

A
MINI PROJECT REPORT ON

**Automatic Appliances Control With Or According to
Bi-Directional Visitor Counter**

SUBMITTED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
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BY

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UNDER THE GUIDANCE OF
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APRIL 2022



Sinhgad Institutes CERTIFICATE

This is to certify that the Mini Project entitled

**"Automatic Appliances Control With Or According to
Bi-Directional Visitor Counter "**

Submitted By

**Abhinav Raj
Yash Baheti
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is a Bonafide work carried out by them under the supervision of Prof S.P Ratunawar and it is approved for the partial fulfillment of the requirements of T.E. E&TC Engineering submitted to Savitribai Phule Pune University, Pune.

The Mini Project work has not been earlier submitted to any other institute or university for the award of degree or diploma.

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Abhinav Raj

Yash Baheti

Ashmit Singh

ABSTRACT

The main intention of a Bidirectional Visitor Counter with automatic light and fan control for room is to

1. Design a system wherein the number of persons entering or leaving a room is kept track of and displayed on a LCD.

2.To turn on and turn off light and fan according to human presence in room with respect Persons Count

This Report presents the design and construction of a bidirectional visitor counter (BVC). The BVC is a reliable circuit that takes over the task of counting number of persons / visitors in the room very accurately and beeps a warning alarm when the number of visitors exceeds the capacity limit of the auditorium/hall. When somebody enters the room then the counter is incremented by one (+1) and when any one leaves the room then the counter is decremented by one (-1). The total number of persons inside the room is also displayed on the LCD (Liquid Crystal Display).

The microcontroller is used for detecting an entry or exit action and computing the figures (addition and subtraction) to acquire accurate results. It receives the signals from the sensors, and this signal is operated under the control of embedded programming code which is stored in ROM of the microcontroller. The microcontroller continuously monitors the Infrared Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed. The obstruction occurs under two circumstances, either you obstruct sensor 1 (i.e. outside the building) before sensor 2 (i.e. which is inside the building) this shows that you are entering the building or you do it the other way round, which is obstructing sensor 2 before sensor 1 to indicates an exit movement. This obstruction is sensed by the Microcontroller, computed and displayed by a 16x2 LCD screen. Keywords: Digital bidirectional visitor counter, IR Rays/Receivers, Microcontroller, Liquid Crystal Display and

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REFERENCES

- Paper (in IEEE format)
- Books with publication, Author

Datasheet of Some Major Components

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Visitor counting is simply a measurement of the visitor traffic entering and exiting conference rooms, malls, sports venues, etc. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Over the years, the usage of Visitor counters has become very positive in terms of monitoring crowd behavior at a particular place. It began with a mechanical tally counter which was introduced to replace the use of tally stick. A tally (or tally stick) was an ancient memory aid device used to record and document numbers, quantities, or even messages. Historical reference is made by Pliny the Elder (AD 23–79) about the best wood to use for tallies, and by Marco Polo (1254–1324) who mentions the use of the tally in China. Tallies have been used for numerous purposes such as messaging and scheduling, and especially in people counting, financial and legal transactions, to the point of being accuracy [22, 19]. The substitute of the tally stick was the mechanical tally counter, it is a device used to incrementally count something, typically passing. One of the most common things tally counters are used for is counting people, animals, or things that are quickly entering and exiting a location. As times went on, an electronic tally counter was introduced which used an LCD screen to display the count, and a push button to advance the count. Some also have a button to decrement the count in case of a miscount. Now, due to technology advancement, various type of people counter has been introduced to automatically count the number of people entering and exiting a building at a particular time. Some of these are laser beam, thermal imaging, video camera and the infra-red sensor. All these sensors play their role respectively as visitor detector. These devices are very reliable and accurate in terms of performance as compared to the mechanical tally counter.

1.2 PROBLEM STATEMENT

Our main objective in this paper includes designing and constructing a visitor counter which will make a controller based model to count and compute the number of visitors in a building at a particular time. It is also our objective that this controller base model beeps a warning alarm when the capacity of the building is exceeded.

1.3 Specifications

1. No need of human intervention.
2. Can work 24x7 without any problem.
3. Low cost and very easy to implement.

1.4 Platform Used

- Proteus Software For Simulation
- Arduino (Sketcher) For Coding The Board

1.5 Advantages

4. No need of human intervention.
5. Can work 24x7 without any problem.
6. Low cost and very easy to implement.

1.6 Applications

1. The Bidirectional Visitor Counter using Arduino circuit can be used domestically to get an indication of number of persons entering a party
2. It can be used at official meetings.
3. It can be used at homes and other places to keep a check on the number of persons entering a secured place.
4. It can also be used as home automation system to ensure energy saving by switching on the loads and fans only when needed.

CHAPTER 2

LITERATURE REVIEW

2.1 LITERATURE SURVEY

[1] The main aim of this paper is to design and employ of power saving in general public places like auditoriums, shopping malls and theatres etc. Generally an Auditorium consists of so many number of electrical and electronic devices or equipments. To control and monitor all these equipments or appliances we need a person or controlling system.

