

# **AUTOMATIC STREET LIGHT**

## **Objective**

1. To design a functional circuit with an Operational Amplifier and BJT to give an output suitable for the circuit.
2. The circuit is to be responsive towards the change of light around its surrounding.
3. Create a layout and construct the circuit on a PCB

## **Equipment**

1. Power Supply
2. Light Dependent Resistor x1
3. Resistor (10K, 1K, 330)
4. Potentiometer 10K x1
5. LM358 x1
6. BC547 x1
7. Diode 1n4007
8. Relay 5V
9. Red LED

## **Discussion**

LDR, LM358 Op-Amp IC, BC547 transistor, and Relay are the main components of the Automatic Street Light Project. The LDR is used to detect the surrounding Dark and Light. The LM358 Op-Amp IC provides an output voltage by comparing the LDR output in Dark and Light circumstances. The output of the LM358 Op-Amp IC controls the BC547 transistor, which acts as a switch. The Relay is controlled by this transistor. Relays are electronic switches that may regulate both AC and DC devices. The LED acts as a street light, and the relay regulates it.

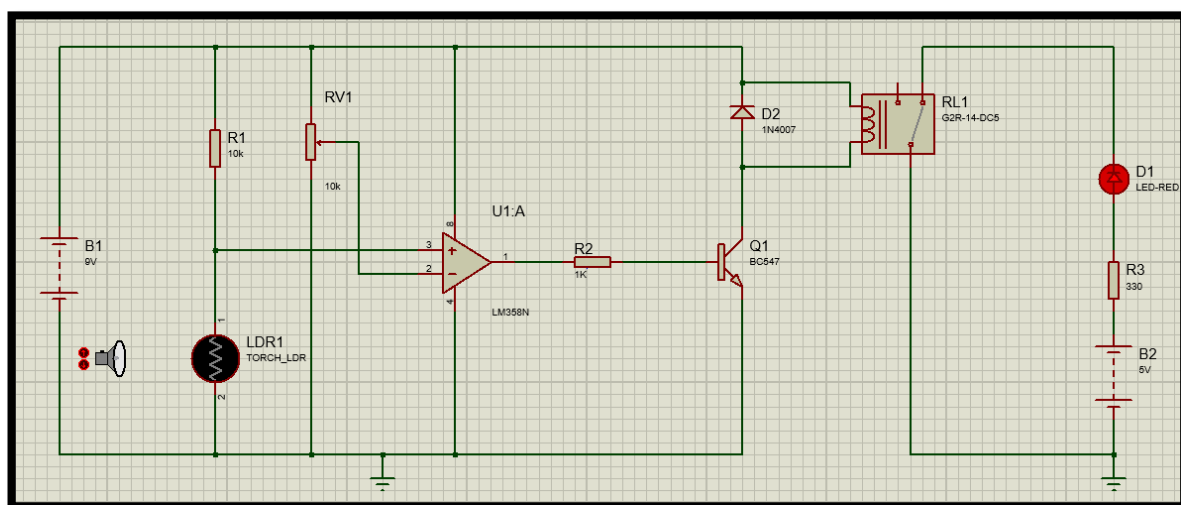
The LM358 IC compares the voltage from the 10 K Potentiometer (RV1) to the voltage from the LDR (R2). The potentiometer is used to modify the LDR sensitivity by setting a reference voltage at the inverting terminal (IC Pin 2) of the comparator-1.

The surrounding area receives a lot of sunlight during the day. As a result, sunlight falls directly on the LDR surface. This time, LDR provides a low output voltage to the LM358 Op-Amp IC's non-inverting terminal (IC Pin 3). The voltage is then compared to the reference voltage by the LM358 IC.

