

Visitor Counter

**A Project Report
Satisfied is partial fulfillment of the
Requirements for the award of the Degree of**

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

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(Affiliated to University of Mumbai)

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CERTIFICATE

This is to certify that the project entitle, “**VISITOR COUNTER**”, is benefited work of **SACHIN YELANGE** bearing Seat No.: 09 submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University Mumbai.

Internal Guide

Coordinator

External Examiner

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ABSTRACT

With the advancement of technology intelligent devices are fast approaching the real of necessity from the status of luxury. With limited energy resources, it is the need of time to revolutionize the traditional methods of counting visitors inside hotels, recreational places, meeting rooms and cinemas to control the electrical appliances. Moreover, the improved living standards demand developing circuits that would ease the complexity of life. Many systems have been developed to fill this technological gap but most of them are not applicable in real time scenarios due to their limitations. This paper describes the development and implementation of real time bidirectional visitor counter along with automatic room light controller. The proposed system keeps track of visitors visiting a room as well as takes over the control of the room lights. As a visitor enters the room, the count is incremented by one and the lights are switched on. While the count is decremented if a person leaves the room. Lights of the room are switched off only if there is no person inside. Though a number of systems have been developed in this field but most of them are not practically applicable due to outdated technology. In this paper, we have used state of the art components to develop a practically applicable system. Finally, the system was deployed and tested in real world situations to enumerate its efficiency

In today's world, there is a continuous need for automatic appliances. The project is aimed based on this project is to make controller based model to count. This device is for handicap person and oldest person. This built an IOT based system which can automatically switch ON room lights and fan when at least one person is present in the room. If room is empty, the lights and fan will automatically get switch off. It also displays count of persons present in the room

This project has been planned for room, which save the electric power.

A counter that can change its state in either direction, under control of an up-down selector input, is known as an up-down counter. The circuit given here can count numbers from 0 to 9999 in up and down modes depending upon the state of the selector. It can be used to count the number of persons entering a hall in the up mode at entrance gate. In the down mode, it can count the number of persons leaving the

hall by decrementing the count at exit gate. It can also be used at gates of parking areas and other public places.

This circuit divided in three parts: sensor, controller and counter display. The sensor would observe an interruption and provide an input to the controller which would run the counter in up/down mode depending upon the selector setting. The same count is displayed on a set of 7-segment displays through the controller.

ACKNOWLEDGEMENT

It is my privilege to express our sincerest regards to our project coordinator, Asst. Prof. Aniket Deo, for their valuable inputs, able guidance, encouragement, whole-hearted cooperation and constructive criticism throughout the duration of my project. I deeply express my sincere thanks to our Head of Department Prof. Mrs. Shubhangi Mainkar for encouraging and allowing me to present the project on the topic “Visitor Counter“ at our department premises for the partial fulfillment of the requirements leading to the award of B.Sc.I.T. degree. I take this opportunity to thank all our lecturers who have directly or indirectly helped in my project. I pay my respect and love to my parents and all other family members and friends for their love and encouragement throughout my career. Last but not the least I express my thanks to my friends for their cooperation and support.

DECLARATION

I hereby declare that the project entitled," Visitor Counter" done at place where the project is done, has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfillment for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

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CHAPTER 1

INTRODUCTION

This Project —Automatic Room Light Controller with Visitor Counter using Arduino is a reliable that takes over the task of controlling the room lights as well as counting number of persons/ visitors in the room very accurately. When somebody enters into the room then the counter is incremented by one and count until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays.

1.1 Background

Often we see visitor counters at stadium, mall, office, class room etc. How they count the people and turn ON or OFF the light when nobody is inside? Today we are here with automation room light controller project with visitor counter by using Arduino Uno. It is very important for handicap person and oldest person. The visitor counter helps to save electric power which user will low electric power use in home.

1.2 Objectives

It is made to prevent unwanted electric power waste in schools, colleges, offices and houses. This whole process is operated automatically by its sensors. This project is divided into four parts: sensors, controller, counter display and gate. The sensor would observe an interruption and provide an input to the controller which would run the counter increment or decrement depending on the entering or exiting of people. And counting is displayed on a 16x2 LCD through the controller.

1.3 Purpose and Scope

1.3.1 Purpose

People or Visitor counters are pretty famous embedded application that was widely used in places like theaters, malls, Transport stations and so. High end counters uses sophisticated hardware to do the process of counting. Today we are about to see building of simple Visitor counter project using Arduino which uses IR as a tool for sensing people. This project can also be used to count objects as well provided that the surface of the object capable of reflecting IR signals.

1.3.2 Scope

- 2 Lights can be turned ON/OFF according to the number of people in the room.
- 3 We can check the ambient light intensity and then decide if the light needs to be turned ON or not.
- 4 Metal detector can be added for security reasons.

CHAPTER 2

SYSTEM ANALYSIS

2.1 Existing System

1. Arduino UNO



Figure:- 1

An Arduino board historically consists of an Atmel 8-, 16-or 32-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 let users connect the CPU board to a variety of interchangeable add-on modules termed 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. It provides 14 digital I/O pins, six of which can produce pulse width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. This board has a 5 volt linear regulator and a 16 MHz crystal oscillator.

2. IR Sensors

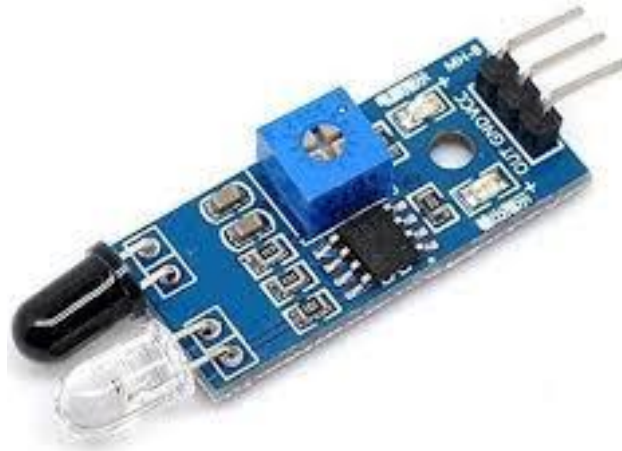


Figure:- 2

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. The radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED.

3. Relay Module



Figure:- 3

The relay module is a separate hardware device used for remote device switching. With it you can remotely control devices over a network or the Internet. Devices can be remotely powered on or off with commands coming from Clock Watch Enterprise delivered over a local or wide area network. You can control computers, peripherals or other powered devices from across the office or across the world.