[2] In this paper Automatic controls play an ever- increasing role in a human way of life. Automatic control is vast technological area whose central aim is to develop control strategies that improve performance when they applied to a system. The distinct characteristic of automatic control is that it reduces the human operator. One such gadget is the fan. In this paper, an automatic control solution is suggested to control the fan speed.

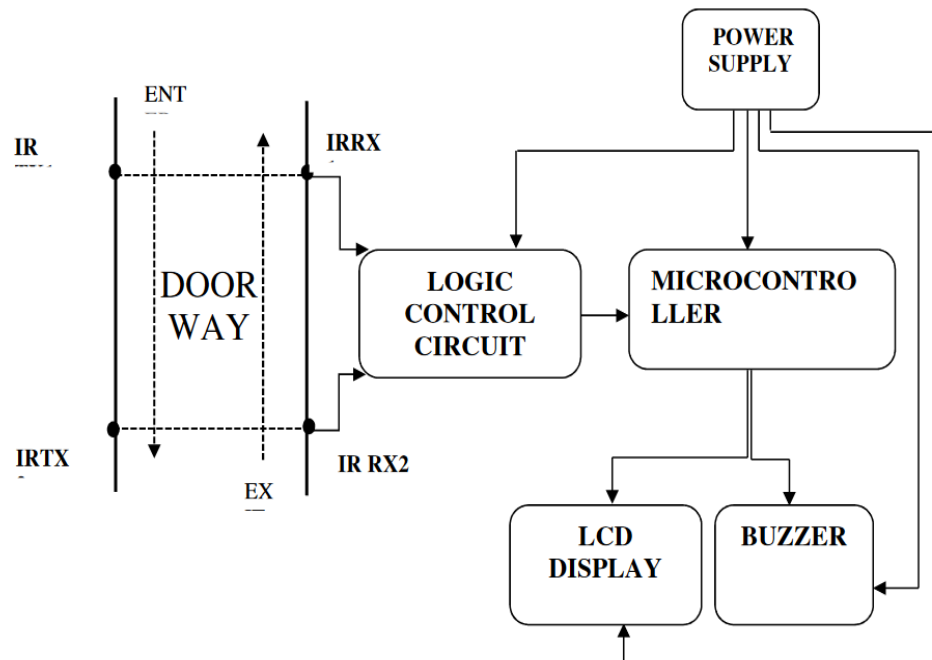
[3] The project controls a room light as well as count the number of individuals entering and leaving a room. When an individual enters in to a room then counter is incremented by and accordingly number of lights in a room will be switched ON and when the individuals leaves a room then the counter is decremented by one. Lights will turn OFF when the individuals in the room are limited. The total number of individuals present inside a room is also displayed on the LCD display. IR sensors sense the obstruction and microcontroller receives these Signals produced by the obstruction from the sensors. The received signal is operated via program stored in ROM of Microcontroller.

[4] Arduino based visitor counter flow chart, bidirectional visitor counter, IR sensor based visitor counter circuit diagram, pc based visitor counter in microcontroller, visitor counter using atmega16 microcontroller.

CHAPTER 3

DESIGN AND DEVELOPMENT

3.1 BLOCK DIAGRAM AND DESCRIPTION



DESCRIPTION :

Infra red sensors are a type of light sensors they function in the infra red part of the frequency spectrum. IR sensors are active sensors They consist of an emitter and a Receiver. When the beam is cut the controller then accordingly comes to know if the person is entering or exiting and then accordingly increments or decrements the count which is then displayed on the 16 x 2 Alphanumeric LCD. If there are more than 5 people in the room the controller turns on the power in the room. Since the controller cannot provide the necessary power a relay is used. The controller turns ON/OFF The Load As Per Count Value.

