCursor(12,1);
 lcd.print(count);
 delay(1000);
}
```

```
void OUT()
{
  count--;
  lcd.print("Students In");
  lcd.setCursor(0,1);
  lcd.print("Class Room");
  lcd.setCursor(12,1);
  lcd.print(count);
  delay(1000);
}
void setup()
{
  lcd.init();
  lcd.backlight();
  lcd.print("Smart Class");
  delay(1000);
  lcd.print("Student Counter");
  delay(1000);
  pinMode(in, INPUT);
  pinMode(out, INPUT);
  lcd.clear();
  lcd.print("Students In");
  lcd.setCursor(0,1);
  lcd.print("Class Room");
  lcd.setCursor(12,1);
  lcd.print(count);
}
void loop()
{
  if(digitalRead(in))
  IN();
  if(digitalRead(out))
  OUT();
}
```
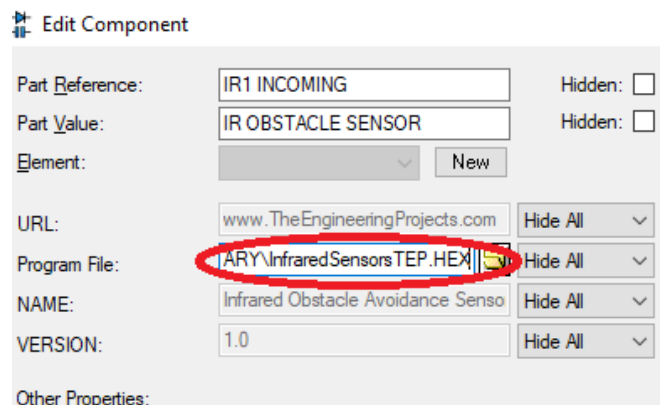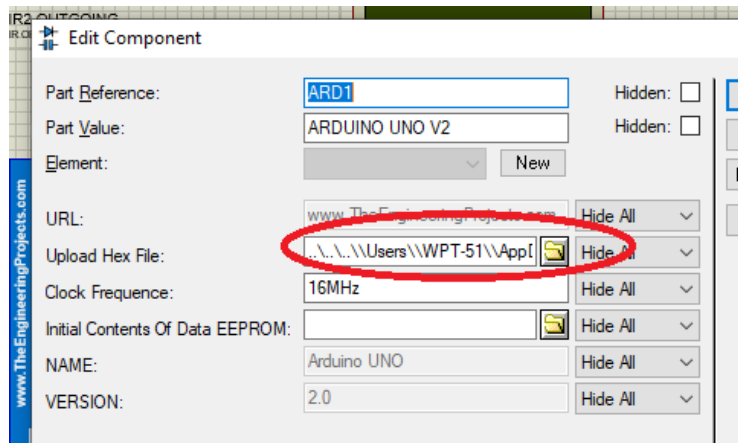
Procedure for Simulation

1. Double click on Proteus 8 icon and open the software.

2. Go to file- Create new project-name the project and save-click on next-choose schematic diagram template and portrait -click next-select do not create PCB layout-select no firmware project-click next-click finish.

3. Select the following components required by clicking on "Picking Devices"

- Arduino Uno
- IR sensor module
- Logic Toggle
- M016L(16x2 LCD Display) & PCF8574

4. Make connections as per schematic diagram

5. Double click this Infrared Sensor and in edit Properties Panel will open up.
Browse to the file InfraredSensorTEP.HEX which is placed in the Library folder of Proteus and click Ok.

6. If test Pin of IR sensor is LOW, then sensor will remain normal and if it's HIGH then sensor will behave as it has something in front of it.

7. Open Arduino IDE, Type the program and Check the compilation option in File—Preferences to generate the hex file.

8. Compile the code and copy the hex file path.

9. Double Click on arduino board to insert hex file code and click ok.

10. Start the simulation and change logic states of IR sensors to" 0" and "1" to check the output.

Procedure for Arduino Kit Downloading

1. Open Arduino IDE software and type the program.
2. Compile and check for errors, if no errors go to TOOL—Select Arduino Board and PORT after connecting the programmer USB cable to PC
3. Make the connections as below

- Connect VCC, GND of IR modules to VCC & GND of Arduino board.
