

Automatic Room Light Controller with Bidirectional Visitor Counter

A Report on Mini Project Submitted for the requirement of

University of Mumbai

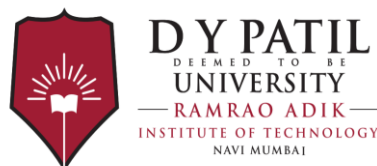
The practical work done during Semester - V in

**Mini Project –
2B(Electronics
Engineering)**
by

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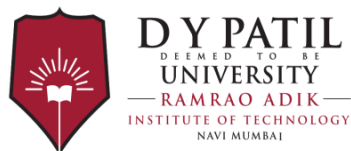
Under the Guidance
of

Dr. Prasiddh Trivedi



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Ramrao Adik Education Society's
Ramrao Adik Institute of Technology
(Affiliated to the University of Mumbai)

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Certificate

This to certify that Miniproject entitled as
**“Automatic Room Light Controller with Bidirectional
Visitor Counter”**

is a bonafide work done by
Manas Manoj Kulkarni

is approved for the practical work done during Semester- V in

**Mini Project –
2B(Electronics
Engineering)**

for the
University of Mumbai.

Project supervisor

Project Coordinator

Head of Department

Principal

Certificate of Approval by Examiners

This is to certify that the submission entitled for the project “**Automatic Room Light Controller with Bidirectional Visitor Counter**” is a bonafide work done by “**Manas Manoj Kulkarni**” under the guidance of “**Dr. Prasiddh Trivedi** “. This project work has been approved for semester **V** in **Mini Project – 2B**, University of Mumbai.

Examiners:

Internal Examiner:

External Examiner

Acknowledgment

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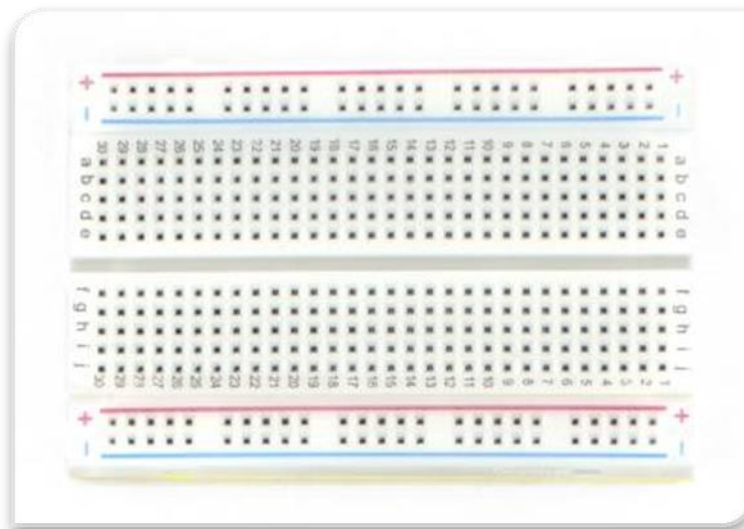
- **Introduction:**

- We 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.
- We build this system using Arduino and IR sensor module.
- Automatic Room Light Controller Using Arduino and IR Sensor can be used to turn ON and OFF the illumination system of home / office routinely by sensing the existence of human. Such Automatic Room Lights systems can be implemented in our Classrooms, faculty cabins, garages, staircases, bathrooms, etc. where we do not need constant light but only when individuals are existing. Also, with the assistance of this system, we can save the energy bill as power will be consumed only when human is present i.e., when required lights will be spontaneously turned ON or OFF. This paper proposed system of Automatic room light controller using Arduino and IR sensor and relay module. IR sensor will spot the human activity and based on response of PIR sensor unit will control the switching action. Proposed method can help us to reduce the consumption of electricity.

