A Project Report on

AUTOMATIC STREET LIGHT USING 555 TIMER & LDR SENSOR

Submitted as a part of IC laboratory course
In

Bachelor of Technology 5th Semester
in
Electronics and Communication Engineering
by

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Objective:

To design and demonstrate an automatic street light that uses an LDR sensor and 555 timer

Components Required:

- 555 timer IC
- LDR (Light Dependent Resistor) sensor
- LED
- 47k ohm Resistor
- 1k ohm load Resistor
- 9V power supply
- Potentiometer-500k ohm
- Connecting wires
- Breadboard

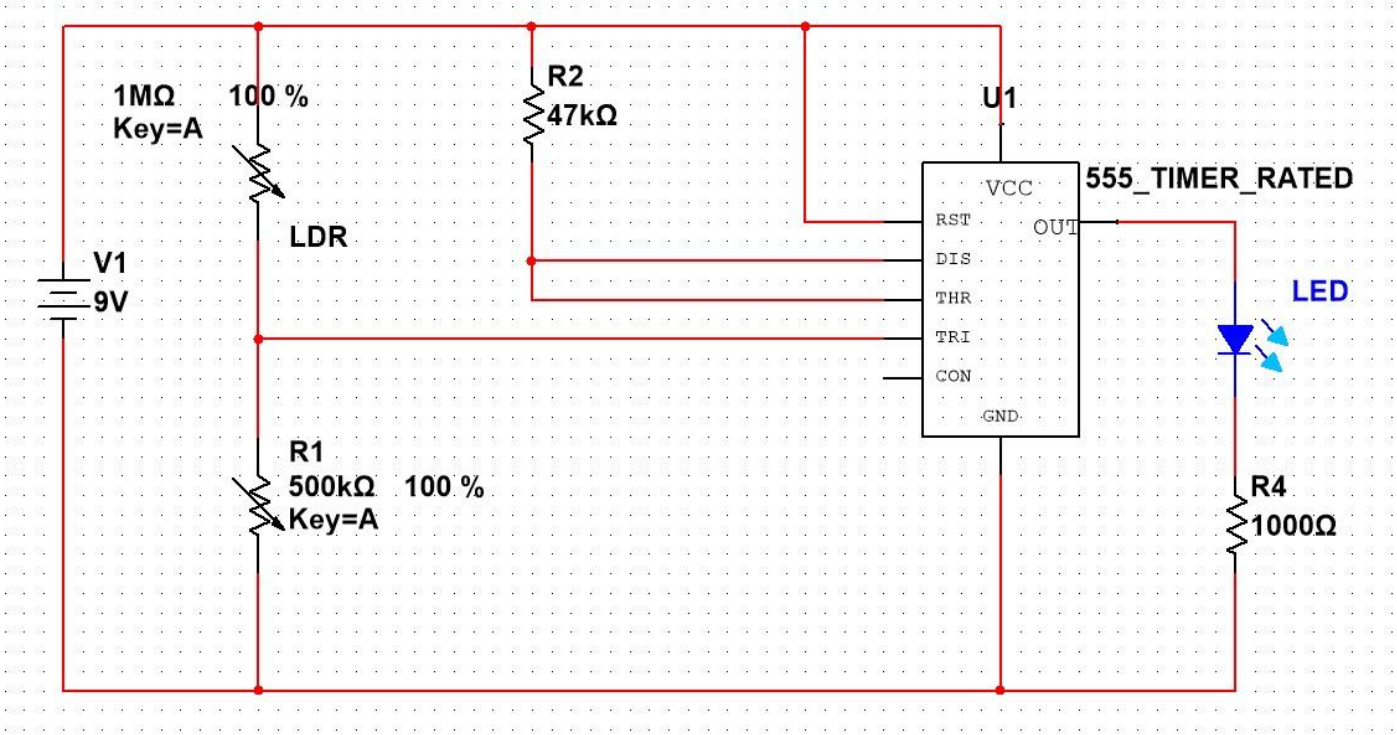
Theory 555 Timer:

The basic 555 timer gets its name from the fact that there are three internally connected 5kΩ resistors which it uses to generate the two comparators reference voltages. The 555 timer IC is a very cheap, popular and useful precision timing device which can act as either a simple timer to generate single pulses or long time delays, or as a relaxation oscillator producing a string of stabilised waveforms of varying duty cycles from 50 to 100%.

