ABSTRACT

PROJECT TITLE: AUTOMATIC ROOM LIGHTING SYSTEM

Automatic Room Lighting System is a microcontroller-based project that automatically turn on or off the lights in a room. Electricity, being one of the most important resources, must be utilized carefully.

We often forget to switch off lights or fans when we leave a room. By using this system, we can intentionally forget about the lights as the system will automatically take care of them. The digital World we are living in allows us to use different technologies to automatically perform certain tasks. Such automation is very useful in certain areas like energy consumption, reducing human efforts, improving standard of living etc. The project implemented here is one such project where the microcontroller-based system automatically controls the room lights.

The aim of this project is to automatically turn on or off the lights in a room by detecting the human movement. We implemented this project using 8051 Microcontroller and two Infrared (IR) sensors. Since the job of the circuit is to turn on the light when someone enters the room and turn off the light when the last person leaves the room, the project has to internally count the number of visitors entering and leaving the room. Hence, the project acts as an Automatic Room Lighting System as well as Bidirectional Visitor Counter.

DETAIL REQUIREMENTS

HIGH LEVEL REQUIREMENTS

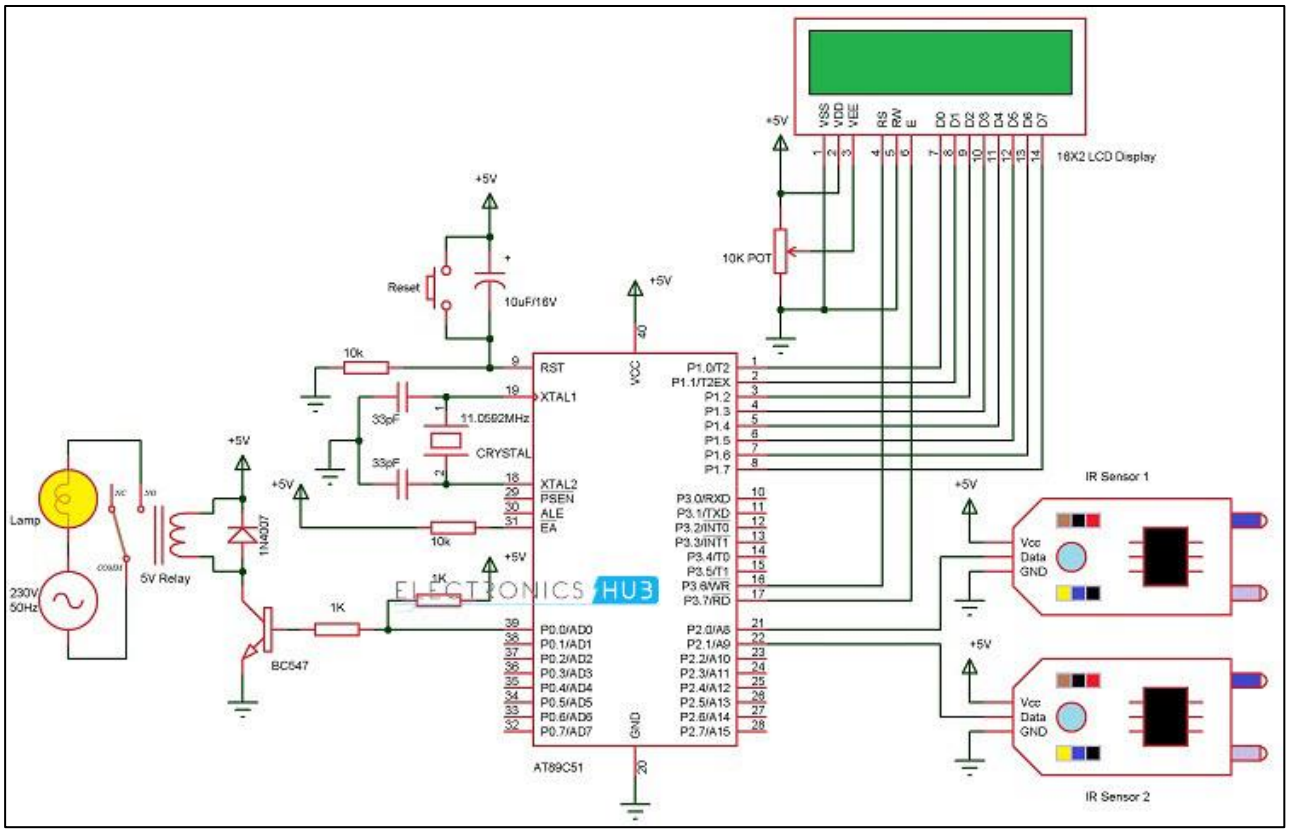
ID	DESCRIPTION	STATUS
HR01	AT89C51 Microcontroller	Implemented
HR02	8051 Development Board	Implemented
HR03	2 x Infrared Sensors	Implemented
HR04	16 x 2 LCD Display	Implemented
HR05	5V Relay Module	Implemented
HR06	Power Supply	Implemented