- Connect VCC , GND of I2C LCD to VCC & GND of Arduino
- Connect IR sensor 1 OUT to A0 of Arduino
- Connect IR sensor 2 OUT to A0 of Arduino
- Connect A4 of Arduino to SDA of I2C LCD
- Connect A5 of Arduino to SCL of I2C LCD

4. Download the program to kit.
5. Check the output.

SWITCH ON THE STREET LIGHT DURING DARK AND AUTOMATICALLY SWITCH OFF DURING THE DAY TIME USING ARDUINO

Aim: To switch ON the street light during dark and automatically switch OFF during the Day time using Arduino and Simulation using Proteus Software.
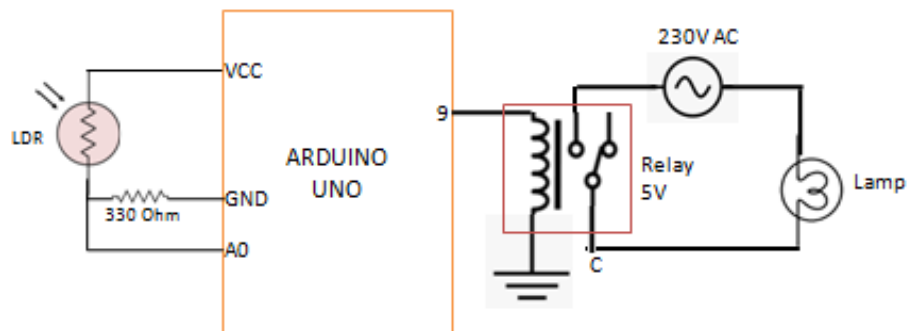
Hardware Required
- Arduino Board
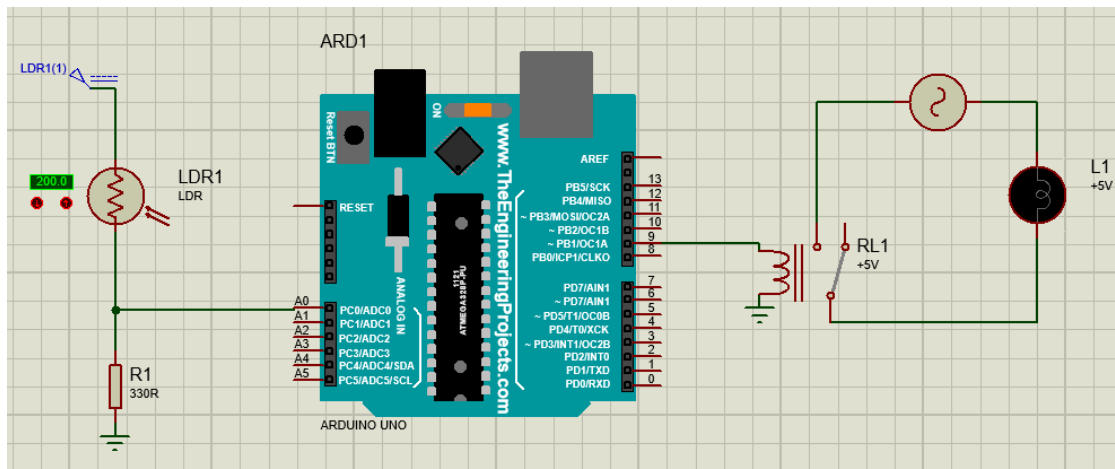- LDR
- Lamp (LED)
- Relay
- Resistor 330 ohm

Software Required
- Arduino IDE
- Proteus

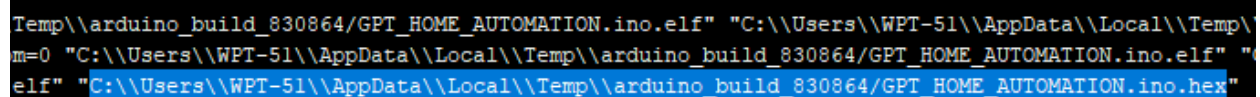## Block Diagram

Schematic Diagram

Program

```c
int sensorPin = A0;
int relayPin = 9;
voidsetup()
{
  pinMode(sensorPin, INPUT);
  pinMode(relayPin, OUTPUT);
}
voidloop()
{
  int sensorValue = analogRead(sensorPin);
  if( sensorValue <= 200)
  {
    digitalWrite(relayPin, LOW);
      }
  else
  {
    digitalWrite(relayPin, HIGH);
  }
}
```

Procedure for Simulation in Proteus

1. Double click on Proteus 8 icon and open the software.

2. Go to file- Create new project-name the project and save-click on next-choose schematic diagram template and portrait A$-click next-select do not create PCB layout-select no firmware project-click next-click finish.