3.2 SELECTION CRITERIA OF COMPONENTS

A. HARDWARE COMPONENT

1. Arduino UNO board:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

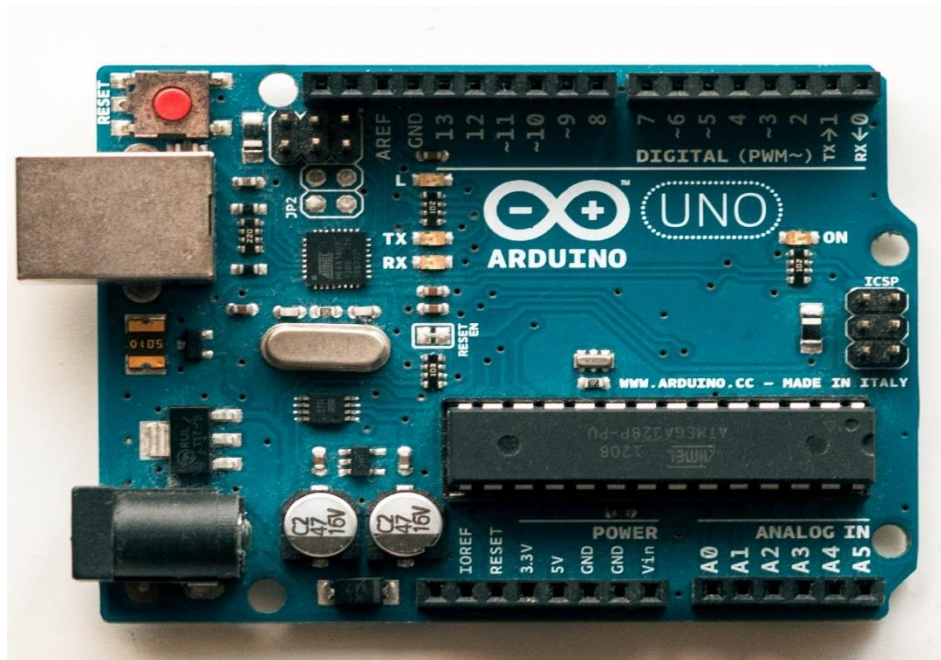


Fig 1: Arduino board

2. IR Sensor:

The basic concept of an Infrared Sensor, which is used as obstacle detector, is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver. An IR sensor consists of an emitter, detector and associated circuitry.

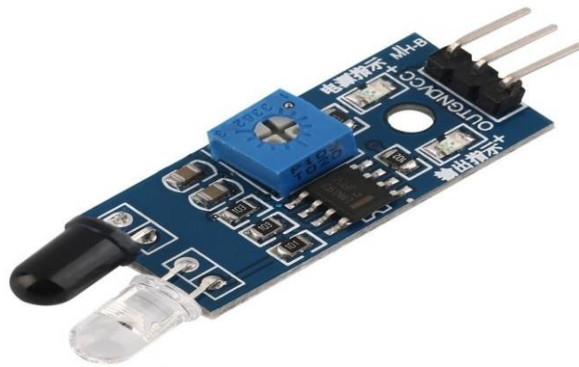


Fig 2: Infrared Sensor

3.Liquid Crystal Display(LCD)

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs



Fig 3: 16x2 Lcd Display

4. Jumper Wires, 1Kohm Resistor, Led 1Watt

A jump wire (also known as jumper, jumper wire, DuPont wire) is an [electrical wire](#), or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a [breadboard](#) or other prototype or test circuit, internally or with other equipment or components, without soldering.¹



