

Automatic Room Light Controller

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Abstract: Aiming the working process of Arduino uno and PIR sensor, the project first deals with the sensitivity detector of people inside a room using PIR sensor, then the paper optimizes the state of Arduino Uno board ,its circuit diagram, coding principle and working procedure. Then the 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. understand the application of PIR sensor, Arduino board, relay module in this digital world, its future developments and applications in different fields.

Keywords: Arduino uno, PIR sensor, relay module, Room Light Controller.

I. INTRODUCTION

In this project, we will see the Automatic Room Lights using Arduino and PIR Sensor, where the lights in the room will automatically turn ON and OFF by detecting the presence of a human. Such Automatic Room Lights can be implemented in your garages, staircases, bathrooms, etc. where we do not need continuous light but only when we are present. Also, with the help of an automatic room light control system, you need not worry about electricity as the lights get automatically off when there is no person. Often we see visitor counters at stadium, mall, offices, class rooms etc. How they count the people and turn ON or OFF the light when nobody is inside? Today we are here with automatic room light controller project by using Arduino Uno. Automatic Room Lights System using Arduino is a very useful project as you need not worry about turning on and off the switches every time you want to turn on the lights. The main components of the Automatic Room Lights project are Arduino, PIR Sensor and the Relay Module. Out of the three components, the PIR Sensor is the one in focus as it is the main device that helps in detecting humans and human motion. In fact, the Automatic Room Lights project can be considered as one major application of the PIR Sensor. A similar concept is being already implemented in automatic toilet flush valves, hand dryers, etc.

II. BRIEF DESCRIPTION ABOUT THE PROJECT

In this project we use different components, they are-

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

PIR sensor section: 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, PIR sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while.

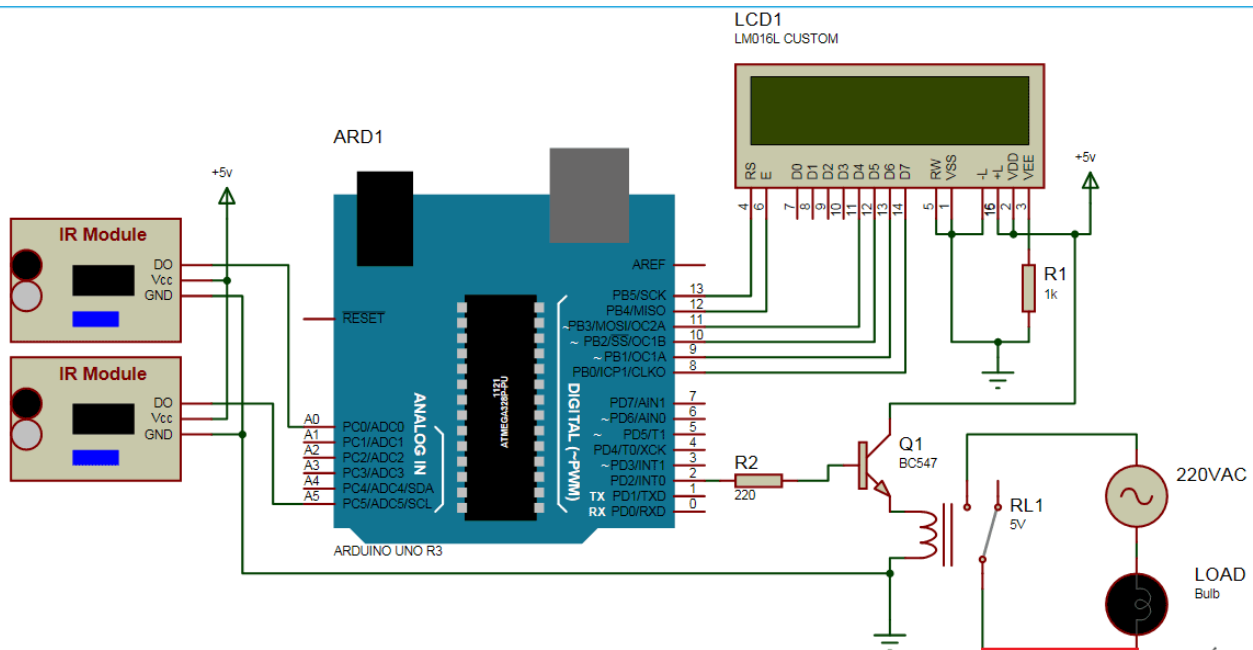
Control Section: Arduino UNO is used for controlling whole the process of this visitor counter project. The outputs of comparators are connected to digital pin number 14 and 19 of arduino. Arduino read these signals and send commands to relay driver circuit to drive the relay for light bulb controlling.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

➤ Circuit Diagram with Connections:

