

OBJECT DETECTOR CIRCUIT

Analog IC's (ELECTRONICS AND COMMUNICATION ENGINEERING)

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Materials Required

- LM741 Op-amp IC
- 555 Timer IC
- BC557 – PNP Transistor
- LDR
- Resistor (210, 1K, 5.7K, 100k, 1M)
- Capacitor (0.1uf, 10uf)
- Connecting wires
- Potentiometer – 100K
- Buzzer
- LED
- Battery - 9V
- Breadboard

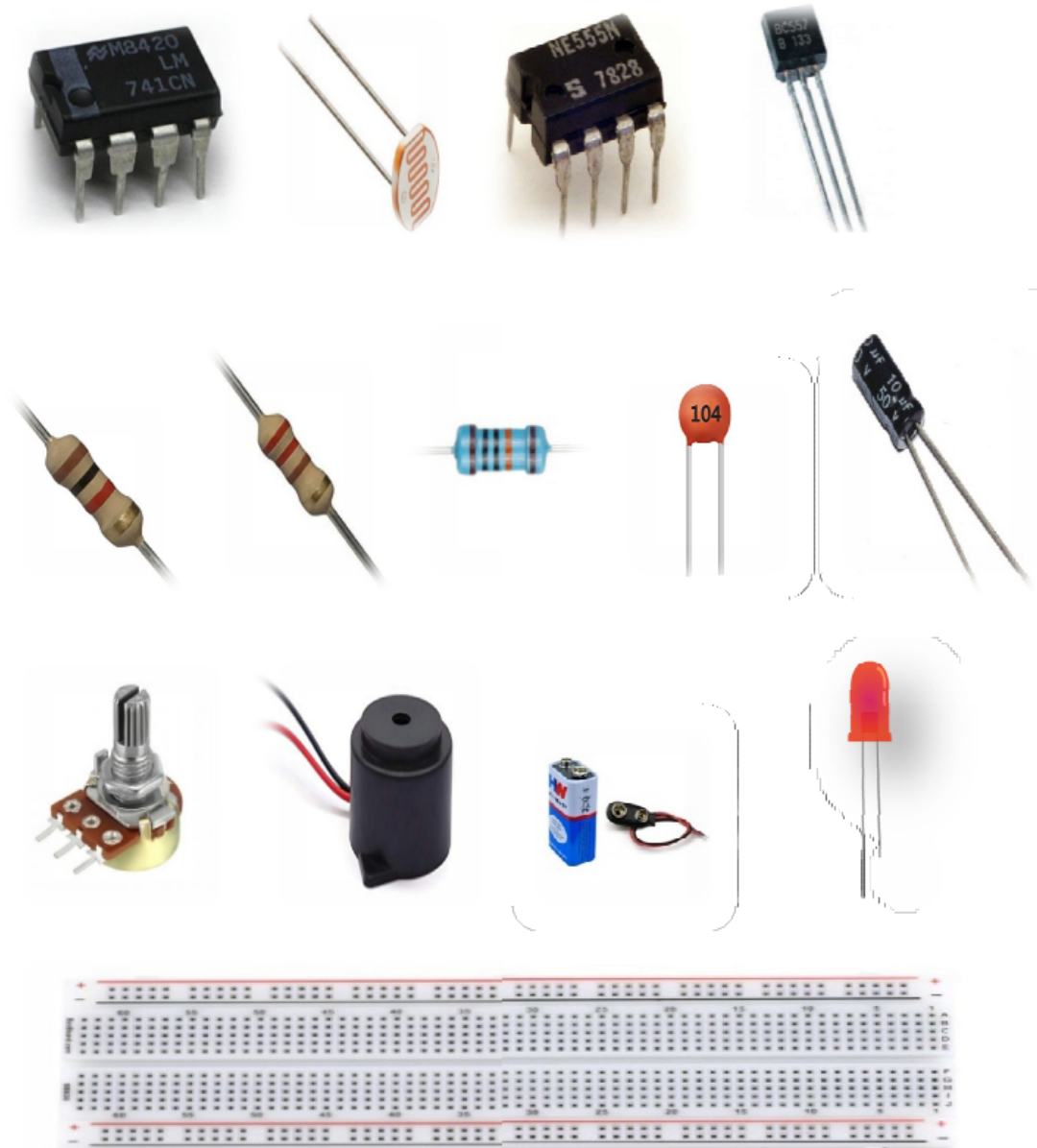
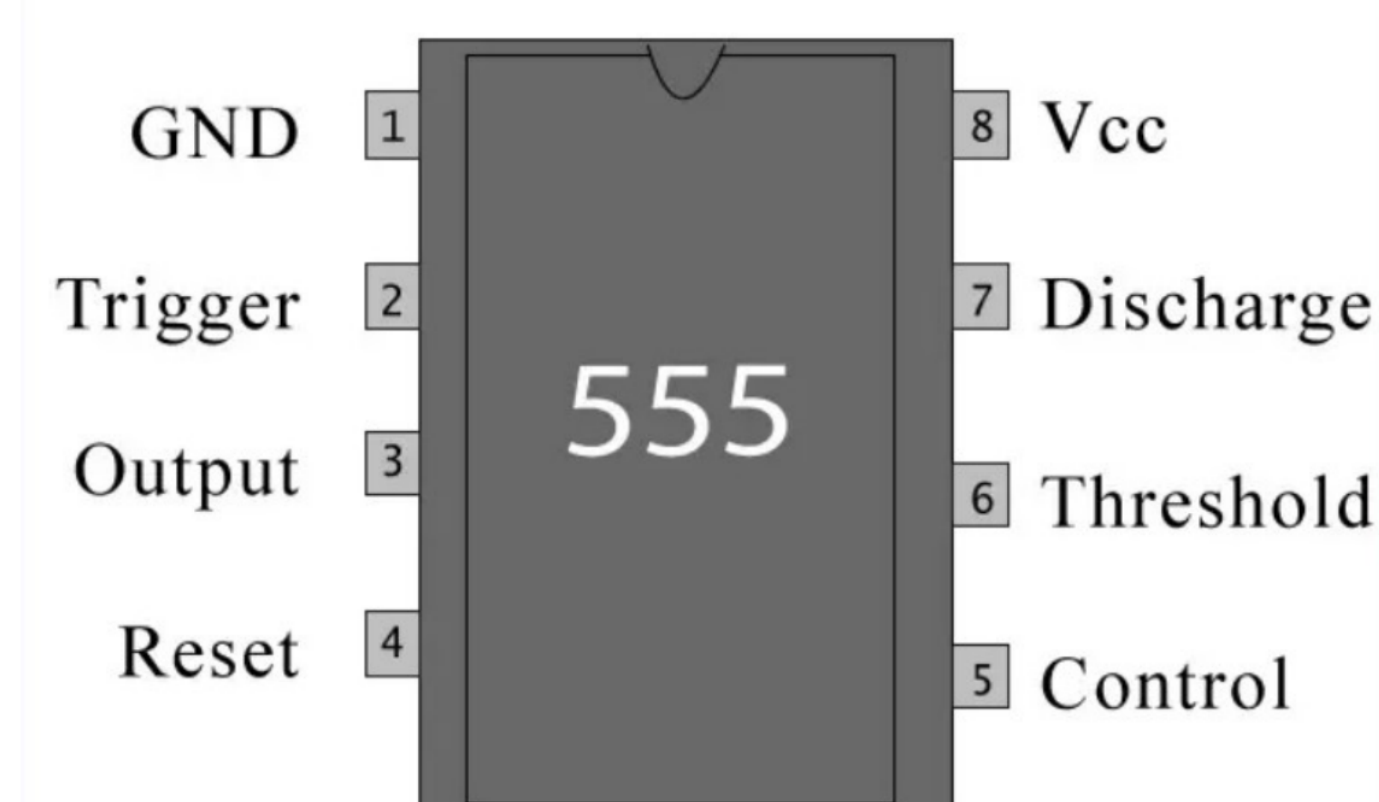