Fig 4: Jumper Wires

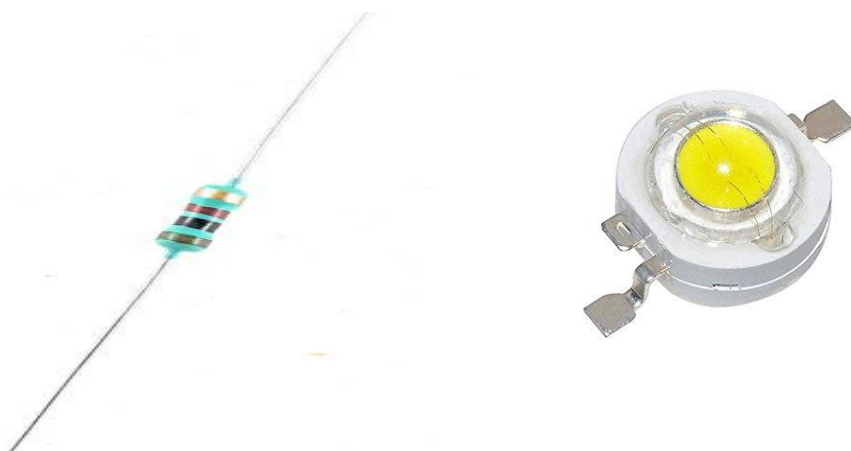
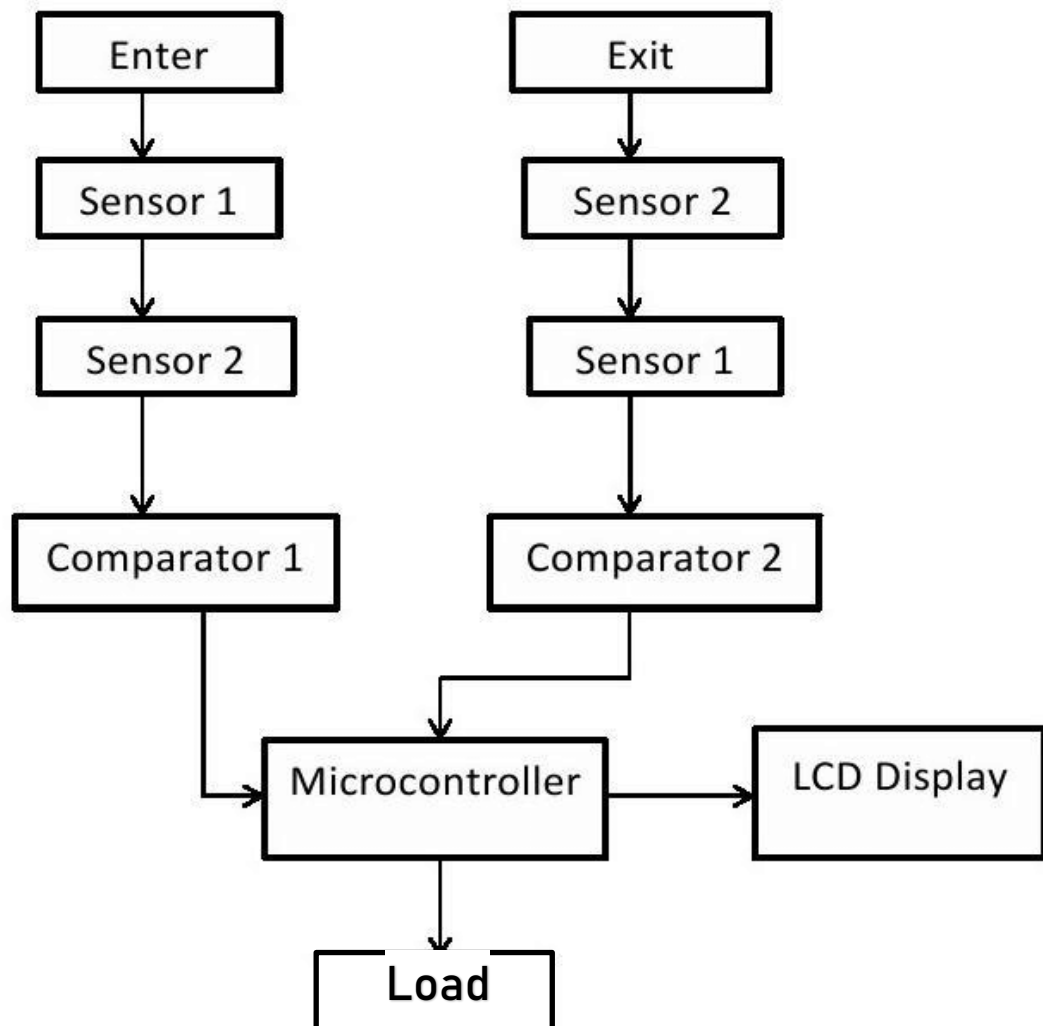
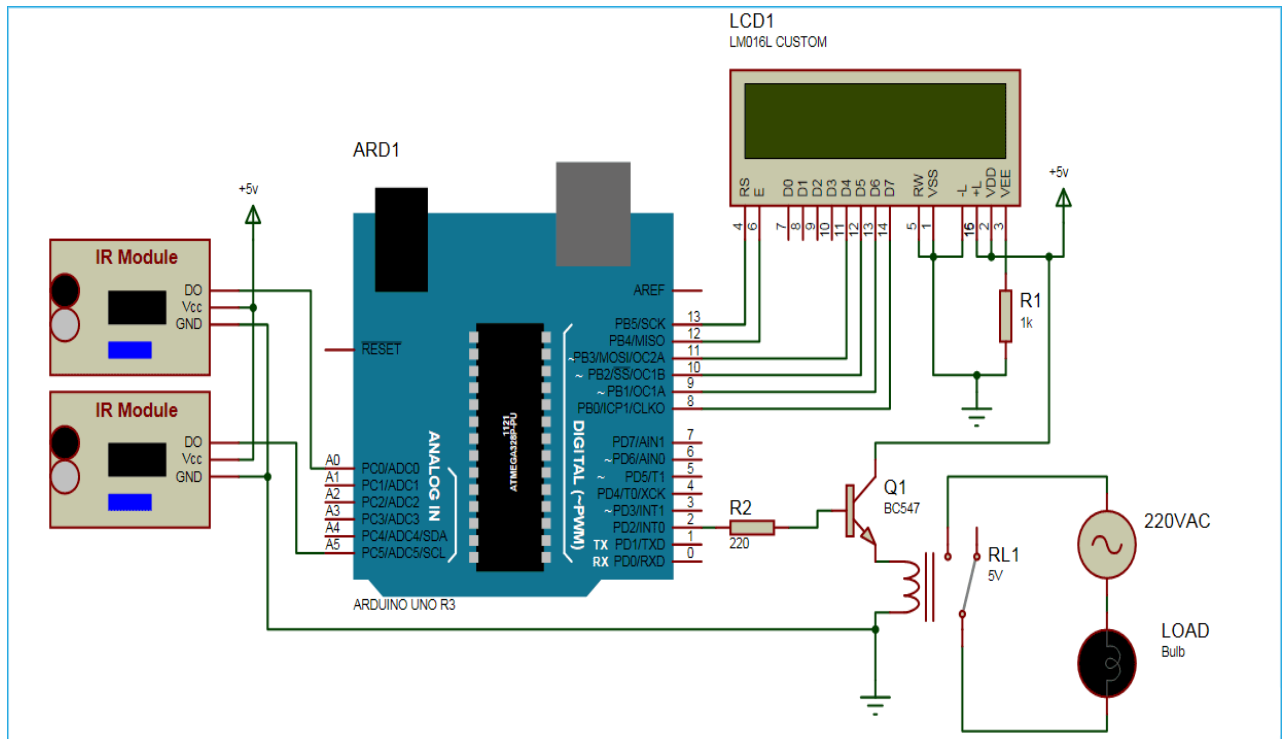