The Relay module can be used to sense external On/Off conditions and to control a variety of external devices. The PC interface connection is made through the serial port.

The Relay module houses two SPDT relays and one wide voltage range, optically isolated input. These are brought out to screw-type terminal blocks for easy field wiring. Individual LED's on the front panel monitor the input and two relay lines. The module is powered with an AC adapter.

4. Potentiometer or resistor



Figure:- 4

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.

The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.

Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.

5. Breadboard

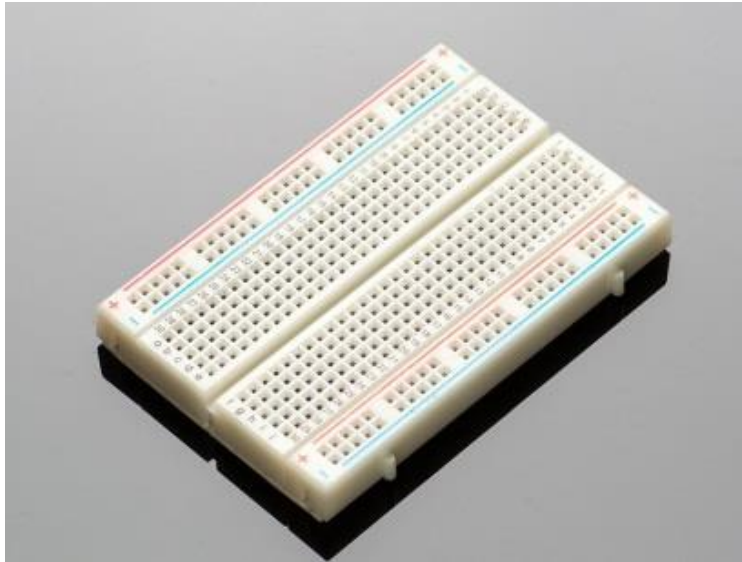


Figure:- 5

A breadboard is a solder less device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The breadboard has strips of metal underneath the board and connects the holes on the top of the board. The metal strips are laid out as shown below. Note that the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically.

Note how all holes in the selected row are connected together, so the holes in the selected column. The set of connected holes can be called a node.

To interconnect the selected row (node A) and column (node B) a cable going from any hole in the row to any hole in the column is needed

6. Jumpers



Figure:- 6

A jump wire (also known as jumper wire, or jumper) 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]

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

Jump wires at the end of a multi-colored ribbon cable are used to connect the pin header at the left side of a blue USB2Serial board to a white breadboard below. Red and black tinned jump wires can be seen on the breadboard.

7. 16x2 LCD Display

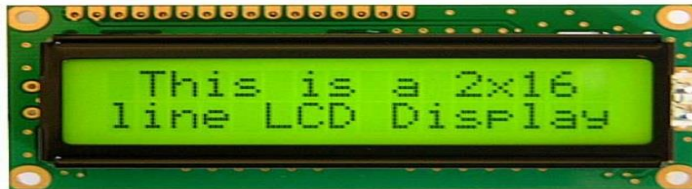


Figure:- 7

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16×2 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. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16×2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5×7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates to a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

8. Cable for Arduino UNO



Figure:- 8

This is a Cable for Arduino UNO/MEGA (USB A to B) 4.5 feet you can use it to connect “Arduino Uno” or any board with the USB female ‘A’ port of your computer. The cable length is approximately 150cm. Cable color and shape may vary slightly from an image as our stock rotates.

This is a standard-issue USB 2.0 cable. The kind that’s usually used for printers, Arduino, etc. Compatible with most SFE designed USB boards as well as USB Arduino boards like the Uno.

Connect your USB printer, scanner and more to your computer. Transmits data at high speeds with the error-free, high-performance transmission.

Feature :

1. Fully compatible with the PC.
2. Molded strain relief and PVC over-molding to ensure a lifetime of error-free data transmissions.
3. Aluminum under mold shield helps meet FCC requirements on KMI/RFI interference.
4. Foil and braid shield complies with fully rated cable specifications reducing EMI/FRI interference.

Package Include :

1 x Cable For Arduino UNO/MEGA (USB A to B) 4.5 feet.

2.2 Proposed System

In this paper our main aim is to propose model for visitor counter. Proposed system architecture. A block diagram representing the circuit developed The System is based on the interruption of IR beam. An IR beam is used as the source of light beam. Bidirectional Visitor Counter with Automatic Room Light Controller and Arduino as the master controller has two sections. The transmitter is an IR diode. It should be powered with 5 volt DC supply and fixed on one side of the door frame. The receiver has a RX at the front end.

A. Monitoring Arduino Reading: Arduino enables users to monitor various kinds of sensors such as IR sensor and motion detectors in real-time. The analog and digital pins on the Arduino board can serve as general purpose input and output pins (GPIO). Usually The ATmega328 microcontroller embedded on the Arduino board contains the analog-to-digital converter (ADC), which converts the analog input signal to a number between 0 and 1023. The integer number is always proportional to the amount of the voltage being applied to the analog input. Any sensor operating on 5 volts can be directly connected to the Arduino board. The prototype has been implemented on the board.

B. Controlling Actuators: The triggering is finally done by Arduino gateway. While monitoring sensors in real-time. The Arduino takes action in real time to control the on/off of the led and controlling the buzzer. In this system it has two section one the transmitter section where the power supply and the light output is given. The other one is the receiver section where light input is taken and implemented on enters sensor circuit and exit sensor circuit.

C. System Protection: Often absurd variation in power supply results in damaging the components of the system. When the BD139 transistor is fed with the input power supply and supplies the outputs to the components it not only provides a liner power supply but also protects from the power surges.

D. Infrared Sensing System: The IR sensor modules contain IR diodes, potentiometer, Comparator (Op-Amp) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then

comparator compares both voltages and generates a digital signal at output one for enter sensor & second for exit sensor circuit.

