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**SYNOPSIS FOR  
AUTOMATIC ROOM LIGHT CONTROLLER WITH  
BIDIRECTIONAL VISITOR COUNTER MULTIPLE LOAD  
USING ARDUINO UNO**

## INTRODUCTION:

The Automatic Room Light Controller with Bidirectional Visitor Counter with Multiple Load using Arduino Uno is a project aimed at automating the control of room lighting based on the number of people present in the room. This system utilizes Arduino Uno, an IR module, an LCD display, and multiple 5V relays to detect and count the number of visitors entering or exiting a room. It provides a flexible solution for controlling multiple loads, allowing for efficient energy management and enhanced convenience.

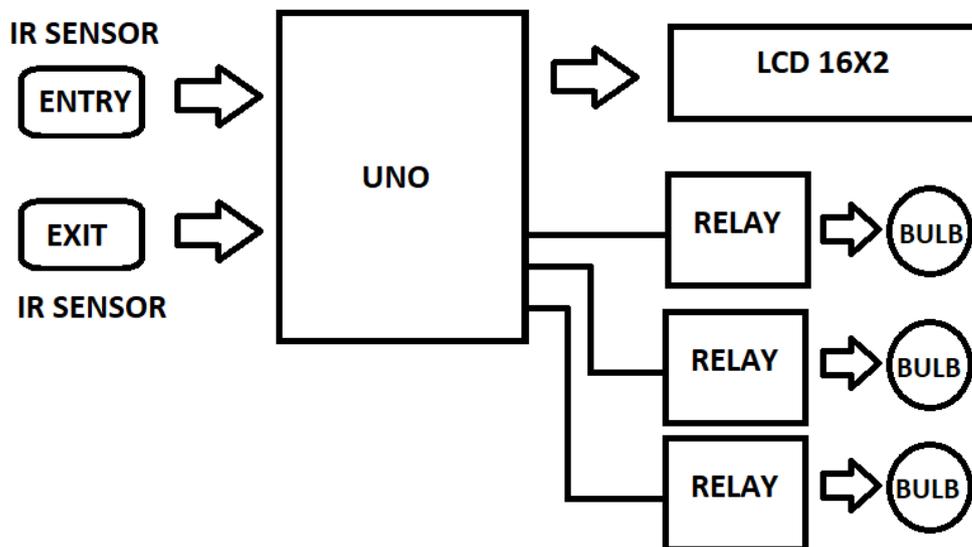
## AIM:

The main objective of this project is to develop an automated room light controller with bidirectional visitor counting capability that can control multiple loads. The aim is to achieve energy efficiency, convenience, and versatility in managing room lighting based on the occupancy level.

## PRINCIPLE:

The system operates on the principle of using an IR module to detect the presence of people. The IR module emits infrared radiation and senses its reflection from nearby objects. When a person enters or exits the room, the module detects the change in reflection and triggers the count accordingly. The Arduino Uno processes this information and updates the visitor count displayed on the LCD display. Additionally, multiple 5V relays are used to control individual loads based on the visitor count.

## BLOCK DIAGRAM:



## WORKING PRINCIPLE:

1. The IR module continuously emits infrared radiation and detects its reflection.
2. When a person enters the room, the IR module senses a change in reflection and triggers the count increment for incoming visitors.
3. Similarly, when a person exits the room, the IR module detects the change in reflection and triggers the count increment for outgoing visitors.
4. The Arduino Uno processes the count and updates the LCD display with the current visitor count.

5. The Arduino continuously checks the visitor count against preset thresholds for individual loads.
6. If the count exceeds the threshold for a specific load, the Arduino triggers the corresponding 5V relay, which controls the associated load (e.g., light, fan, etc.) by turning it on.
7. When the count falls below the threshold, the Arduino turns off the corresponding load by deactivating the relay.

### **HARDWARE:**

- Arduino Nano -1
- LCD 16x2 -1
- IR module - 2
- 5V Relay - 3
- Transistor BC548 - 3
- Resistor 220ohm - 5
- Resistor 1K – 3
- Variable Resistor 10k - 1
- 1N4007 diode -3
- LEDs -4
- 7805 voltage regulator IC -1
- male Header 8 Pin - 2
- male Header 6 Pin - 2
- Female Header 3 Pin - 2
- Printed circuit board -1
- 2 Pin Screw Terminal -8
- DC socket -1
- Switch - 1
- Main lead -1
- Bulb Holder -3
- Male to Female Jumper Wire - 6
- 6V -9V DC SMPS supply

### **ADVANTAGES:**

- **Energy Efficiency:** The automatic control of room lights ensures that the lights are only turned on when necessary, resulting in energy savings.
- **Convenience:** The system eliminates the need for manual control of room lights, providing a hands-free and automated approach.
- **Accurate Visitor Count:** The bidirectional visitor counter ensures an accurate count of incoming and outgoing visitors for better monitoring and management.
- **Cost-effective:** The project utilizes cost-effective components, making it a cost-efficient solution for room light control and visitor counting.

### **APPLICATIONS:**

- **Offices and Commercial Spaces:** The system can be implemented in offices and commercial spaces to optimize energy consumption and enhance convenience.
- **Educational Institutions:** Schools, colleges, and universities can benefit from this system to effectively manage room lighting based on occupancy.
- **Hospitals:** Automatic room light control can be valuable in hospitals and medical facilities, improving energy efficiency and reducing manual intervention.
- **Residential Buildings:** Home automation systems can incorporate this project to automate room lighting based on the number of occupants.

### **FUTURE SCOPE:**

- **Integration with Smart Home Systems:** The project can be expanded to integrate with existing smart home systems, enabling control and monitoring of room lights through smartphones or voice commands.
- **Data Logging and Analysis:** Implementing data logging and analysis capabilities can provide valuable insights into occupancy patterns and help in optimizing energy consumption further.
- **Security Features:** The system can be enhanced to incorporate security features, such as triggering alarms or sending notifications when the visitor count exceeds a certain threshold.
- **Integration with IoT Platforms:** Connecting the project to an Internet of Things (IoT) platform can enable remote access, control, and monitoring of the system from anywhere.

### **CONCLUSION:**

The Automatic Room Light Controller with Bidirectional Visitor Counter with Multiple Load using Arduino Uno offers an effective and flexible solution for automated room lighting control. By integrating Arduino Uno, an IR module, an LCD display, and multiple 5V relays, the system enables accurate visitor counting and efficient management of multiple loads. This project showcases the potential for energy savings, convenience, and customization in various applications such as residential buildings, commercial spaces, educational institutions, and public areas. With further enhancements and integration with advanced technologies, the system can be extended to cater to specific needs and contribute to smart and sustainable environments.