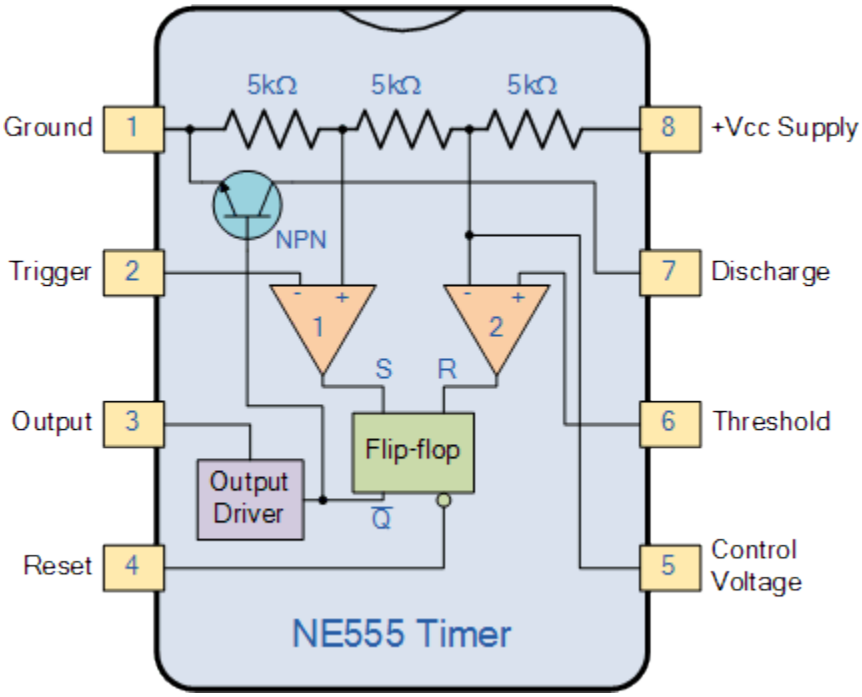
The 555 timer chip is extremely robust and stable 8-pin device that can be operated either as a very accurate Monostable, Bistable or Astable Multivibrator to produce a variety of applications.

The Monostable 555 Timer circuit triggers on a negative-going pulse applied to pin 2 and this trigger pulse must be much shorter than the output pulse width allowing time for the timing capacitor to charge and then discharge fully. Once triggered, the 555 Monostable will remain in this “HIGH” unstable output state until the voltage drop across LDR is < (1/3)Vcc.

Schematic Diagram:



Pin Diagram of 555 timer :



Connections:

Connections of 555 timer -

1. GND – To –ve terminal of battery
2. TRIGGER – between LDR and GND
3. OUTPUT – to LED
4. RESET – to +ve terminal of battery
5. CONTROL – no connection
6. THRESHOLD – between 47k resistor and GND
7. DISCHARGE – between 47K resistor and GND
8. Vcc – to +ve terminal of battery

Connections of other components -

- LDR – between pin 8 and pin 2
- 47K resistor – between pin 7 and pin 8
- LED – between pin 3 and pin 1
- Potentiometer – between pin 2 and pin 1

Working & Principle:

This automatic lighting Circuit works on the op-amp comparator principle. We are using the 555 timer in **monostable multivibrator mode.** The potentiometer connected in between the 4.7k and Pin 2(Trigger) and is used to change the amount of voltage drop at Pin 2(Trigger). LDR sensor is connected between the Pin 2(Trigger) and the Pin 8(+Vcc) of the 555 timer. The LDR creates a variation in the amount of voltage drop across itself as the LDR resistance varies. Since the resistance of the LDR is dependent on the intensity of light falling on it, the Voltage drop across itself is controlled by the intensity of light falling on it.

The opamp 1 compares the voltage at its input terminal(i.e 1/3*Vcc) with the voltage at Pin 2(Trigger) and accordingly the flip-flop will be SET or RESET. If the flip-flop is SET, it produces output

=1(HIGH) at pin number 3 or else if the flip-flop is RESET, it produces output=0(LOW) at Pin number 3

CASE1- when light falls on LDR(**daytime**)

In this case resistance of LDR is minimum so all voltage drop is across potentiometer, due to which voltage at pin 2 or trigger pin is greater than 1/3 of 9v causing reset of flip-flop inside the 555 timer and thus zero voltage at output(pin 3) . Now since output pin is directly connected to the LED, it remains OFF

CASE2- when no light falls on LDR(**evening/night time**)