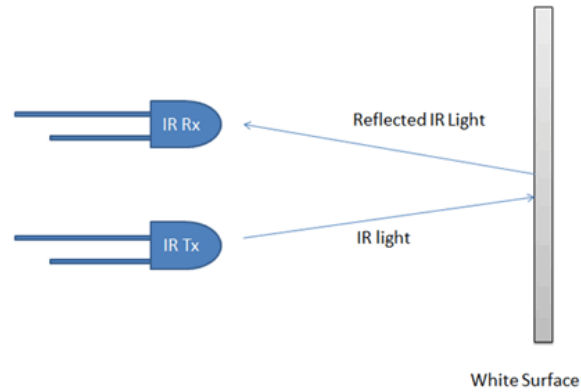
E. Counter Display In this section we have used LCD to display number of persons in the room. The system is designed using the Arduino (IDE) platform. When Arduino check for zero condition (Zero condition means no one in the room) and finds it is true then Arduino turn off the bulb by deactivating the relay through transistor. And if zero condition is false then Arduino turns on the light. Here are two functions for enter and exit. This increment or decrement is displayed in LCD.

2.3 Requirement analysis

The project of “**Digital visitor counter**” is based on the interfacing of some components such as sensors, motors etc. with Arduino microcontroller. This counter can count people in both directions. This circuit can be used to count the number of persons entering a hall/mall/home/office in the entrance gate and it can count the number of persons leaving the hall by decrementing the count at same gate or exit gate and it depends upon sensor placement in mall/hall. It can also be used at gates of parking areas and other public places.

This project is divided in four parts: sensors, controller, counter display and gate. The sensor would observe an interruption and provide an input to the controller which would run the counter increment or decrement depending on entering or exiting of the person. And counting is displayed on a 16x2 LCD through the controller.

When any one enters in the room, IR sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while.

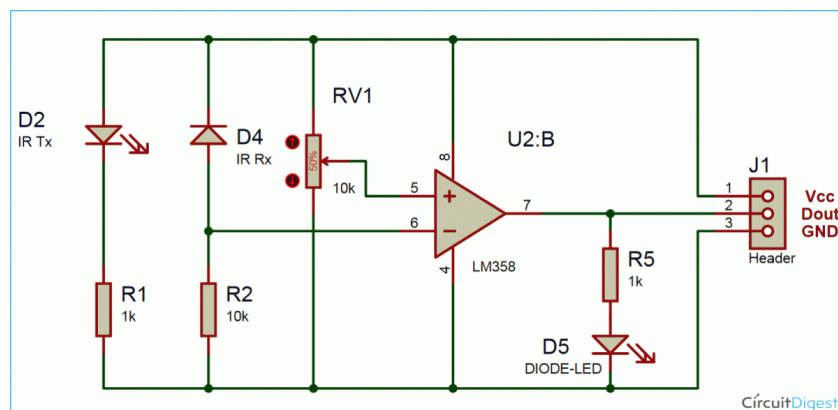


Circuit Explanation

There are some sections of whole visitor counter circuit that are sensor section, control section, display section and driver section.

Sensor section:

In this section we have used two IR sensor modules which contain IR diodes, potentiometer, Comparator (Op-Amp) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output. Here in this circuit we have used two comparators for two sensors. LM358 is used as comparator. LM358 has inbuilt two low noise Op-amp.



Control Section:

Arduino UNO is used for controlling whole the process of this visitor counter project. The outputs of comparators are connected to digital pin number 14 and 19 of Arduino. Arduino read these signals and send commands to relay driver circuit to drive the relay for light bulb controlling. If you find any difficulty in working with relay, check out this tutorial on [Arduino relay control](#) to learn more about operating relay with Arduino.

Display section:

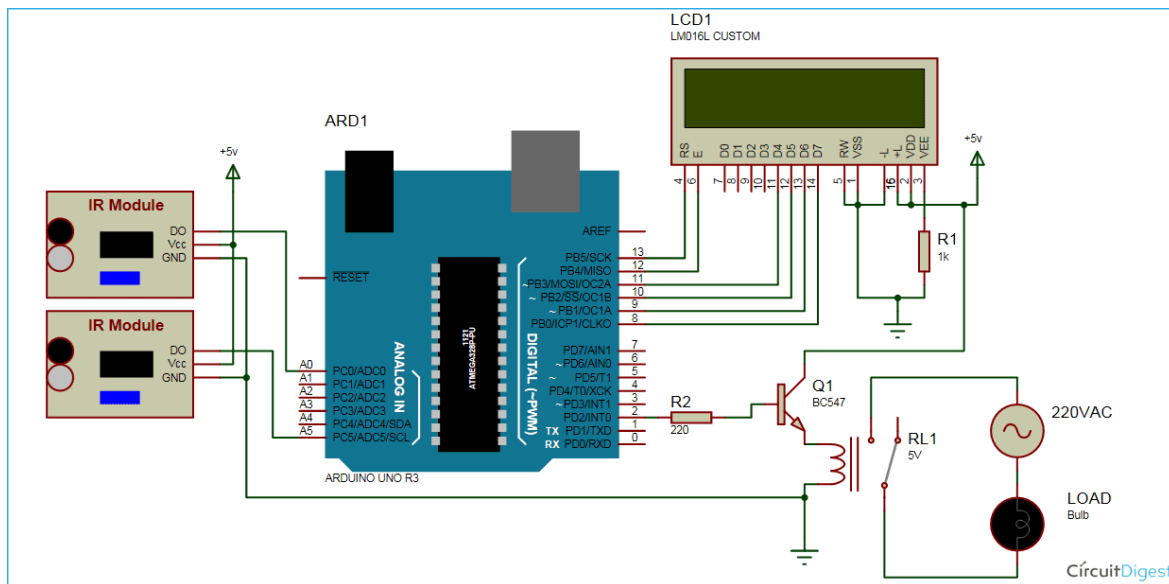
Display section contains a 16x2 LCD. This section will display the counted number of people and light status when no one will in the room.

Relay Driver section:

Relay driver section consist a BC547 transistor and a 5 volt relay for controlling the light bulb. Transistor is used to drive the relay because arduino does not supply enough voltage and current to drive relay. So we added a relay driver circuit to get enough voltage and current for relay. Arduino sends commands to this relay driver transistor and then light bulb will turn on/off accordingly.

Visitor Counter Circuit Diagram

The outputs of IR Sensor Modules are directly connected to arduino digital pin number 14(A0) and 19(A5). And Relay driver transistor at digital pin 2. LCD is connected in 4 bit mode. RS and EN pin of LCD is directly connected at 13 and 12. Data pin of LCD D4-D7 is also directly connected to arduino at D11-D8 respectively. Rest of connections are shown in the below circuit diagram.



Code Explanation

First we have included library for LCD and defined pin for the same. And also defined input output pin for sensors and relay.

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);

#define in 14
#define out 19
#define relay 2
```

Then given direction to input output pin and initialized LCD in setup loop.