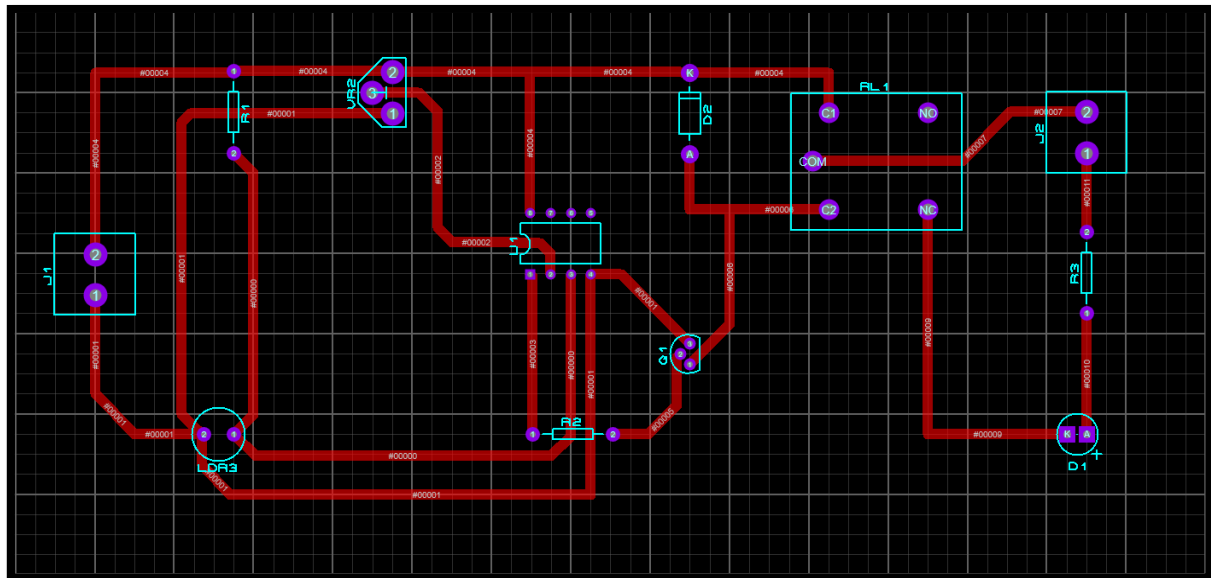
In this case, the non-inverting terminal (IC Pin 3) of the IC has a lower input voltage than the inverting terminal (IC Pin 2) of the IC. As a result, the IC output (Pin1) is low, and the IC does not give adequate voltage to the transistor's base terminal. As a result, the transistor is turned off, and the Relay is turned off as well. It indicates that the street light is turned off.

The LDR surface does not receive any light at night. This time, LDR provides a high output voltage to the LM358 Op-Amp IC's non-inverting terminal (IC Pin 3). After that, the LM358 IC compares this voltage to the reference voltage once more. The input voltage at the comparator-1's non-inverting terminal (IC Pin 3) is greater than the input voltage at the comparator-1's inverting terminal (IC Pin 2). As a result, the output of comparator-1 is High. The transistor will then turn on. As a result, the Relay receives input voltage and is now active. It indicates that the street light is turned on.

