PSG COLLEGE OF TECHNOLOGY, COIMBATORE

19L204 – ELECTRON DEVICES

AUTOMATIC STREET LIGHT

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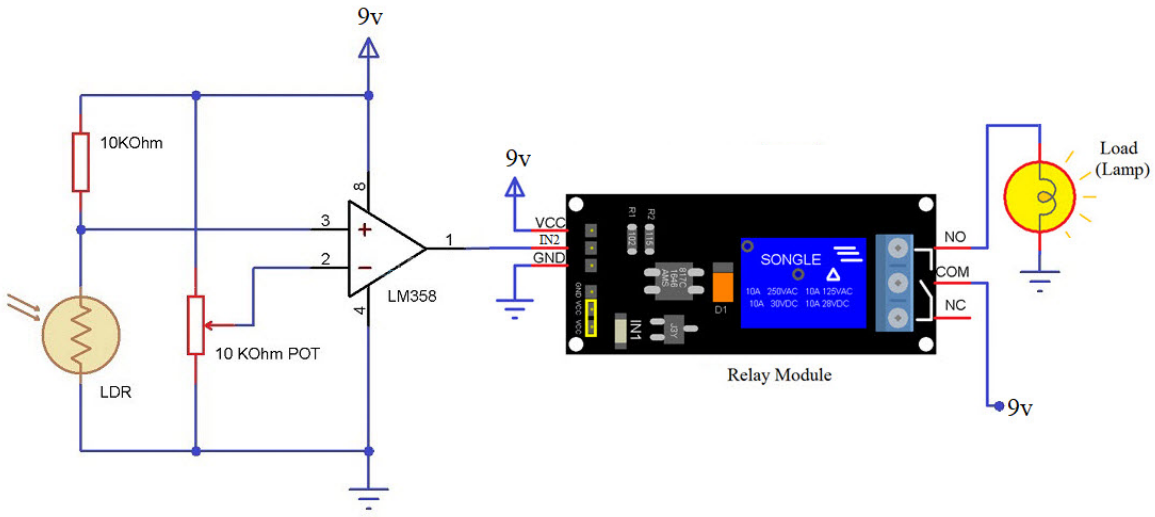
INTRODUCTION:

Many people have a phobia of darkness, so to assist them in such situations, we have explained a simple circuit that will automatically turn on the streetlight consisting of LEDs or bulb coupled with relay. It is lit well enough to see the objects nearby.

This circuit is very easy to work around, and it is battery operated. The power consumed by the circuit is very low because of the very few components used in the circuit.

The whole circuit is based on IC LM358, which is basically an operational amplifier that is configured in a voltage comparator. LDR (Light depending resistor), whose resistance is based upon the quantity of the light falling on it, is the main component for sensing the light. Along with these, a few more components are also used.

CIRCUIRT DIAGRAM:



COMPONENTS REQUIRED:

- IC LM358 – 1
- Resistor 10KΩ – 1
- Potentiometer 10KΩ – 1
- 5V Relay Module – 1
- Small LED
- 9V Battery
- LDR – 1
- Connecting Wires
- Breadboard

COMPONENTS DESCRIPTION:

1) IC LM358:
   It is an Operational Amplifier IC. It is an 8-pin device. It can be used in several configurations like Amplifier, oscillator, comparator etc.

2) LDR:
   LDR (Light Dependent Resistor) is a special type of resistor that works on the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light. It is also known as photoresistors.

3) RELAY:
   The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus protects the system from damage.

WORKING OF THE CIRCUIT:

The working of circuit is very much easy to understand. In this circuit, we used IC LM358, which is basically an operational amplifier. Pins 2 and 3 of these IC are used to compare the voltage and give us an output as high or low depending on the voltages at the input pins.