3. Select the following components required by clicking on "Picking Devices"

- Arduino Uno
- LDR
- Alternator
- Relay(animated)
- Lamp(animated)
- Resistor 330R

4. Make connections as per schematic diagram

5. Open Arduino IDE, type the program and Check the compilation option in File—Preferences to generate the hex file.

6. Compile the code and copy the hex file path

7. Double Click on arduino board to insert hex file code and click ok.
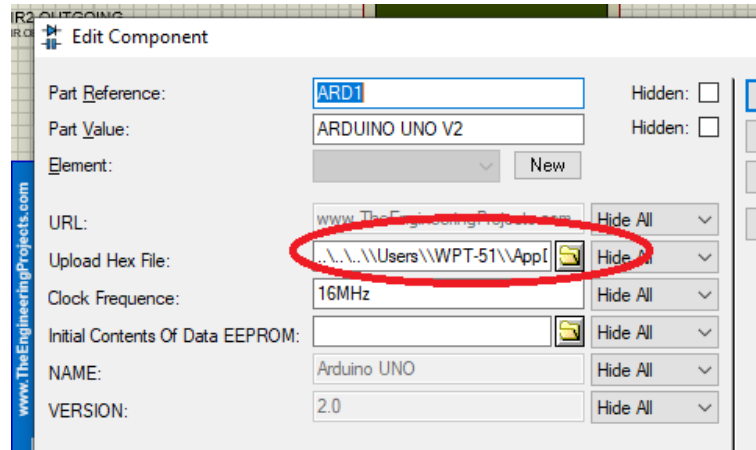
8. Start the simulation and change the value of LDR to check the output.

Procedure for Downloading to Arduino Board

- Connect the programmer USB cable to kit and PC
- Open Arduino IDE software and type the program
- Make the connections as below
    1. Connect VCC of Arduino to LDR