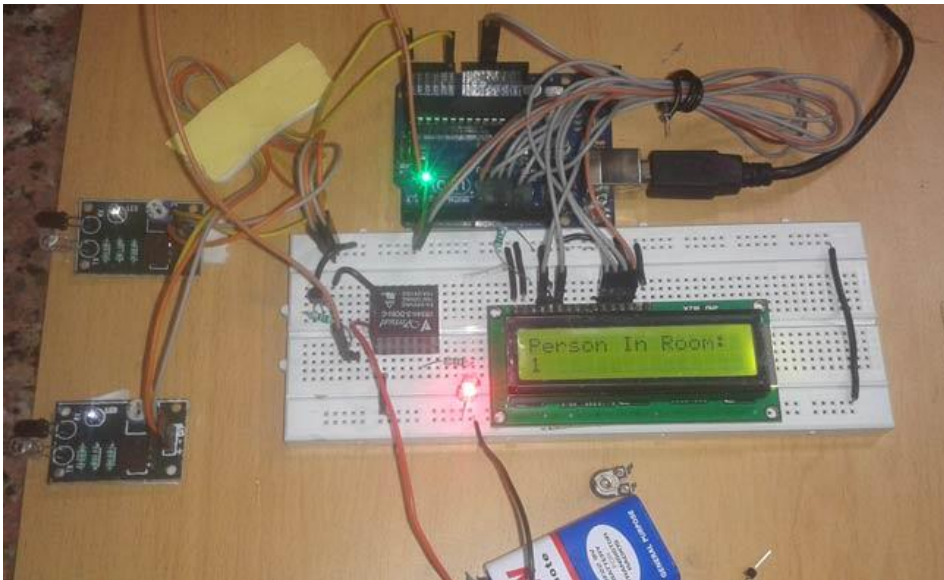
The outputs of PIR Sensor Modules are directly connected to arduino digital pin number 14(A0) and 19(A5). And Relay driver transistor at digital pin 2. LCD is connected in 4 bit mode. RS and EN pin of LCD is directly connected at 13 and 12. Data pin of LCD D4-D7 is also directly connected to arduino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



After all the connections, we need to connect the Arduino UNO board to the computer to set it with a perfect code so that it works correctly and senses the inputs and lit the Led on time and vice versa.

III. UNIQUENESS OF THE PROJECT

The Automatic Room Lights using Arduino and PIR Sensor is a simple project, where the lights in the room will automatically turn on upon detecting a human motion and stay turned on until the person has left or there is no motion. Working of this project is very simple and is explained here. Initially, when there is no human movement, the PIR Sensor doesn't detect any person and its OUT pin stays LOW. As the person enters the room, the change in infrared radiation in the room is detected by the PIR Sensor. As a result, the output of the PIR Sensor becomes HIGH. Since the Data OUT of the PIR Sensor is connected to Digital Pin 8 of Arduino, whenever it becomes HIGH, Arduino will activate the relay by



making the relay pin LOW (as the relay module is an active LOW module). This will turn the Light ON. The light stays turned ON as long as there is movement in front of the sensor. If the person takes a nap or leaves the room, the IR Radiation will become stable (there will be no change) and hence, the Data OUT of the PIR Sensor will become LOW. This in turn will make the Arduino to turn OFF the relay (make the relay pin HIGH) and the room light will be turned OFF. This project can create a great impact on the society as it consumes power and help us to

overcome our fault while leaving the room without turning off the lights. This is a unique project as it reduces power consumption and also we can store these powers for the beneficial of mankind in future.

IV. BENEFITS AND PROBLEM SOLVING AREAS OF THIS PROJECT

Automatic Room Lights System using Arduino is a very useful project as you need not worry about turning on and off the switches every time you want to turn on the lights. So it consumes power and the efficiency can be increased respectively. Further more, this model can be used in –

1. Automatic toilet flush valves.
2. Hand dryers.
3. Bathroom light controller.
4. Garage Lights
5. Security Lights
6. Traffic controller in highways
7. Power consumptions in different places like classrooms, office, Shopping malls, cinema halls, etc.

V. CONCLUSION

This automatic room light controller can be used in different places to decrease the power consumptions as well as to utilize the consumed power in different fields. The project consists of different electronic gadgets which are very cheap and maintain the sustainability throughout the project. This project can be a great movement towards the electric power generation as we all know that the power sources are decreasing day by day. Using further technologies we can utilize the consumed power in different sectors and also we can use this project as security alarm in spite using the led in the circuit diagram. The project can solve some daily life problems which we face while forgetting to turn off the room lights. This controller can sense the incoming persons in the room and automatically lit the led and also turn off the light when no one is present in the room. In this way power consumption can be optimized and store it for further usage. Our society will get various benefits in the fulfilment of this project.