- **Components Required: -**

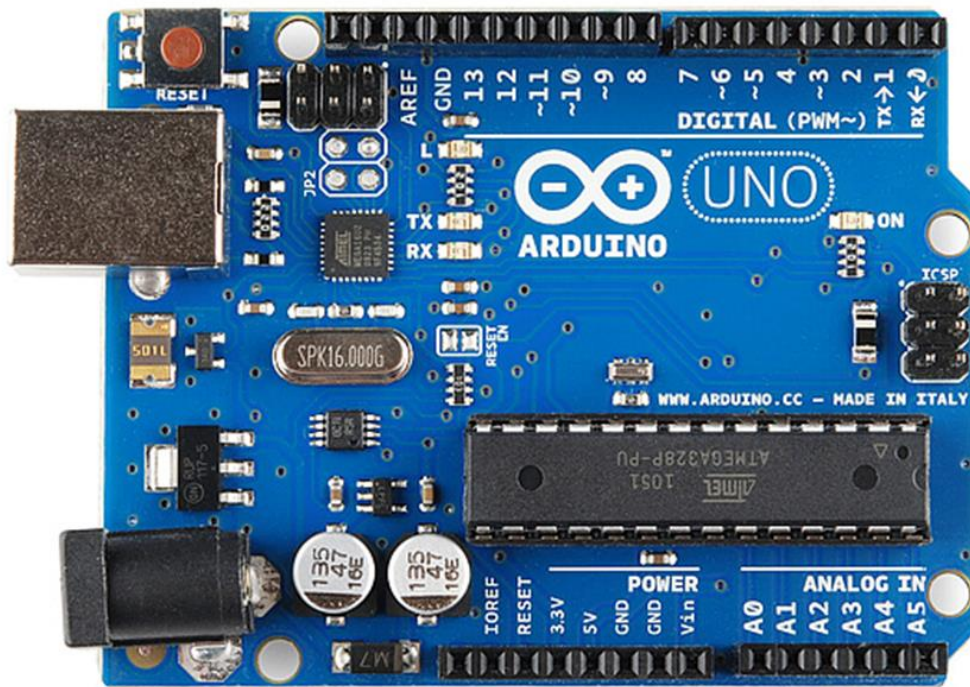
- **Breadboard:**

- A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.
- Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. Older breadboard types did not have this property.



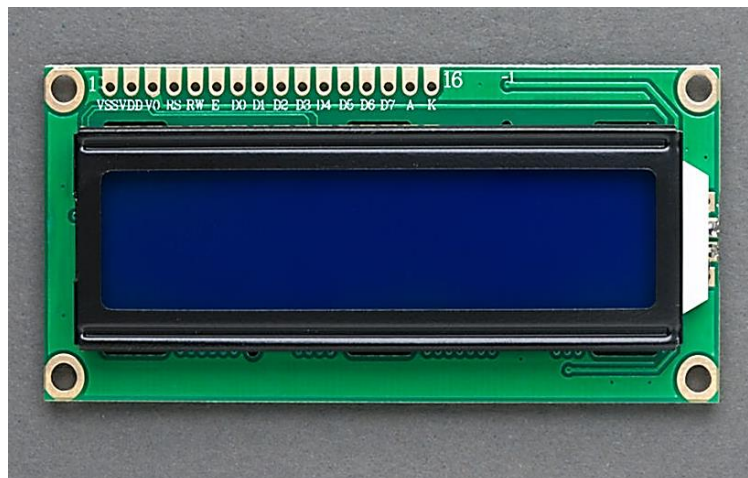
- **ARDUINO UNO:**

- Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst-case scenario you can replace the chip for a few dollars and start over again.



- **16*2 LCD Display:**

- An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display can display 224 different characters and symbols. This LCD has two registers, namely, Command and Data.
- Command register stores various commands given to the display. Data register stores data to be displayed. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register. In your Arduino project Liquid Crystal Library simplifies this for you so you don't need to know the low-level instructions. Contrast of the display can be adjusted by adjusting the potentiometer to be connected across VEE pin.



• **IR SENSOR MODULE:**

- The IR sensor or infrared sensor is one kind of electronic component, used to detect specific characteristics in its surroundings through emitting or detecting IR radiation. These sensors can also be used to detect or measure the heat of a target and its motion. In many electronic devices, the IR sensor circuit is a very essential module. This kind of sensor is like human's visionary senses to detect obstacles.
- The sensor which simply measures IR radiation instead of emitting is called PIR or passive infrared. Generally, in the IR spectrum, the radiation of all the targets radiation and thermal radiation are not visible to the eyes but can be sensed through IR sensors.
- In this sensor, an IR LED is used as an emitter whereas the photodiode is used as a detector. Once an infrared light drops on the photodiode, the output voltage & resistance will be changed in proportion to the received IR light magnitude.