    2. Connect LDR output A0 of Arduino
    3. Connect LDR output to GND of Arduino through 330 ohm resistor
    4. Connect pin 9 of Arduino to Relay IN1
    5. Connector Relay output to AC power supply & Lamp

- Load the program to Kit and Check the Output by Varying Light Intensity at LDR

LIGHT SENSOR USING ARDUINO AND LDR

Schematic diagram
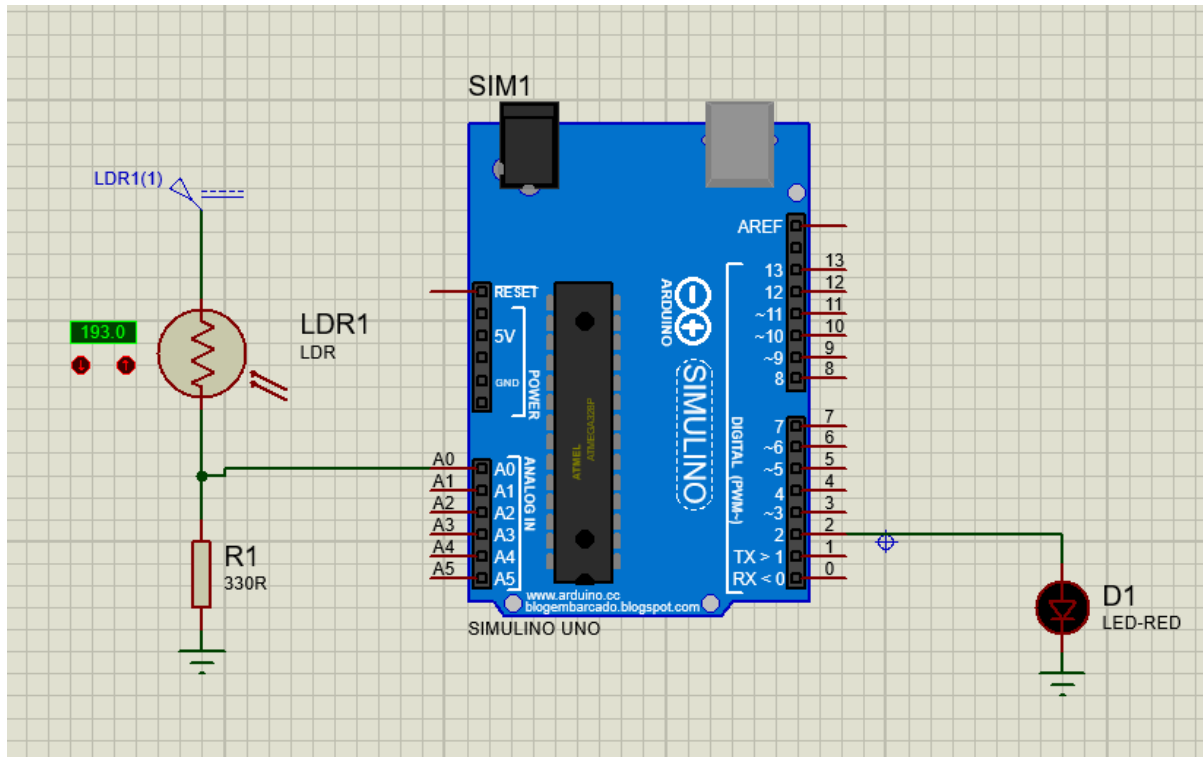
Program

```
int LDR=A0;
int LED=2;
voidsetup(){
pinMode(LDR,INPUT);
pinMode(LED,OUTPUT);
}
voidloop(){
int value=analogRead(LDR);
if(value<50)
  {
    digitalWrite(LED,HIGH);
  }
  else
  {
    digitalWrite(LED,LOW);
  }
}
```

THE LIGHTS AND FANS SHOULD SWITCH OFF IF NO ONE IS PRESENT IN THE ROOM.

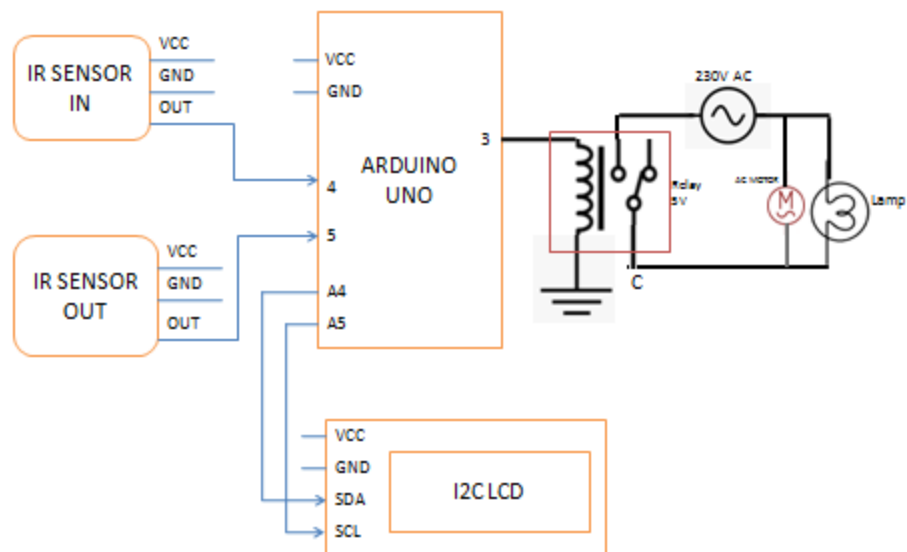**Aim:** To turn off the lights and fans if no one is present in the room.