```
void setup()
{
    lcd.begin(16,2);
    lcd.print("Visitor Counter");
    delay(2000);
    pinMode(in, INPUT);
    pinMode(out, INPUT);
    pinMode(relay, OUTPUT);
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
}
```

In loop function we read sensors input and increment or decrement the counting depending upon enter or exit operation. And also check for zero condition. Zero condition means no one in the room. If zero condition is true then arduino turn off the bulb by deactivating the relay through transistor.

```

void loop()
{

    if(digitalRead(in))
    IN();
    if(digitalRead(out))
    OUT();

    if(count<=0)
    {
        lcd.clear();
        digitalWrite(relay, LOW);
        lcd.clear();
        lcd.print("No Body In Room");
        lcd.setCursor(0,1);
    }
}

```

And if zero condition is false then arduino turns on the light. Here are two functions for enter and exit.

<pre> void IN() { count++; lcd.clear(); lcd.print("Person In Room:"); lcd.setCursor(0,1); lcd.print(count); delay(1000); } </pre>	<pre> void OUT() { count--; lcd.clear(); lcd.print("Person In Room:"); lcd.setCursor(0,1); lcd.print(count); delay(1000); } </pre>
---	--

2.4 Hardware Requirements

The system mainly uses Arduino UNO board for the process of monitoring, Relay for the process of external switching of the circuit, LCD Display board to display the person in the room and finally the IR Sensors.

The list of the components

1. Processor: Intel Pentium III or later
2. Main Memory (RAM): 256 MB
3. Cache Memory: 512 KB
4. Monitor: 14 inch Color Monitor
5. Keyboard: 108 Keys
