WEEK 7
Session 4: Display the number of students in a classroom at any time of the day using Arduino Uno.

AIM : Display the number of students in a classroom at any time of the day using Arduino Uno.

HARDWIRE REQUIRED

- Arduino UNO
- IR Sensor module- 2 No's
- 16x2 LCD display
- Bread Board
- Connecting Wires

SOFTWARE REQUIRED
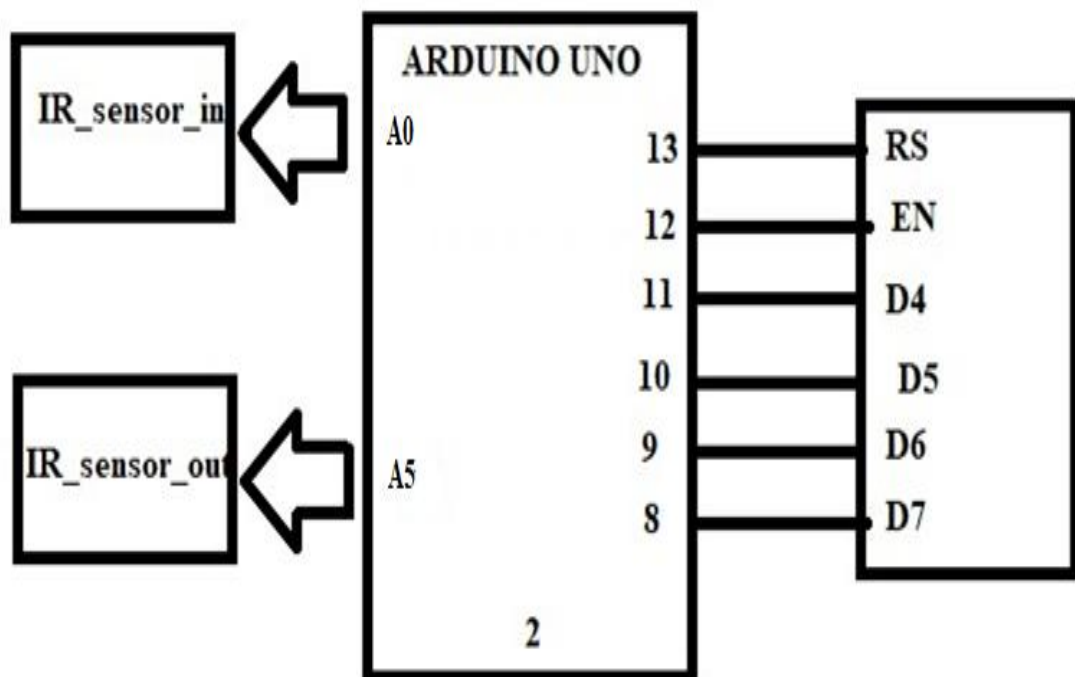- Proteus for simulation
- Arduino

Block Diagram

Fig : Student Counter Arduino Uno block diagram
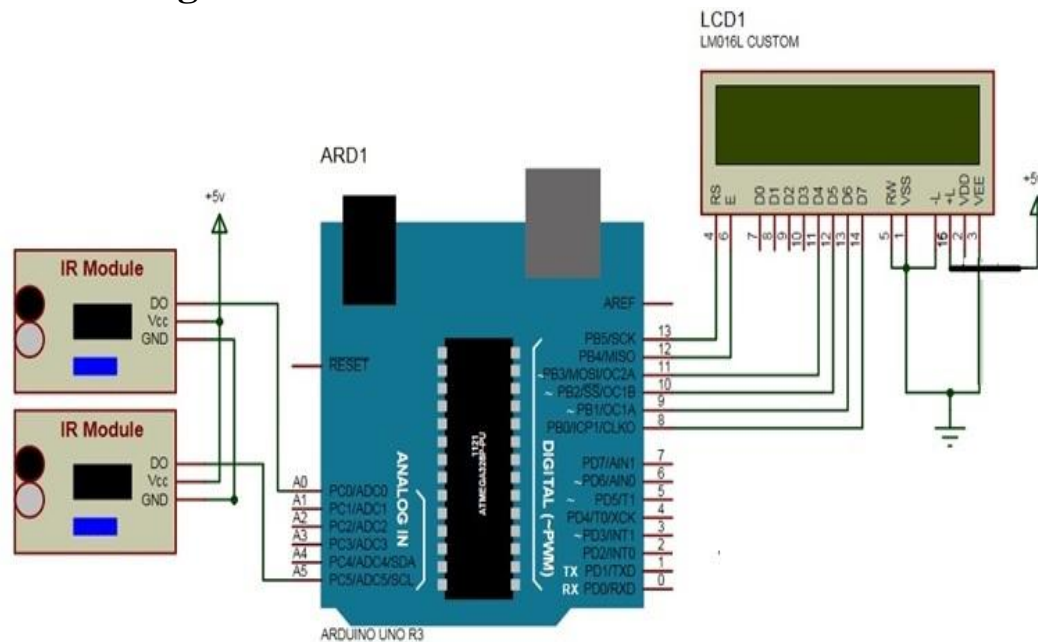
Circuit Diagram