Hardware Required
- Arduino Board
- 16x2 LCD display
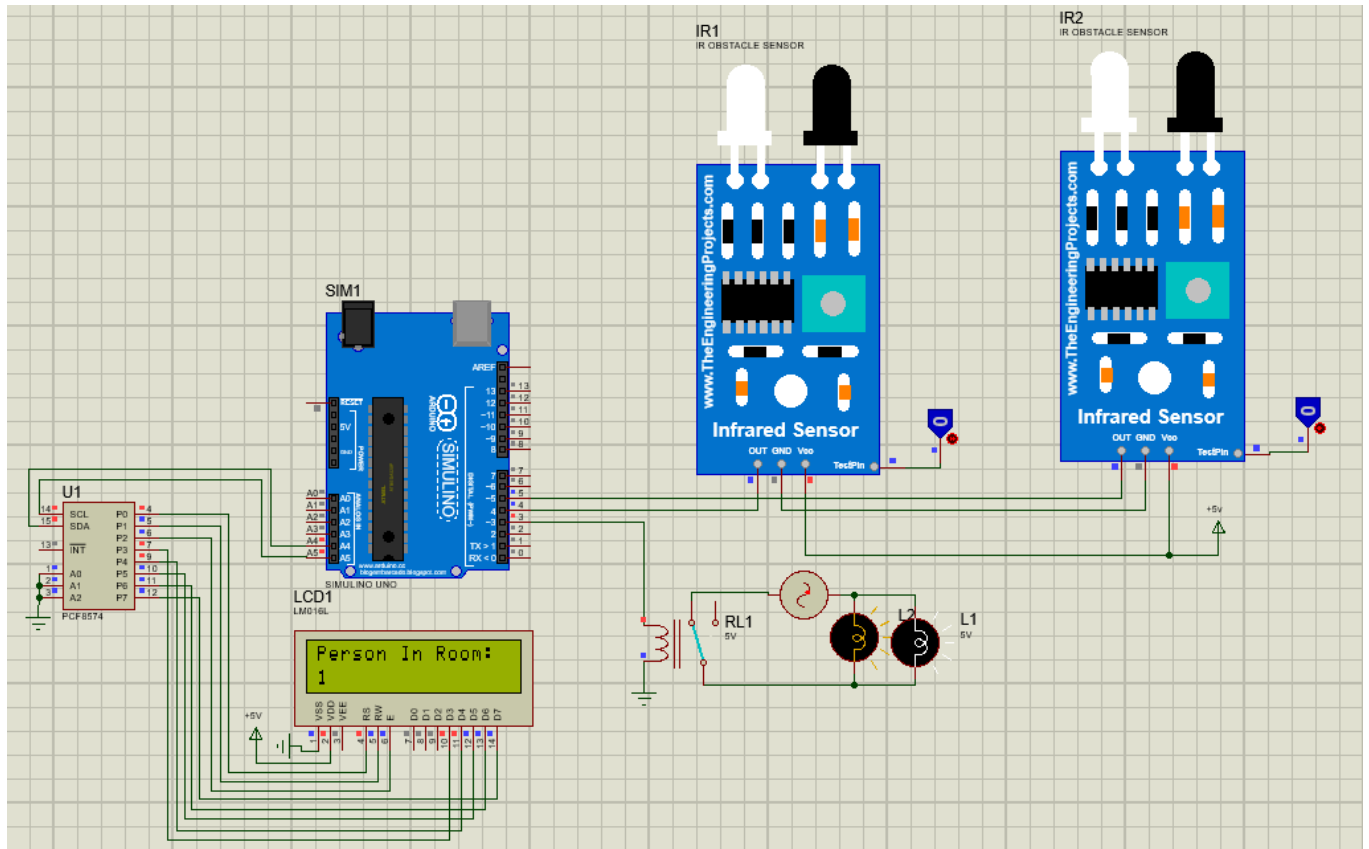- Lamp(LED)
- Relay module
- IR SENSOR-2 No's
- AC MOTOR

Software Required
- Proteus for simulation
- Arduino

Block Diagram

Schematic Diagram

Program

```
#include<LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3f,16,2);
#define in 4
#define out 5
#define relay 3
int count=0;
void IN()
{
    count++;
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
}
void OUT()
{
  count--;
    lcd.clear();
    lcd.print("Person In Room");
```
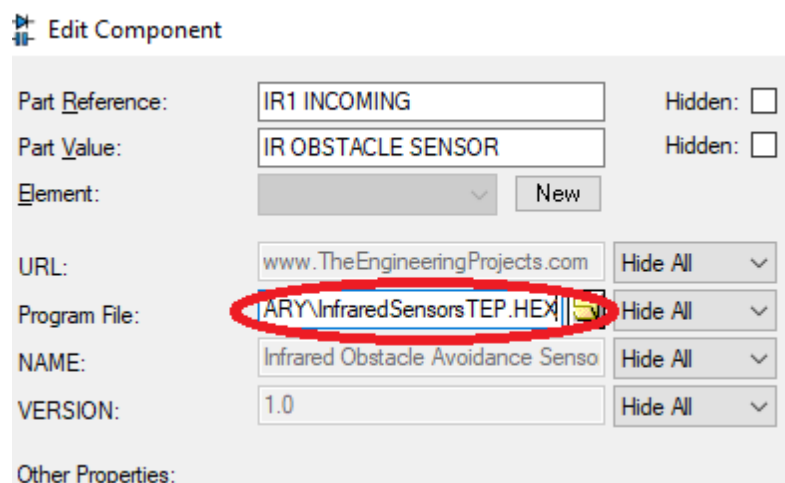
```arduino
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
}
void setup()
{
  lcd.init();
  lcd.backlight();
  lcd.print("smart home");
  delay(1000);
  pinMode(in, INPUT);
  pinMode(out, INPUT);
  pinMode(relay, OUTPUT);
  lcd.clear();
  lcd.print("person IN Room");
  lcd.setCursor(0,1);
  lcd.print(count);
}
void loop()
{
  if(digitalRead(in))
  IN();
  if(digitalRead(out))
  OUT();
  if(count<=0)
  {
    lcd.clear();
    digitalWrite(relay,LOW);
      lcd.clear();
    lcd.print("Nobody In Room");
    lcd.setCursor(0,1);
    lcd.print("Light Is Off");
    delay(1000);
  }
  else
    digitalWrite(relay, HIGH);
   }
```
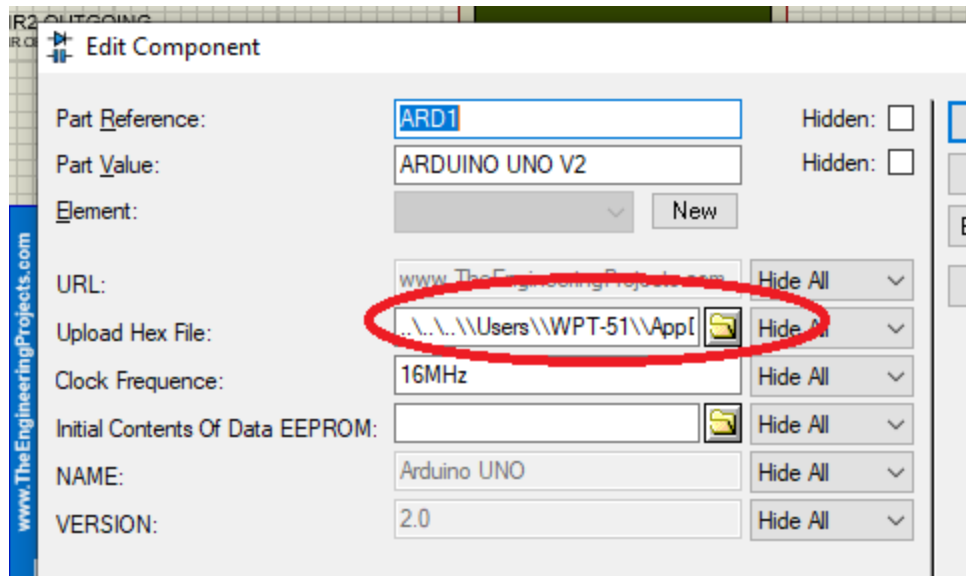
Procedure for Simulation

1.Double click on Proteus 8 icon and open the software.

2.Go to file- Create new project-name the project and save-click on next-choose schematic diagram template and portrait A$-click next-select do not create PCB layout-select no firmware project-click next-click finish.