Fig 5: Led And 1Kohm Resistor

3.3 FLOW CHART AND ALGORITHM

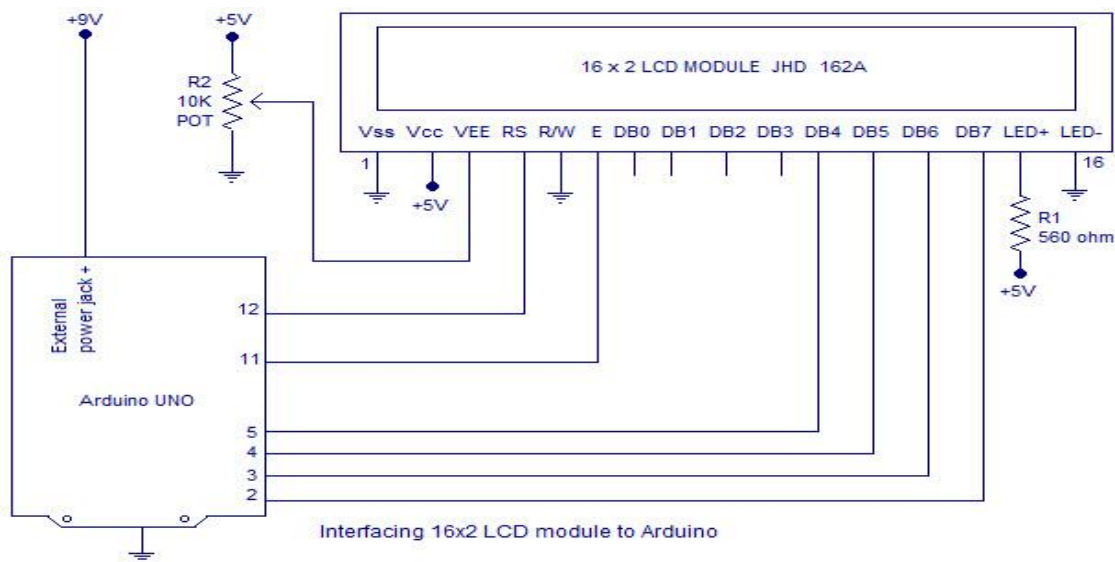


3.4 CIRCUIT DESIGN (CIRCUIT SCHEMATIC)

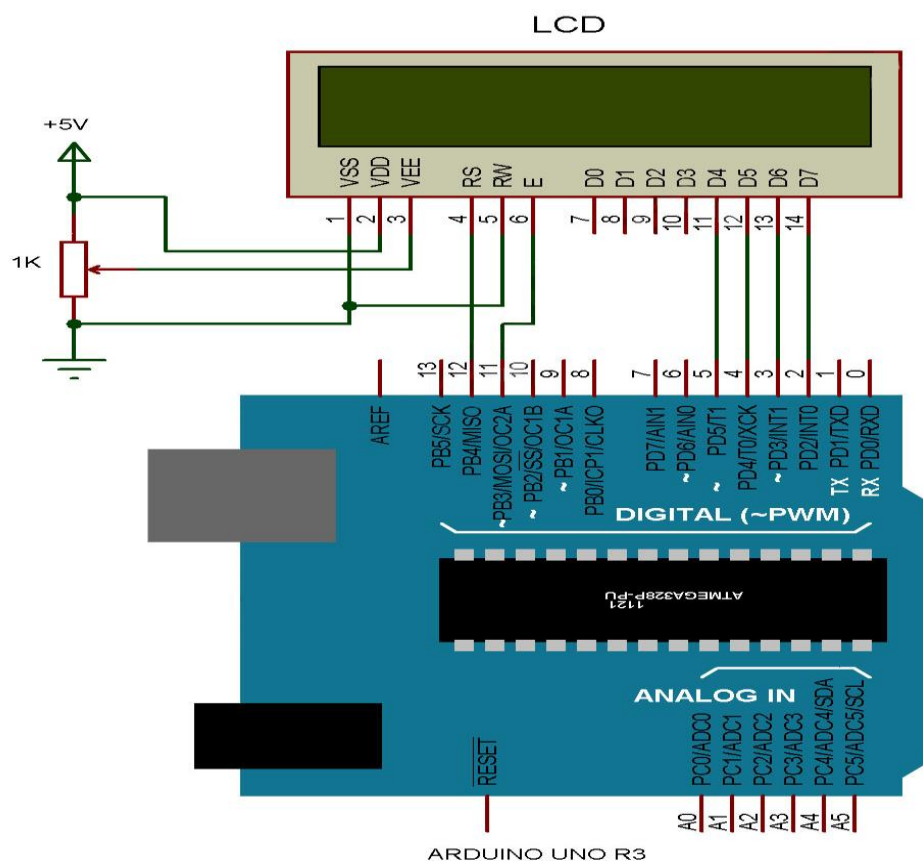


Lcd Interfacing With Arduino Module

The following circuit diagram shows the liquid crystal display with the [Arduino module](#). From the circuit diagram, we can observe that the RS pin of the LCD is connected to the pin 12 of the Arduino. The LCD of R/W pin is connected to the ground. The pin 11 of the Arduino is connected to the enable signal pin of LCD module. The LCD module & Arduino module are interfaced with the 4-bit mode in this project. Hence there are four input lines which are DB4 to DB7 of the LCD. This process very simple, it requires fewer connection cables and also we can utilize the most potential of the LCD module.