6. Mouse: Optical Mouse
7. Hard Disk: 160 GB
8. Arduino UNO
9. IR Sensors
10. Relay Module
11. Potentiometer or resistor
12. Breadboard
13. Jumpers
14. 16x2 LCD Display
15. USB Cable

2.5 Software Requirements

Arduino IDE

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux.



Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or **IDE** (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

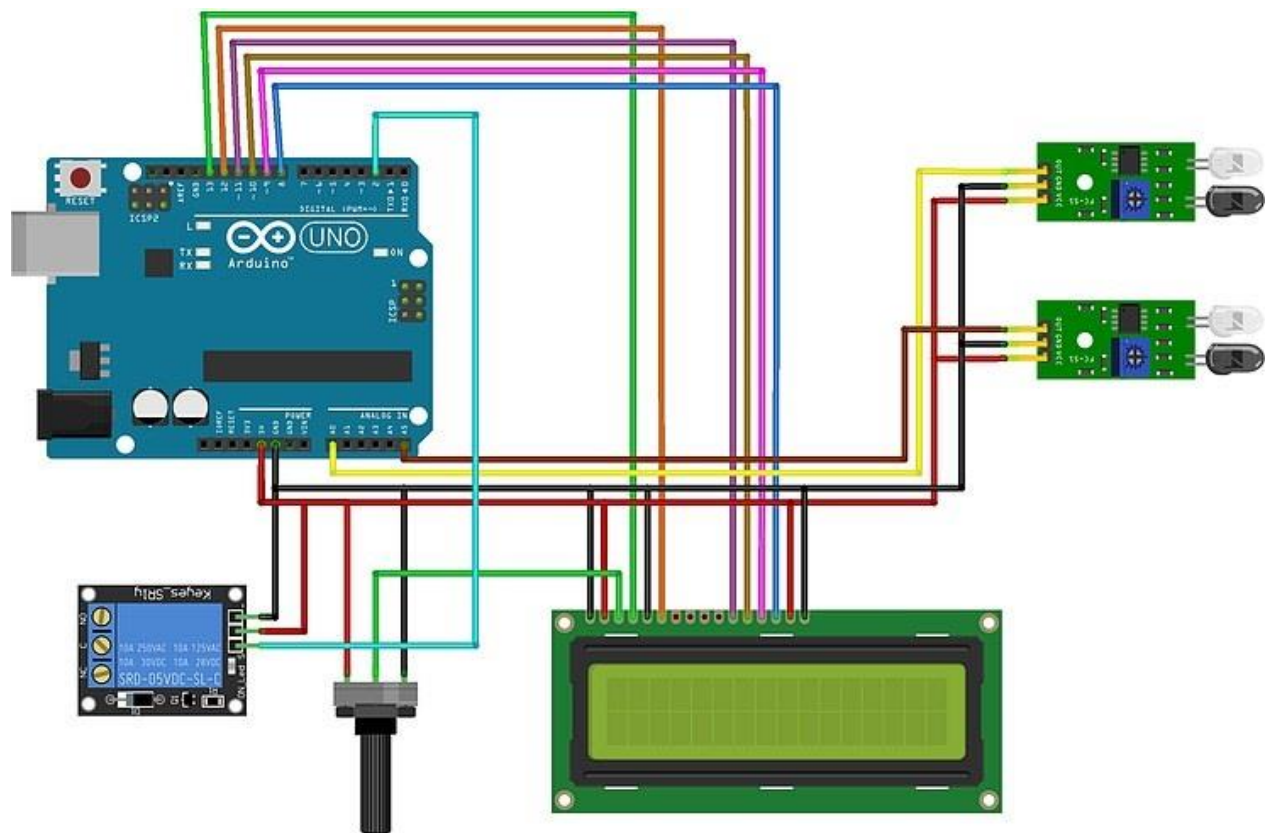
2.6 Justification of selection of Technology

This device is mostly used for handicap person and oldest person, which can automatically switch ON room lights and fan when at least one person is present in the room. If room is empty, the lights and fan will automatically get switch off. It also displays count of persons present in the room. This project has been planned for room, which save the electric power.

CHAPTER 3

SYSTEM DESIGN

3.1 Module Division

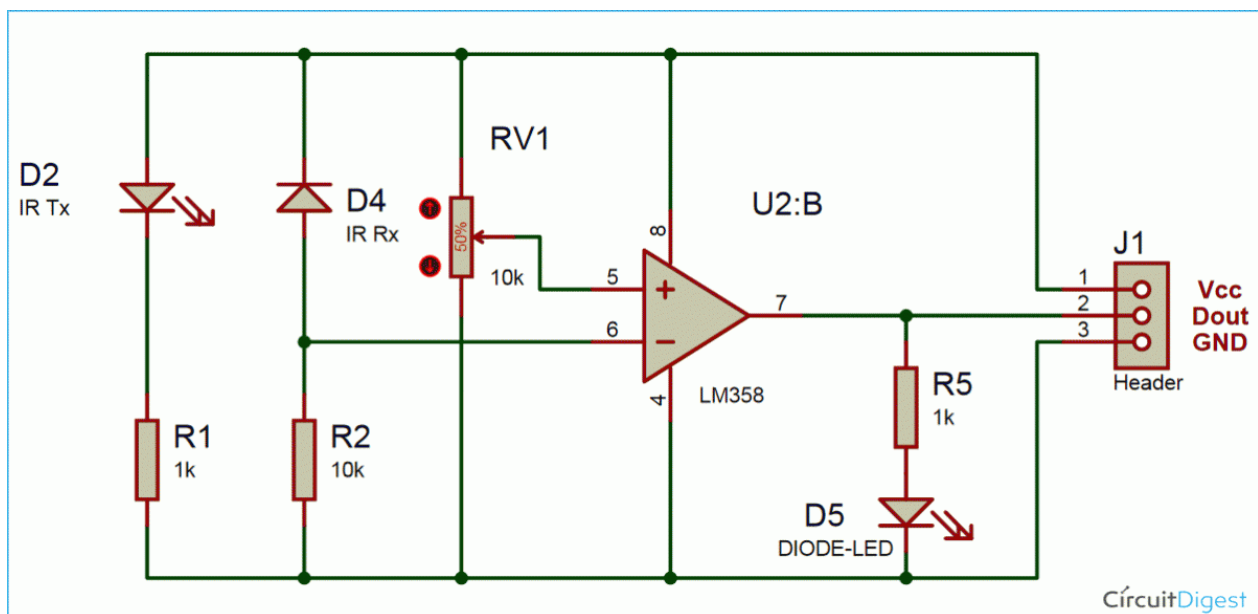


3.2 Data dictionary

There are some sections of whole visitor counter circuit that are sensor section, control section, display section and driver section.

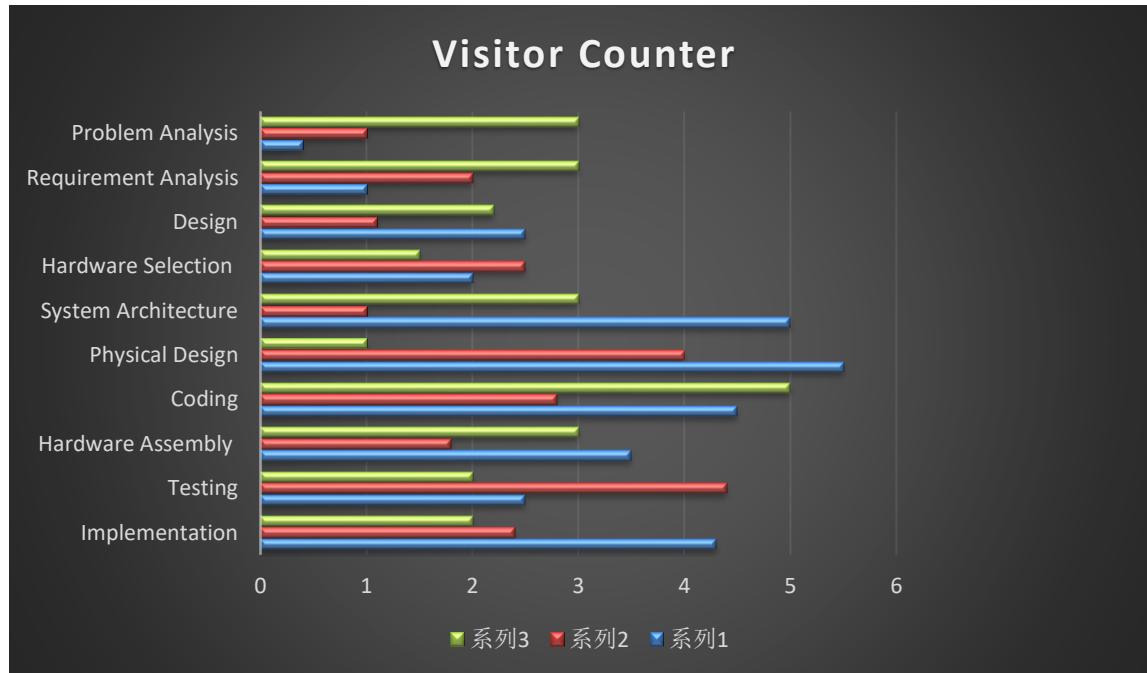
Sensor section:

In this section we have used two IR sensor modules which contain IR diodes, potentiometer, Comparator (Op-Amp) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output. Here in this circuit we have used two comparators for two sensors. LM358 is used as comparator. LM358 has inbuilt two low noise Op-amp.



3.2.1 Planning and Scheduling:

Gantt Chart:



Control Section:

Arduino UNO is used for controlling whole the process of this visitor counter project. The outputs of comparators are connected to digital pin number 14 and 19 of arduino. Arduino read these signals and send commands to relay driver circuit to drive the relay for light bulb controlling. If you find any difficulty in working with relay, check out this tutorial on [arduino relay control](#) to learn more about operating relay with Arduino.

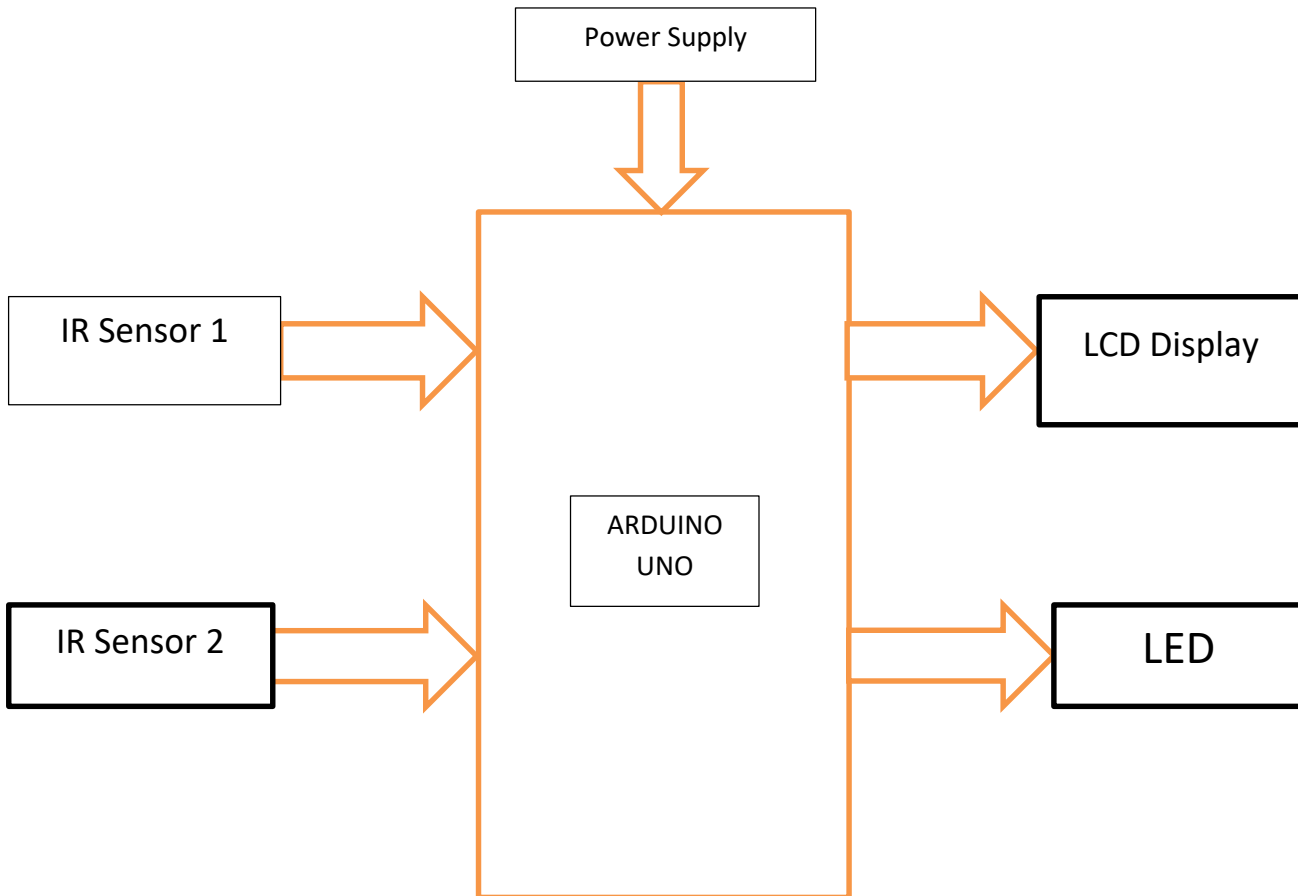
Display section:

Display section contains a 16x2 LCD. This section will display the counted number of people and light status when no one will in the room.

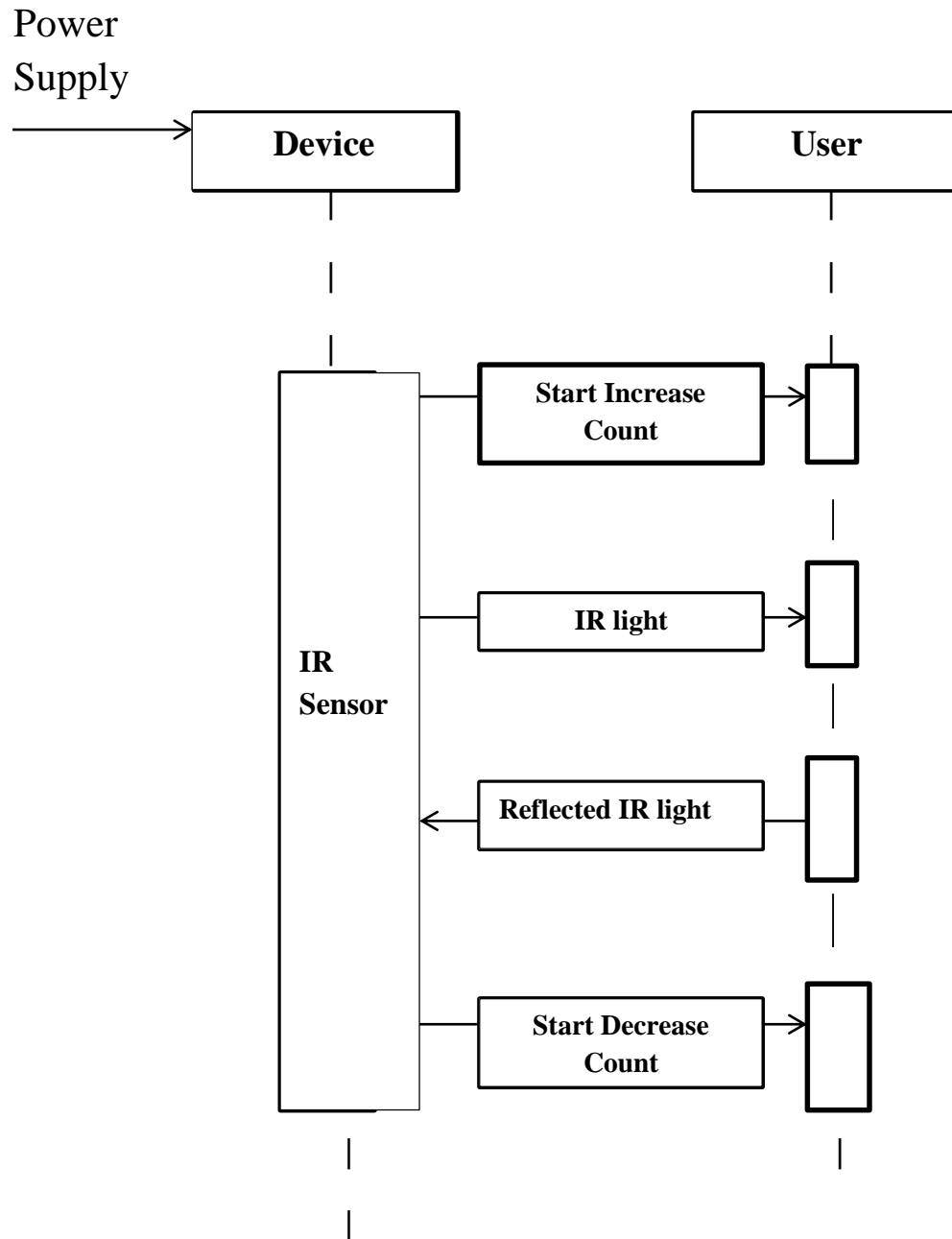
Relay Driver section:

Relay driver section consist a BC547 transistor and a 5 volt relay for controlling the light bulb. Transistor is used to drive the relay because arduino does not supply enough voltage and current to drive relay. So we added a relay driver circuit to get enough voltage and current for relay. Arduino sends commands to this relay driver transistor and then light bulb will turn on/off accordingly.

3.3 ER Diagram



3.4 Sequence Diagrams



CHAPTER 4

IMPLEMENTATION AND TESTING

4.1 Code (Place Core segments)

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(13,12,11,10,9,8);


#define in 14

#define out 19

#define relay 2


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:");  
  
    lcd.setCursor(0,1);  
  
    lcd.print(count);  
  
    delay(1000);  
}
```

```
void setup()  
{  
    lcd.begin(16,2);  
  
    lcd.print("Visitor Counter");  
  
    delay(2000);  
  
    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(200);  
}  
  
else
```