3. Select the following components required by clicking on "Picking Devices"

- Arduino Uno
- IR Obstacle sensor
- Alternator
- LogicState
- Motor(animated)
- Relay(animated)
- Lamp(animated)
- LM016L(16x2 LCD Display) & PCF8574

4.Make connections as per schematic diagram

5. Double click this Infrared Sensor and in edit Properties Panel will open up. Browse to the file InfraredSensorTEP.HEX which is placed in the library folder of Proteus and click Ok.

6.If test Pin of IR sensor is LOW, then sensor will remain normal and if it's HIGH then sensor will behave as it has something in front of it.

7.Open Arduino IDE, Type the program and check the compilation option in File—Preferences to generate the hex file.

8.Compile the code and copy the hex file path.

9.Double Click on arduino board to insert hex file code and click ok

10.Start the simulation and change logic states of IR sensors to" 0" and "1" to check the output.

Procedure for Arduino Kit Downloading

1.Open Arduino ide software and type the program.

2.Compile and check for errors, if no errors go to TOOL—Select Arduino Board and PORT after connecting the programmer USB cable to kit and PC

3.Make the connections as below

- Connect A5 of Arduino to SCL of I2C LCD
- Connect A4 of Arduino to SDA of I2C LCD
- Connect IR module 1 OUT to Arduino board Pin 4
- Connect IR module 2 OUT to Arduino board Pin 5
- Connect Arduino board pin 3 to Relay IN1
- Connect alternator and lamp to relay as per the connections in the schematic
- Connect VCC, GND of IR modules, LCD to Arduino board

4. Download the program to kit & check the output.