



# VIT<sup>®</sup>

## Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

### Sensors and Instrumentation

#### Final-Report

**Topic** : Automatic Room Light Controller Using Bi-Directional Counter

**Slot** : TE2

**Course Code** : ECE1005

**Class Number** : VL201819500126

**Faculty** : Prof. Govardhan K

#### Group Members

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## **Introduction:**

In our day-to-day life we see these visitor counters in malls, stadiums offices, classrooms and even in lifts etc. How they count the people and turn ON and OFF when nobody is inside? With this Automatic Room Light Controller with Bidirectional counter by using Arduino Uno we can make an interesting project to showcase how this works!!

The “Digital Visitor counter” is based on the interfacing of components such as Infrared Sensors, Relay etc. with Arduino microcontroller.

These IR sensors are used to count the people in both the directions. This equipment is used in malls, classrooms, lifts in the entrance. As the people enter in it will increment the count and when they leave it will decrement the count. Another novel idea it can be used in parking of cars in parking places where it is difficult to find the place of parking.

The components of this project are divided into four parts: Sensors, Controller, counter, display and gate. The IR sensor would observe the interruption of its signal (by the object and the other sensor will not work because we have added a delay for a while) and provide an input to the controller which would increment or decrement the count and depending on the count i.e., number of people entering and leaving it will display in the LCD through the controller.

## **Components Required:**

- Arduino UNO
- Relay (5v)
- Resistors
- IR Sensor module
- 16x2 LCD display
- Bread Board
- Connecting Wires
- Led's
- BC547 Transistor

## **Circuit Explanation:**

**Sensor section:** we have used two IR sensor modules which contain IR diodes, potentiometer, Comparator and LED's. Potentiometers are used for setting reference voltage at comparator's one terminal and IR sensors sense the object and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output.

**Control Section:** Arduino UNO is used for controlling whole the process of this project. The outputs of comparators are connected to digital pin number 14 and 19 of Arduino. Arduino read these signals and send signals to relay circuit to drive the relay for controlling light Bulb.

**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:** Normally Arduino UNO cannot supply enough voltage drop across the relay so in order the amplify it we use the BC547 transistor to make it possible, the primary work of transistor is to amplify the current passing through it and in turn the voltage. With the help of transistor Arduino send command to relay to turn light bulb on and off.

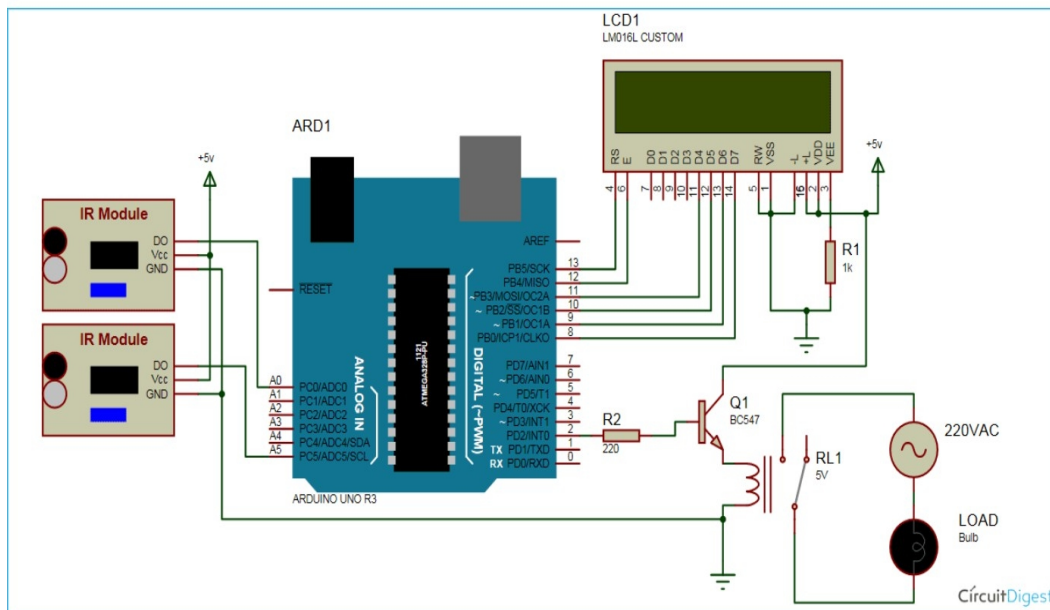
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### Circuit Diagram:



### Code Explanation:

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

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

```
LiquidCrystal lcd(13,12,5,4,3,2);
```

```
#define in 14
```

```
#define out 19
```

```
#define relay 8
```

- Then given direction to input and output pin and initialized for 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 /decrement the counting depending upon enter or exit operation. We will also check for zero condition. Zero means no one in the room. If Zero condition satisfies, the Arduino send commands to turn off the light to relay driver through transistor.

```
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{  
  
    digitalWrite(relay, HIGH);  
  
}
```

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

```
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);  
  
}
```

### **Reference:**

<https://circuitdigest.com/microcontroller-projects/automatic-room-light-controller-with-bidirectional-visitor-counter-using-arduino>