LOW LEVEL REQUIREMENTS

ID	DESCRIPTION	HLR ID	STATUS
LR01	Switches	HR02	Implemented
LR02	Sockets	LR01	Implemented

DESIGN

The project implemented here is one such project where the microcontroller based system automatically controls the room lights



CIRCUIT DESCRIPTION

Let us see the design of the circuit for automatic room lighting project. The circuit diagram shows all the connections with respect to microcontroller. If you are doing this project on a development board, some of the connections mentioned in the circuit diagram might not be necessary.

Also, we have used modules for Relay and IR Sensor and hence, the connections are shown with respect to those modules only. Corresponding circuit diagrams are also provided.

Coming to the circuit design, a 16 x 2 LCD Display, two IR Sensors and a 5V Relay Module must be connected to the 8051 Microcontroller. First, connect the 8 data pins of the LCD to PORT1 pins i.e. P1.0 to P1.7.

The 3 control pins of LCD i.e. RS, RW and E are connected to P3.6, GND and P3.7 pins respectively. A 10 KΩ Potentiometer is connected to contrast adjust pin of LCD i.e. its pin 3.

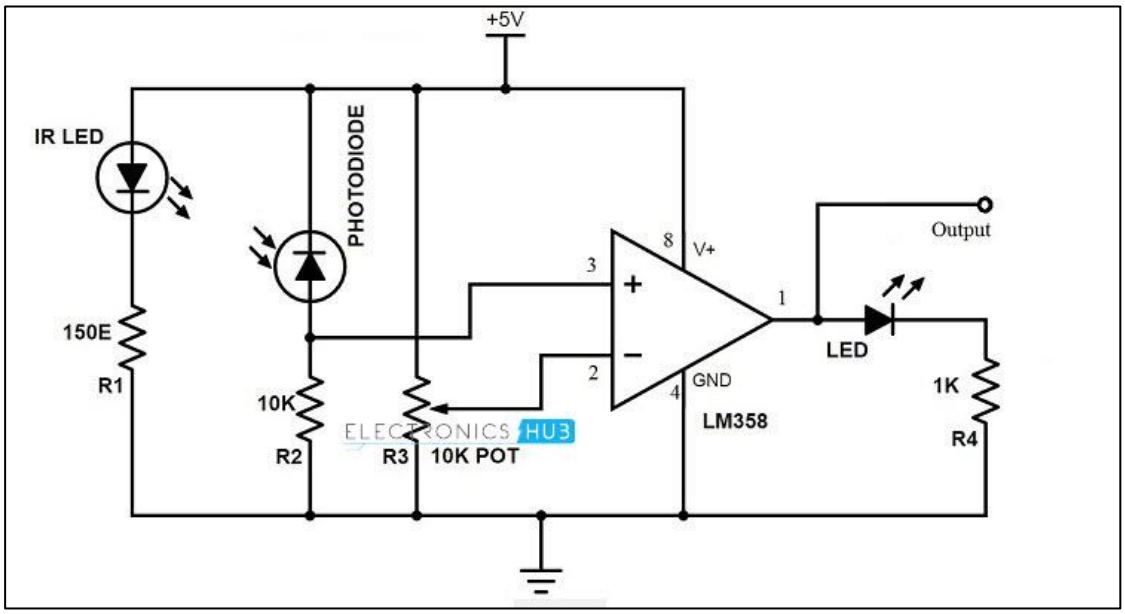
Two Reflective type IR Sensors are connected to PORT2 pins i.e. P2.0 and P2.1. Detailed circuit of the IR Sensor is mentioned in the Component Description.

The input of the 5V Relay is connected to PORT0 pin P0.0. The detailed circuit of the 5V Relay module used in the project is explained in the component description section. Alternatively, you can construct the circuit as per the circuit diagram (which consists of 5V Relay, Transistor, Diode and a Resistor)

COMPONENT DESCRIPTION

IR Sensor Module

An Infrared or IR Sensor is a simple circuit that is used to detect objects (Proximity Sensor) or measure distance (Range Finder). An IR Sensor consists of 3 components: an IR Transmitter (IR LED), an IR Receiver (like a Photo Diode) and a signal processing circuit. We have used reflective type IR sensor modules in this project. The detailed circuit diagram of the module is shown in the following image



5V RELAY MODULE

A 5V Relay Module is used in this project which helps 8051 Microcontroller to operate high voltage AC loads like a light. The detailed circuit of the Relay Module is shown in the following image. It consists of a 5V Electromechanical Relay, an Optocoupler IC, transistor, two resistors and two diodes