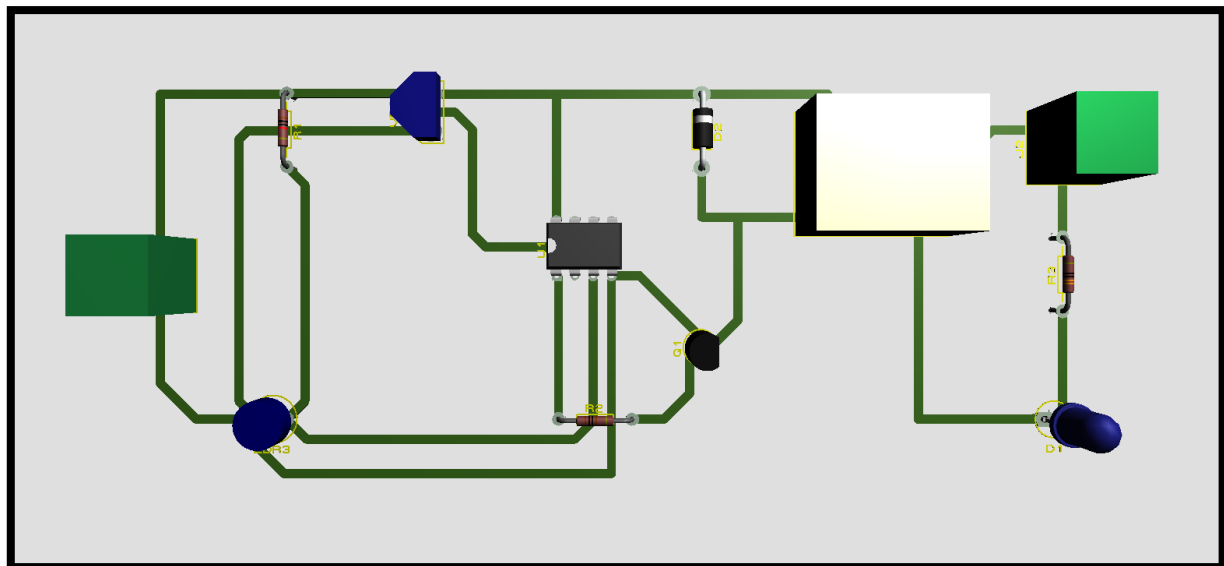
## Proteous Circuit



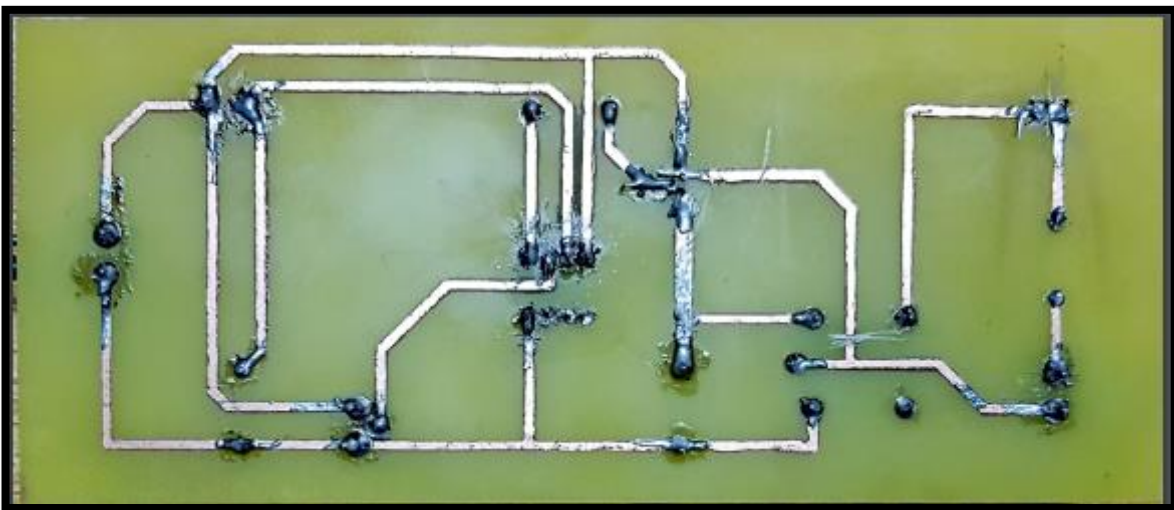
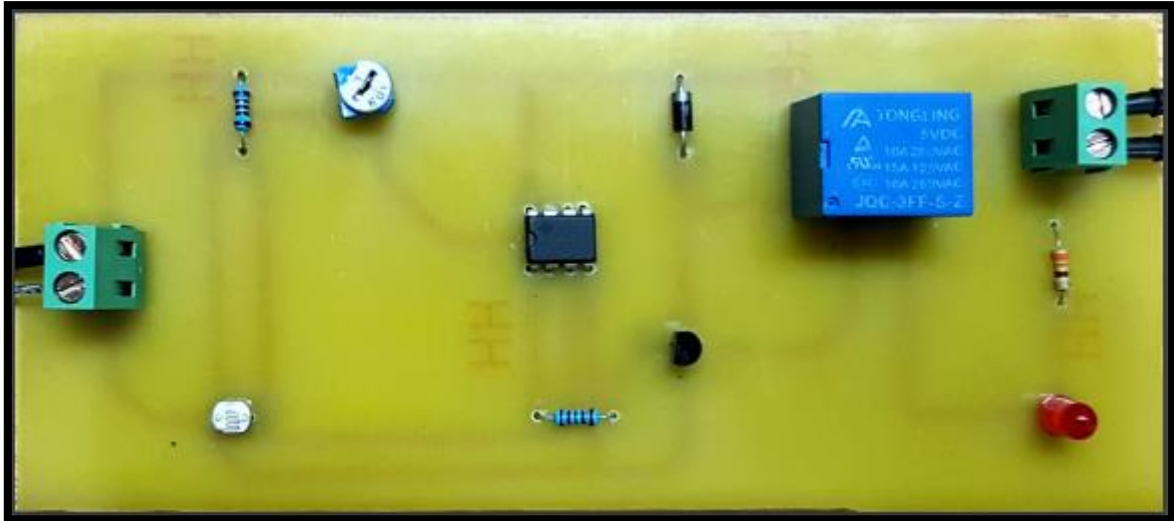
## Proteous Layout



## Proteous 3D Visualizer



## Actual Circuit



## Conclusion

The purpose of this project was to show the implementations of an Operational Amplifier, our implementation of the OpAmp is acting as a comparator where the LDR when triggered brings change in the OpAmp making it output a value to trigger the 5V DC Relay through BC547 Transistor. This trigger the circuit on the right to activate causing the LED to turn ON.