Fig : Circuit diagram showing Connections between Arduino uno, IR sensors, LCD display

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"
   o   Arduino Uno
   o   IR sensor
   o   Alternator
   o   LogicState
   o   M016L(16x2 LCD Display)
   o   Ground

NOTE: Add arduino and IR sensor libraries to Proteus Library

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.
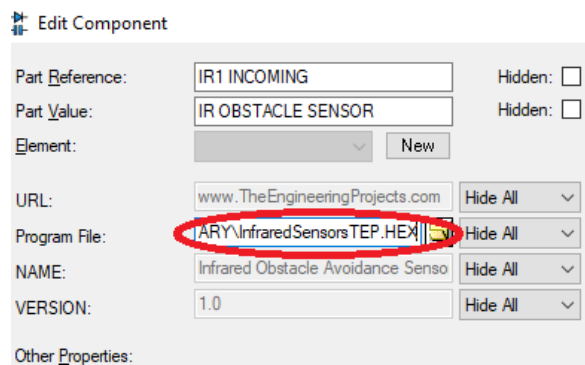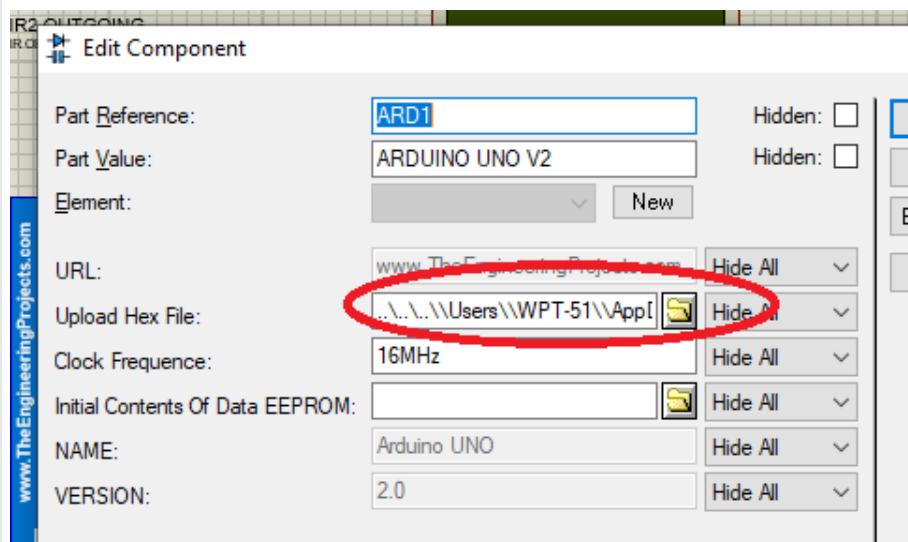
6. If test Pin of IR sensor is LOW, then sensor will remain normal and if it's HIGH

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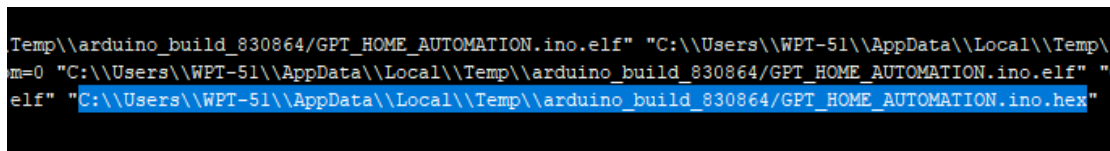
9.Double Click on arduino board to insert hex file code and click ok.

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 Kit connection
3.Make the connections as below

- Use 3-line connector, connect the connector head to IR module of entry
  Connect the VCC pin to 5v power supply section
  Connect the GND pin to GND power supply section
  Connect the signal pin to GPIO of A0 Arduino PIN
- Use 3-line connector, connect the connector head to IR module of exit
  Connect the VCC pin to 5v power supply section
  Connect the GND pin to GND power supply section
  Connect the signal pin to GPIO of A5 Arduino PIN
- Use 3-line connector, connect the connector head to LCD module of pin header [RS, VCC, EN] Connect the VCC pin to 5v power supply section. Connect the RS pin to GPIO of 13 Arduino PIN Connect the EN pin to GPIO of 12 Arduino PIN
- Use 8-line connector, connect the connector head to LCD module of pin.header [D4 D5 D6 D7] Connect the D4 pin to GPIO of 11 Arduino PIN. Connect the D5 pin to GPIO of 10 Arduino PIN. Connect the D6 pin to GPIO of 9 Arduino PIN. Connect the D7 pin to GPIO of 8 Arduino PIN.

4. Dowload the program to kit.

5. Check the output .

Program:

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
#define in A0
#define out A5
int count=0;
void IN()
{
    count++;
    lcd.clear();
    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.clear();
```

```arduino
   lcd.print("Students In");
   lcd.setCursor(0,1);
   lcd.print("Class Room:");
   lcd.setCursor(12,1);
   lcd.print(count);
   delay(1000);
}
void setup()
{
  lcd.begin(16,2);
  lcd.print("Student Counter");
  delay(2000);
  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();
}
```