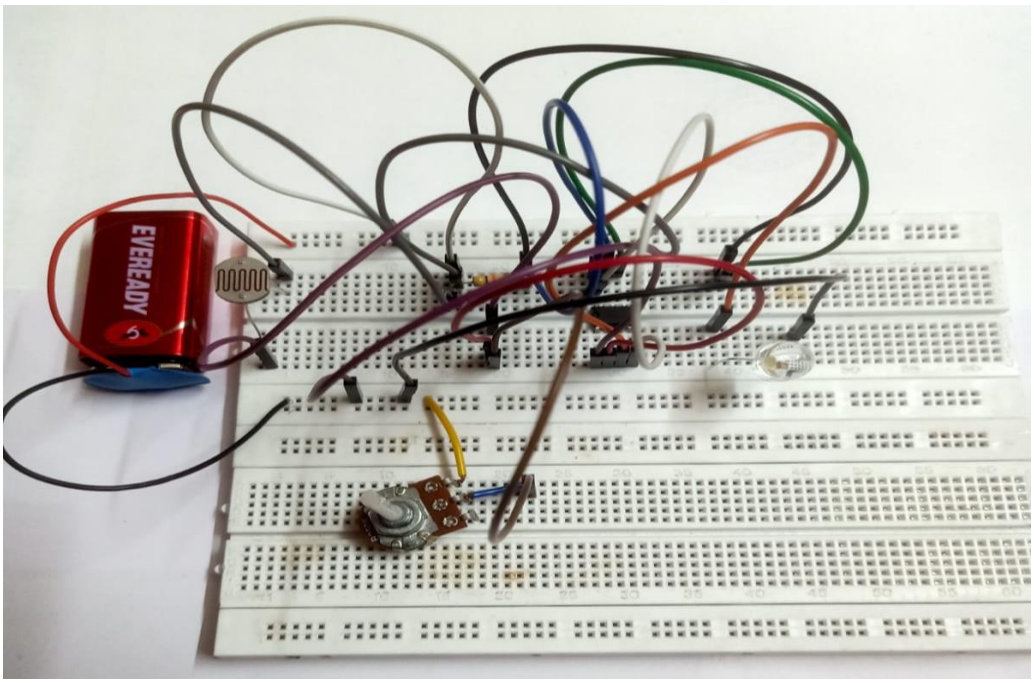
In this case resistance of LDR is maximum so all voltage drop is across LDR, due to which voltage at pin 2 or trigger pin is less than 1/3 of 9v causing set of flip-flop inside the 555 timer and thus one as output(pin3). Now since output pin is directly connected to LED, it turns ON.

The 500K Potentiometer connected is used to vary the sensitivity of the LDR sensor. If the Potentiometer is set to higher value, very small amount of voltage drops across LDR, hence reducing its Sensitivity. If the Potentiometer resistance is decreased, then the amount of voltage that can be dropped across the LDR increases, hence increasing its Sensitivity.

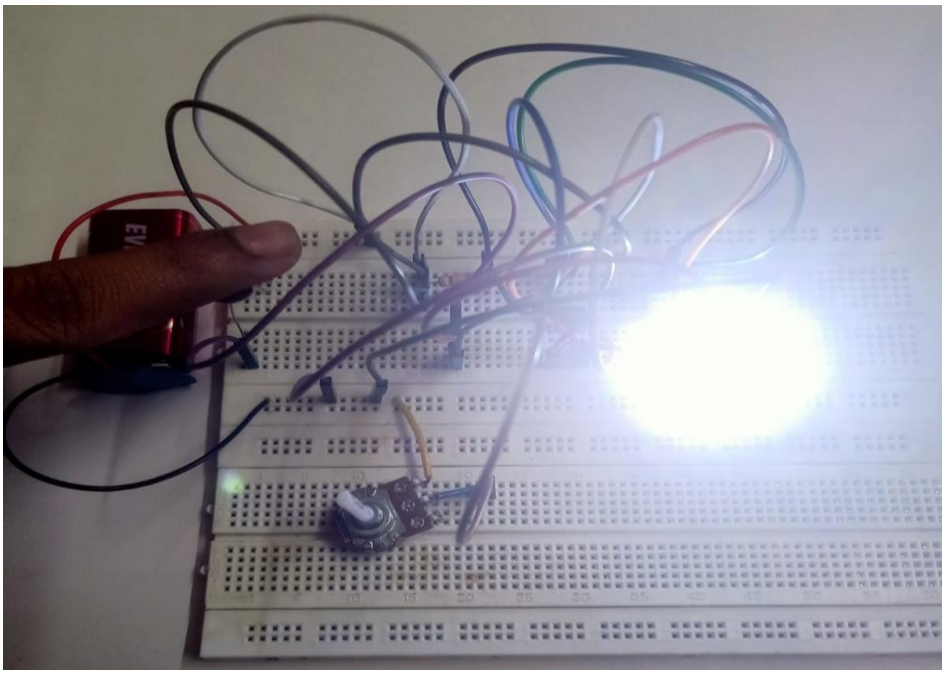
Results:

Here, we successfully connected the components to complete the experimental setup. Here are the Photos of the results.

CASE 1 : Daytime



CASE 2 : Evening/Night time



Conclusion:

This automatic street light circuit is a great project to save power, environment, energy, and money, making our life easier and more comfortable.