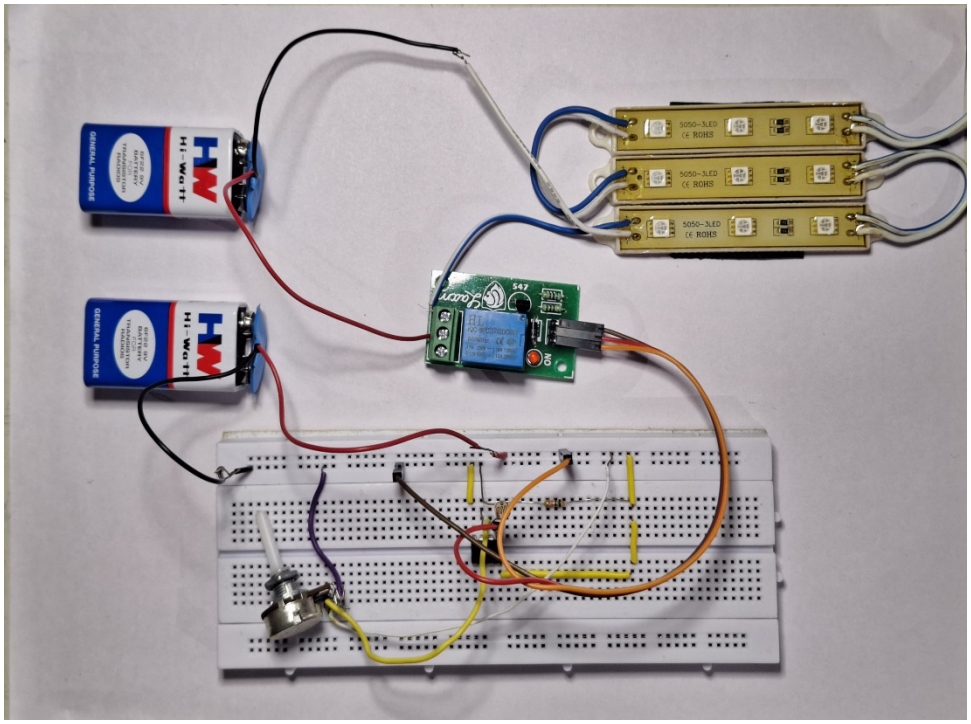
In this circuit, LDR and 10KΩ Resistor form one potential divider pair, which is used to provide a variable voltage at the non-inverting input (that is Pin 3). The second potential divider is built around inverting input (Pin 2) with the help of 10KΩ Potentiometer, which will supply half of the supply voltage to inverting pin.

As we know the property of LDR that during the daytime, its resistance is low, the voltage at the non-inverting input (i.e., pin 3) is higher than the voltage at the inverting input (pin 2). Hence, the output at the pin 1 is high. As a result, the relay is OFF, and the LED (or the bulb) will not glow.

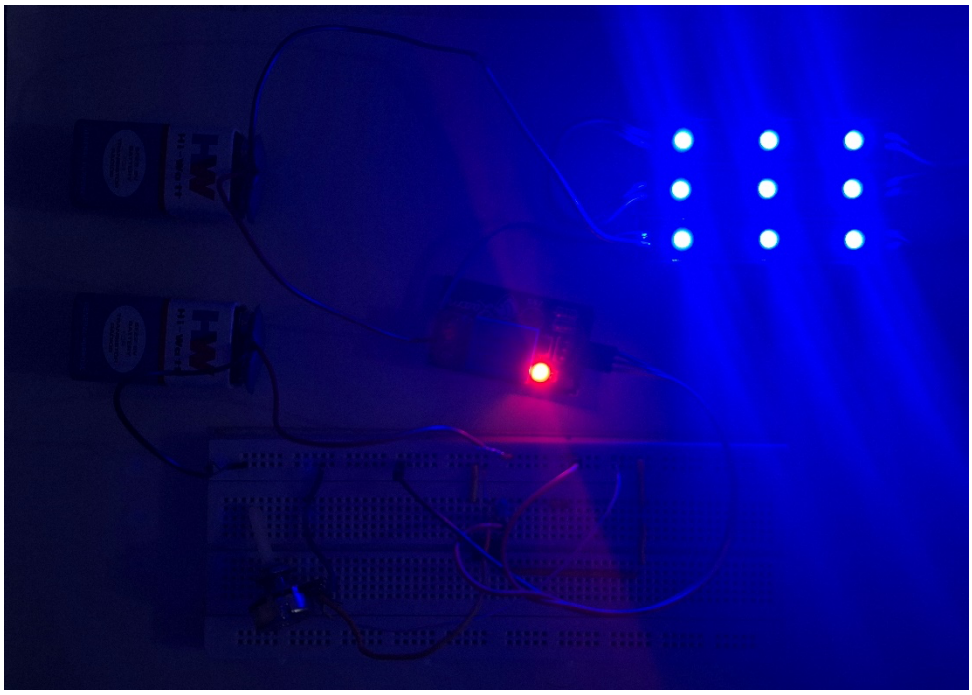
But in dimness or at nighttime, we know that resistance of LDR is high. Hence, the voltage at non-inverting input pin 3 of the IC LM358 decreases than the inverting input pin 2. As a result, the output pin 1 moves to low state, which further makes the relay to activate, and the LED or bulb associated to it will glow.

CIRCUIT:

At daytime:



At nighttime:



CONCLUSION:

This project was done to switch on and off the streetlight automatically in nighttime and daytime. This will also help to lower the power consumption due to the light in daytime.

Various future enhancements such replacing the battery with rechargeable battery and adding a solar panel to the circuit can be done so that the device can be operate independent of power house.