The digital input lines (DB4-DB7) are interfaced with the Arduino pins from 5-2. To adjust the contrast of the display here we are using a 10K potentiometer. The current through the back LED light is from the 560-ohm resistor. The external power jack is provided by the board to the Arduino. Using the PC through the USB port the Arduino can power. Some parts of the circuit can require the +5V power supply it is taken from the 5V source on the Arduino board.



SYSTEM DESIGN AND WORKING

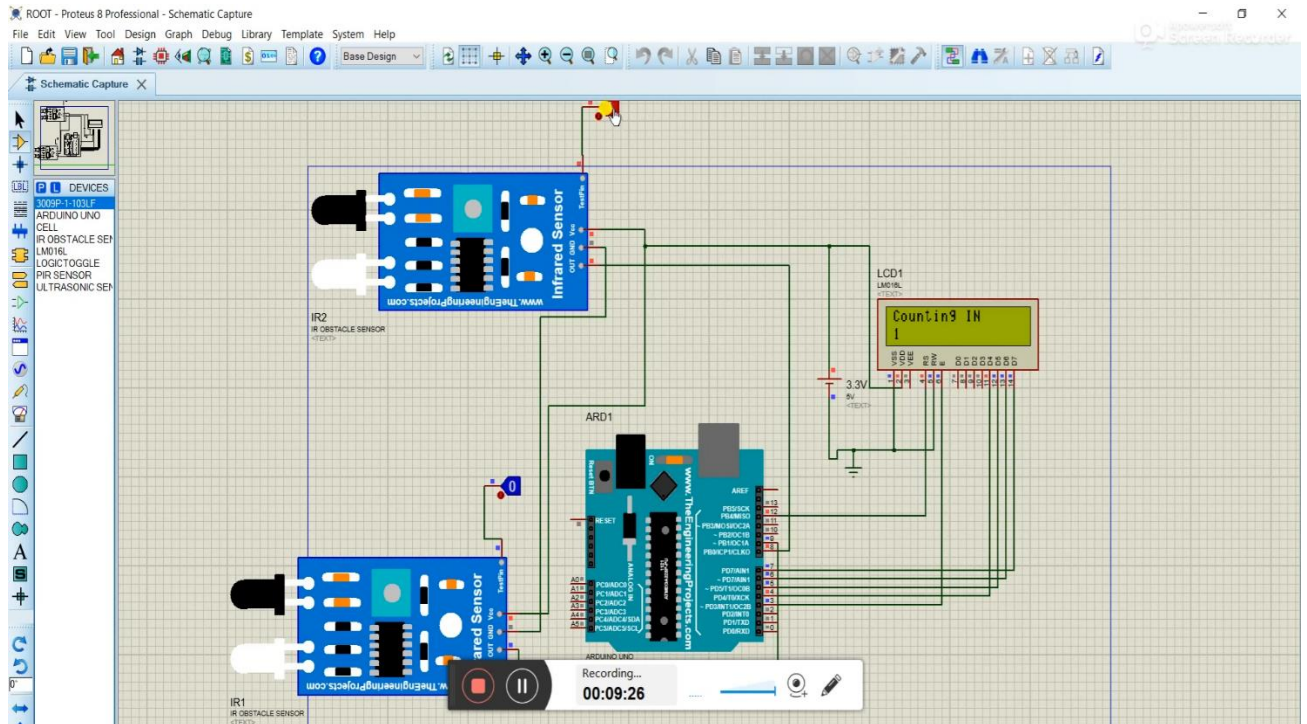
The IR transmitter will emit IR signal and at the receiver TSOP1738 (Infrared receiver led) is used. The output goes low when there is an interruption and it returns back to high when there is no obstacle to the ray. Input is given to the pin 8 and 9 of the Arduino microcontroller. Pin 11 and 12 is used for the connecting loads using relay for turn ON and turn OFF purpose. In this bidirectional circuit two infrared (IR) sensor components are used for up and down counting, respectively. Whenever an interruption is observed by the IR sensor 1 and IR sensor 2 respectively then counter is incremented. And whenever the IR sensor 2 and IR sensor 1 respectively detects any obstacle, the counter is decremented. The number of interruption count depends upon the sensors input and is displayed on a LCD. LDR is connected to pin A0 of the controller to sense intensity of light. Whenever the count becomes greater than or equal to one, then fan gets turned ON and light gets turned ON depending upon the LDR sensed value or intensity of light inside the room. An Arduino relay of 5V is used to connect loads. The relay has two different types of electrical contacts inside: normally open (NO) and normally closed (NC). The one you use will depend on whether you want the 5V signal to turn the switch on or turn the switch off. The 120-240V supply current enters the relay at the common (C) terminal in both configurations. To use the normally open contacts, use the NO terminal. To use the normally closed contacts, use the NC terminal. The signal pins of relay are used to create connection with Arduino. Loads are provided with a 220V supply.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 SIMULATION