4.2 Testing Approach

The proposed paper is tested and experimented with a model, where the working is based on the IR sensor in the following cases:

Case (i): The room appliances are in off state, if there is nobody in the room which implies that energy is getting conserved instead of wasting. This is pictorial representation of the circuit connection and the gives the external appearance with the LCD display.

Case (ii): The room appliances are switched on as the person enters the room. The pictorial representation is and the circuit connection.

CHAPTER: 5

IMPLEMENTATION AND TESTING

5.1 Implementation Approaches

The results of implementation and experimentation has shown the proposed system can provide more IoT application possibilities daily life. Here the work proposed is an approach to enhance old appliances and the controlling experience through an IOT based Bidirectional visitor counter.

5.2 Coding Details and Code Efficiency

Code for Visitor Counter

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(13, 12, 11, 10, 9, 8);

#define in 14 // Analog pin A0 has a IR Module attached to it.
#define out 15 // Analog pin A1 has a IR Module attached to it.
#define relay 2 // Digital pin D2 has a Relay attached to it.

int count=0;

void IN()
{
    count++; // increment the value
    lcd.clear();
    lcd.print("Person In Room:");
```

```

    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
}

void OUT()
{
    count--; // increment the value
    lcd.clear(); // Clear the LCD Value
    lcd.print("Person In Room:");
    lcd.setCursor(0,1); // set the cursor positon
    lcd.print(count); // Display count value
    delay(1000);
}

void setup()
{
    lcd.begin(16,2);
    lcd.print("Visitor Counter");
    delay(2000);

    pinMode(in, INPUT); // Assign the IR is Input
    pinMode(out, INPUT);Assign the IR is Input
    pinMode(relay, OUTPUT); Assign the Relay is 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); // relay is in ON conditon  
    lcd.clear();  
    lcd.print("Nobody In Room");  
    lcd.setCursor(0,1);  
    lcd.print("Light Is Off");  
    delay(200);
```