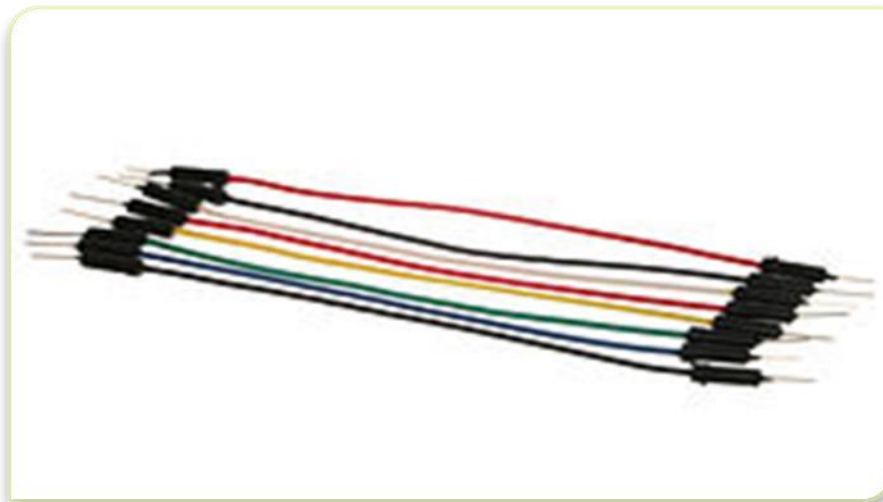
- **Potentiometer:**

- A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider.[1] 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.

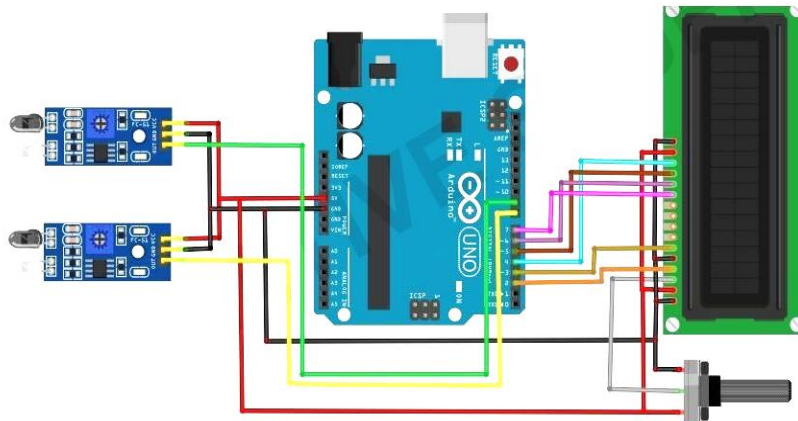


- **CONNECTING WIRES:**

- Connecting Wires are electrical wires, 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.
- 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.



- **Hardware Implementation:**



- **Software Implementation:**

```
5k,m,mmkklk,m#include<LiquidCrystal.h>
LiquidCrystal lcd(2,3,7,6,5,4);
```

```
#define in 8
#define out 9
#define led 10
```

```
int count=0;
```

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

```

pinMode(in, INPUT);
pinMode(out, INPUT);
pinMode(led, 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(led, LOW);
  lcd.clear();
  lcd.print("Nobody In Room");
  lcd.setCursor(0,1);
  lcd.print("Light is Off");
  delay(200);
}

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

- **Advantages:**

- Completely Automatic system.
- No need of human.
- Can work 24*7 without any problem
- Low cost and very easy to implement.
- Power Saving.

- **Disadvantages:**

- IR sensor cannot detect if lots of people are entering at one time.
- IR sensors don't work well in presence of sunlight.
- When anybody is inside the room, and we need to switch off the power then we've to do it manually. So, in this case we fail to automatically control the light.

- **Results:**

- Hence, we have Designed and implemented “**Automatic Room Light Controller with Bidirectional Visitor Counter**” with the use of the IR sensors and Arduino UNO and LCD.

- **Future Implementation of the Project:**

- In the proposed system decision are taken based on presence of human but here we can also interface LDR (Light Dependent Resistor) along with PIR sensor for better working of the system. This system can also be interfaced with the Bluetooth module so the whole system can be controlled from the mobile by just single click. Applications of this system are:
 - 1. It can be used in college labs, schools, etc.
 - 2. It can also be used in bathrooms, staircases, etc. in the house.

- **Conclusions:**

- 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.

- **References:**

- <https://circuitdigest.com/>
- <https://www.wikipedia.org/>