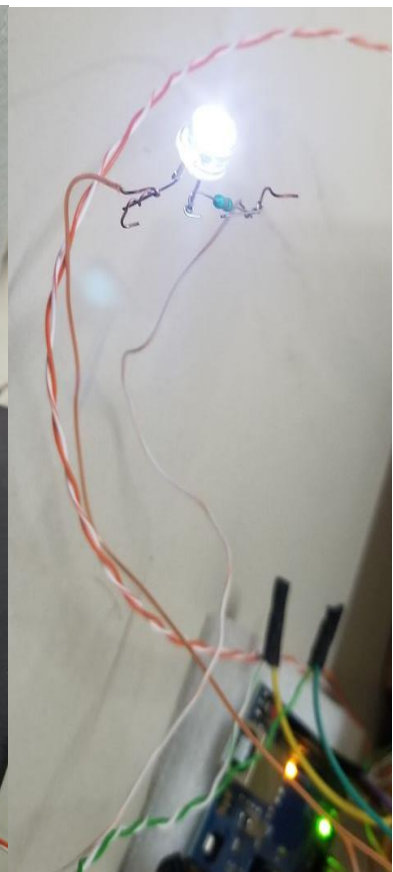
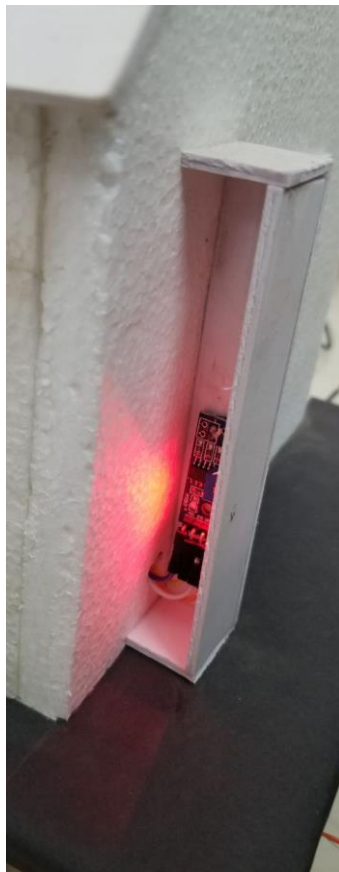
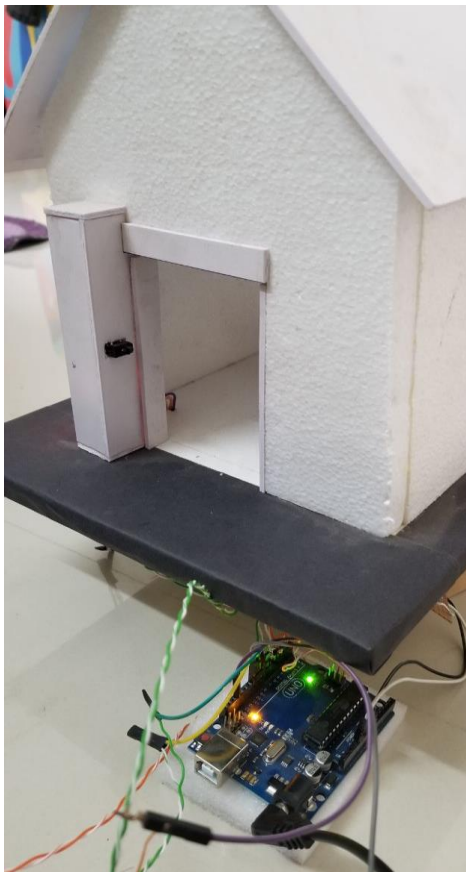
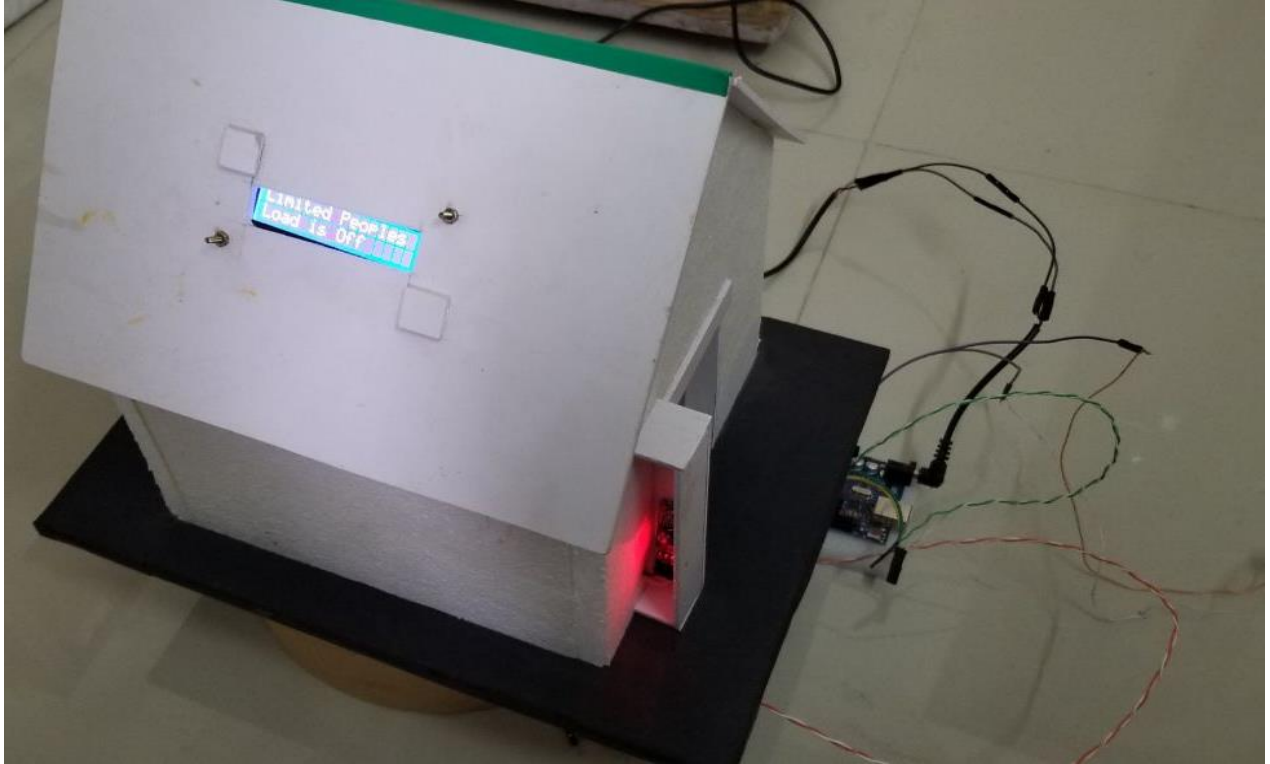
Proteus Simulation