```
}
```

```
else
```

```
digitalWrite(relay, HIGH); // relay is OFF condition
```

5.3 Testing Approach

The proposed paper is tested and experimented with a model, where the working is based on the IR sensor in the following cases:

Case (i): The room appliances are in off state, if there is nobody in the room which implies that energy is getting conserved instead of wasting. This is pictorial representation of the circuit connection and the gives the external appearance with the LCD display.

Case (ii): The room appliances are switched on as the person enters the room. The pictorial representation is and the circuit connection.

5.4 Modification and Improvements

When the project is planned during the planning stage, various things are written on the manual or in the synopsis. But due to time constraint or some other reason the project needs to be modified. With respect to the modification we need to keep in mind the most important factor of the system i.e. improvement. In my project the main thing which I had modified the most is Functioning of the whole system without errors or defects.

5.5 Test cases



Figure:- 1

In this image when persons enters into the room then the counter is incremented by one and count until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays.



Figure:- 2

In this image a Cable for Arduino UNO 4.5 feet you can use it to connect “Arduino Uno” or any board with the USB female ‘A’ port of your computer and another side power supply.

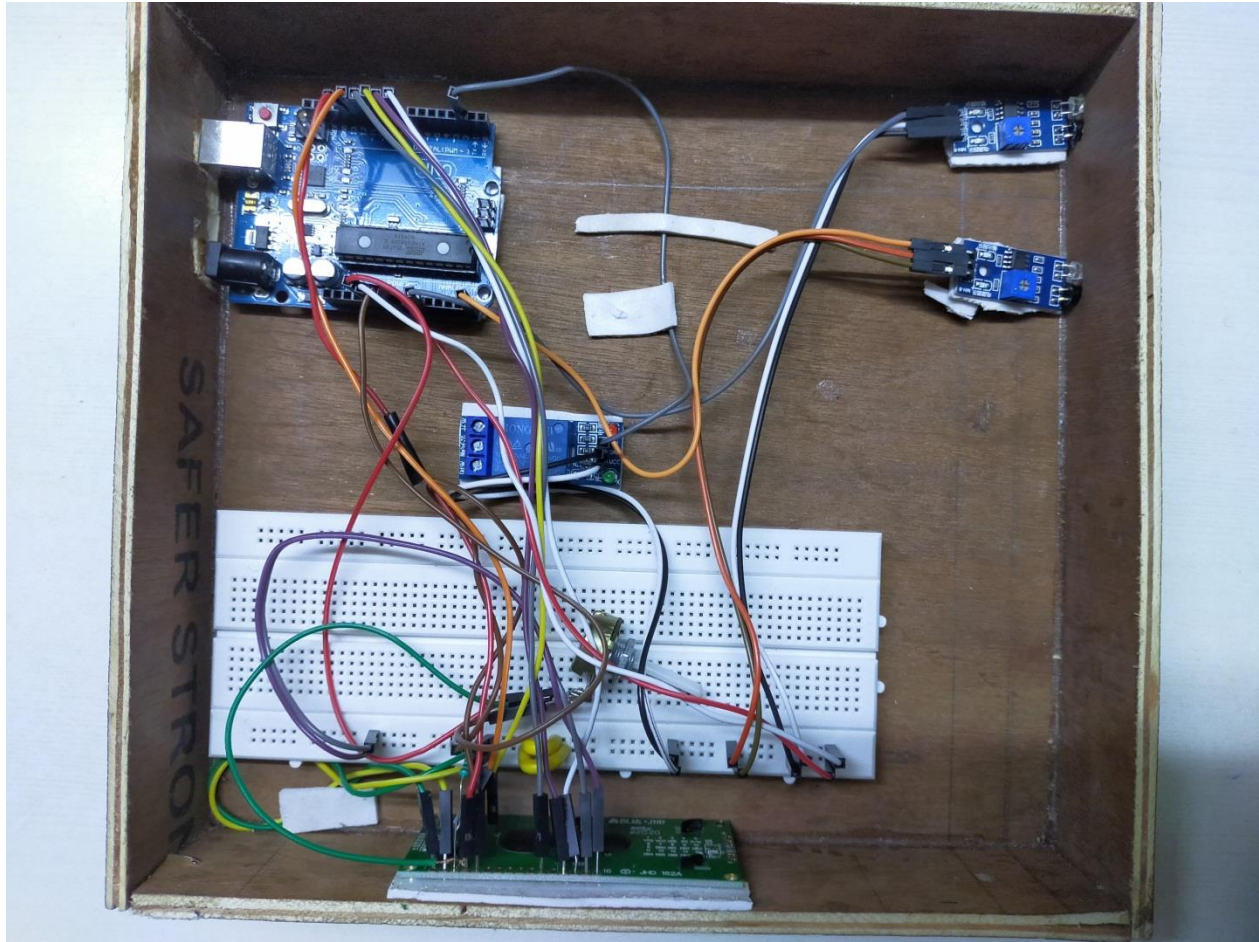


Figure:- 3

In this image the important aspect of the Arduino is its standard connectors, which let users connect the CPU board to a variety of interchangeable add-on modules termed shields. It is give power to all devices. In this image the IR sensor is most important role which IR sensor can measure the heat of an object as well as detects the motion. The radiations are invisible to our eyes, which can be detected by an infrared sensor and this whole process is operated automatically by its sensors. This project is divided into four parts: sensors, controller, counter display and gate. The sensor would observe an interruption and provide an input to the controller which would run the counter increment or decrement depending on the entering or exiting of people. And counting is displayed on a 16x2 LCD through the controller.

CHAPTER: 6

RESULTS AND DISCUSSION

6.1 Test Reports

Test Cycle System Test

EXECUTED	PASSED			
	FAILED			
	(Total) TEST EXECUTED (PASSED + FAILED)			
PENDING				
IN PROGRESS				
BLOCKED				
(Sub-Total) TEST PLANNED				
(PENDING + IN PROGRESS + BLOCKED + TEST EXECUTED)				

Functions	Description	% TCs Executed	% TCs Passed	TCs pending	Priority	Remarks
IR Sensor (Entrance)	Check person is entry	100%	100%	0	HIGH	
IR Sensor (Exist)	Check person is exit	100%	100%	0	HIGH	
LCD 16x2 Screen	Display the person enter or not in room	100%	100%	0	HIGH	
Alert Message	Alert message is sense the person enter or not and give output in display	100%	100%	0	HIGH	

6.2 User Documentation

The design of the arduino based automatic room light controller with bidirectional counter and visit detector is meant to be a system that is used to take the number of people in a particular room on entrance and exist, so that when there is no one in the room the lights, fans and gadgets are turned off automatically. With this system the user do not need to press any button, once he/she enters the room, the room the light turns on. To effectively carry out an intensive test, it is a good practice to run or retest the project as many times as possible to make sure that the desired design specification is met.

The result that is expected is for the system, when the laser ray is blocked, the sensor sends signals which will activate the load and power the lights. The expected test results were obtained as the photo transmitter (entrance) communicated successfully with the receiver on the receiver (exit) section of the control system. The signal received was then able to activate the load and control the lighting point successfully.

CHAPTER: 7

CONCLUSIONS

7.1 Conclusion

In today's world, there is continuous need automatic appliance will be increase in standard of living, there is a sense of urgency for developing circuit that would ease the complexity of life. Also if someone wants to know the number of persons present in a room so as not to have congestion, the circuit proves to be helpful. The theme of this project when merged with certain established technologies can be quite effective in number of countries like Germany, France & Japan etc. which control the train.

This Project is useful in developing countries and this project has a bright future. This project helps us to control the light of a room automatically and counts the number of persons/visitors entering and leaving the room. By using this circuit and proper power supply we can implement various applications such as fans, tube lights and other gadgets etc.

7.1.1 Significance of the System

In today's world, there is a continuous need for automatic appliances. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Many times we need to monitor the people visiting some place like shopping mall. To provide solution for this we are going to implement a project called "Visitor Counter" with automatic room light control. This project has a "Visitor counter". Basic concept behind this project is to measure and display the number of persons entering in any room like seminar hall, conference room etc. LCD displays number of person inside the room. We can use this project to count and display the number of visitors entering inside any conference room or seminar hall. This works in a two way. That means counter will be incremented if person enters the room and will be decremented if a person leaves the room. In addition, it will automatically control room lights.

When the room is empty the lights will be automatically turn off. Digital Visitor Counter bidirectional visitor counter In today's world, there is continuous need automatic appliance will be increase in standard of living, there is a sense of urgency for developing circuit that would ease the complexity of life. Also if someone wants to know the number of persons present in a room so as not to have congestion, the circuit proves to be helpful.

The theme of this project when merged with certain established technologies can be quite effective in number of countries like Germany, France & Japan etc. This Project is useful in developing countries and this project has a bright future. This project helps us to control the light of a room automatically and counts the number of persons/visitors entering and leaving the room. By using this circuit and proper power supply we can implement various applications such as fans, tube lights, etc.

7.2 Limitations of the System

It is a low range circuit and cannot be implemented at large areas. With frequent change in the count value, after a certain time the output may look confusing. It is used only used when one person cuts the rays of the sensor hence cannot be used when two or more person cross the door simultaneously.

7.3 Future Scope of the Project

A report on **Visitor Counter** using IR sensors and Arduino Uno R3 and basic concept behind this project is to measure and display the number of persons entering in any room like seminar hall, conference room etc. LCD displays number of person inside the room. By using this circuit and proper power supply we can implement various applications, such as fans, tube lights and other gadgets etc. By modifying this circuit and using two relays we can achieve a task of opening and closing the door. In visitor counter the voice alarm may be added to indelicate room is full and person can't enter in the room.

References:

<https://www.youtube.com/bidirectional-visitor-counter>

<https://www.google.co.in/search?client=opera-gx&q=bidirectional+visitor+counter+using+ir+sensors+and+arduino+uno+r3&source=opera&ie=UTF-8&oe=UTF-8>

<https://www.slideshare.net/Abhishekvb/bidirectional-visitor-counter-using-ir-sensors-and-arduino-uno-r3>

https://www.youtube.com/results?search_query=bidirectional+visitor+counter+using+arduino