Results of Simulation

The proposed system is implemented as shown in Above Figure . The number of persons inside the room is counted by using IR sensors. The count is displayed in the LCD. According to the count value loads are controlled by the controller

4.2 PHYSICAL BOARD





Arduino Uno Borad Code:

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(2,3,4,5,6,7);

#define in 8
#define out 9
#define fan 10

int count=0;

void setup()
{
    lcd.begin(16,2);
    lcd.print("Visitor Counter");
    delay(2000);
    pinMode(in, INPUT);
    pinMode(out, INPUT);
    pinMode(fan, OUTPUT);
    lcd.clear();
    lcd.print("Person In Room:");
```



```
    lcd.setCursor(0,1);  
    lcd.print(count);  
}  
void loop()  
{  
    int in_value = digitalRead(in);  
    int out_value = digitalRead(out);  
    if(in_value == LOW)  
    {  
        count++;  
        lcd.clear();  
        lcd.print("Person In Room:");  
        lcd.setCursor(0,1);  
        lcd.print(count);  
        delay(1000);  
    }  
  
    if(out_value == LOW)  
    {  
        count--;  
        lcd.clear();  
        lcd.print("Person In Room:");  
        lcd.setCursor(0,1);  
        lcd.print(count);
```

```
    delay(1000);  
}
```

```
if(count==0)  
{  
    lcd.clear();  
    digitalWrite(fan, LOW);  
    lcd.clear();  
    lcd.print("Nobody In Room");  
    lcd.setCursor(0,1);  
    lcd.print("Fan is Off");  
    delay(200);  
}
```

```
else  
{  
    digitalWrite(fan, HIGH);  
}  
}
```

Results of Implementation

The proposed system is implemented as shown in Above Figures . The number of persons inside the room is counted by using IR sensors. The Limit of Peoples Count is 5 if The No of Persons in Room Increases above 5 is that 6 or More Than 6 Then The Load Gets Triggered And Starts Conducting. The count is displayed in the LCD. According to the count value loads are controlled by the controller

Problems Faced During Connections

1. Setting Up The Contrast Of Lcd Display
2. Writing Up The Arduino Code And Facing Some Bugs
3. Working With The Architecture of The Project

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1. CONCLUSION

This project compacts with the usage of the energy in this competitive world of electricity. it is well- organized enough to let someone know about the accuracy of the person entered and have taken the exit from the room. In any big hall if we want to count number of individuals it is very difficult as it results in congestion and disturbance to the whole Class. This project turns out to be serving hand in such situation because it gives the count on LCD display. Also it controls the lighting system automatically according to how many persons are there in a room. Saves more electric power than it seems and also collaborates the knowledge of electric and digital study. One can be knowledgeable about two different study at the same time with this project. It not only teaches us about the functioning of the circuit but also teaches us how we can preserve electricity even in the electricity based project.

5.2. FURTHER SCOPE

By using this circuit and proper power supply we can add various loads depending on applications such as fans, tube lights, A/C, kitchen exhausters, heater etc. By modifying this circuit we can achieve a task of opening and closing the door. Voice alarm system can be added to indicate that room is full and person cannot enter inside. In future, we can send this data to remote areas using mobile or internet

CHAPTER 6

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