Fig. 1: Material Required

555 Timer IC

- The IC 555 timer is a one type of chip used in different application like an timer, pulse generation, oscillator.
- The designing of IC 555 timers can be done by using various electrical and electronic components like transistors, resistors, diodes and a flip flop.
- The operating range of this IC ranges from +5V to +15V DC supply.
- The main function of this IC is to generate an accurate timing pulse.
- The 555 timer IC consist of 8-pins where each pin has some function.
- The pin configuration of this IC is shown in Fig.2.



Object Detector Circuit

Object Detector circuit is used to detect the presence of any human or object in a particular area. The detecting range of Object Detector Circuit is about 1.5 to 3 meters. It's quite simple to design the circuit using LDR and Op-amp. This portable circuit can work smoothly with a commonly available 9V battery and the alarm sound generated from the buzzer is loud enough to detect the presence of a human, vehicle or object.

In this project, we are going to show you how to make a Object Detector Circuit using 555 Timer IC. This circuit can be attached to a vehicle and it will monitor whether the objects are not coming closer to the amenity.

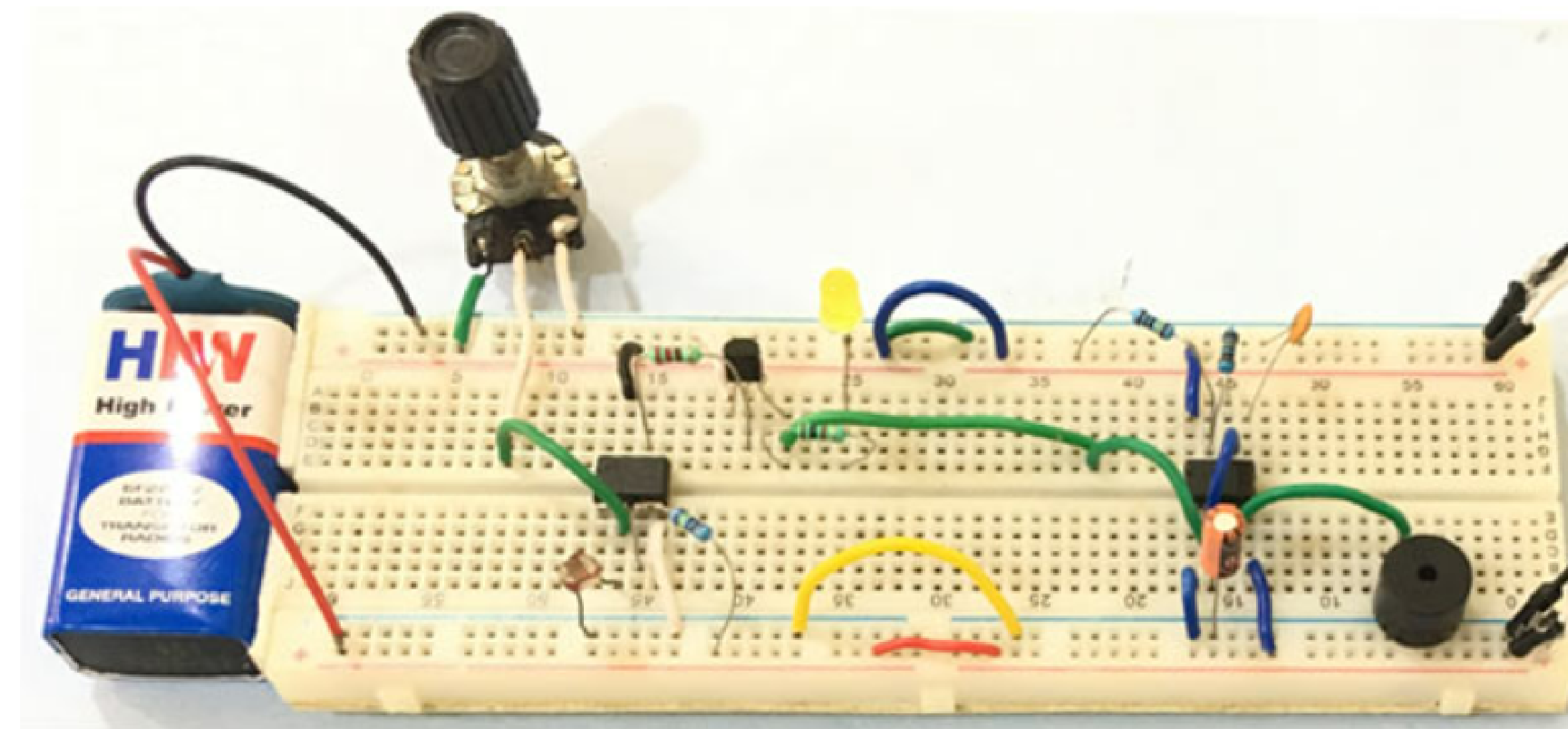
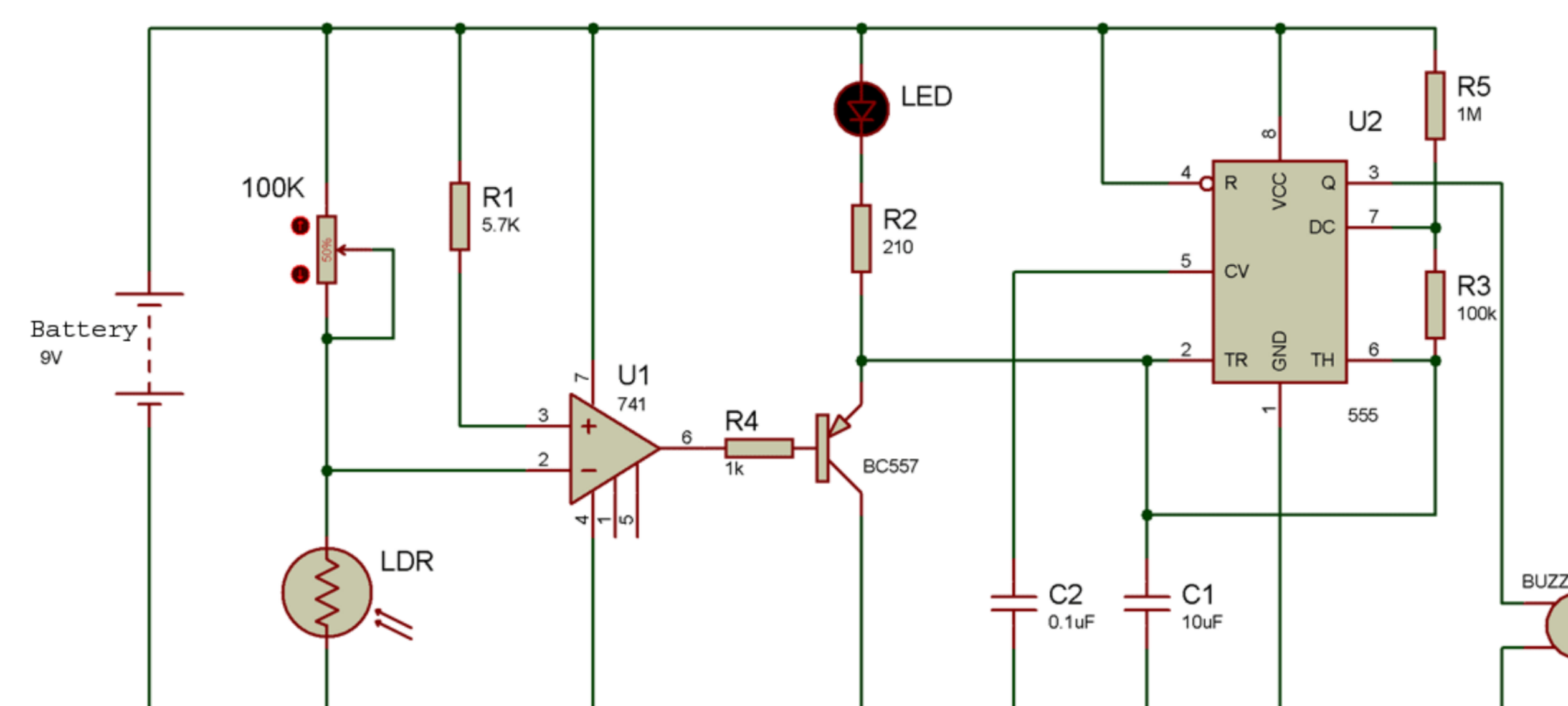


Fig. 3: Circuit Diagram

Connections

1. Connect Pin 4 and Pin 8 of IC 555 and Pin 7 of IC 741 to VCC.
2. Use a jumper wire to connect Pin 6 and Pin 2, Pin 7 and Pin 3 of IC 555 together.
3. Use a jumper wire to connect Pin 1 of IC 555 and Pin 4 of IC 741 to GND.
4. Connect 10uF and 0.1uF capacitor between Pin 2 , Pin 5 and GND respectively.
5. Connect Buzzer between Pin 3 and GND, R5 b/w Pin 3 and VCC, R3 b/w Pin 7 and 8.
6. Connect pin 2 of ic-741 with LDR and to 100k Resistor.
7. Connect LED to VCC in series with R2, R4 between pin 6 and base of transistor.
8. Connect Pin 2 of IC 555 to emitter of pnp and ground the collector .



Working Explanation

- The op-amp IC is used as a voltage comparator and the 555 timer IC is placed in an astable mode. The LDR and the potentiometer are creating a voltage divider circuit.
- The output of this divider circuit will change according to the intensity of light falls on the LDR.
- The divider is connected to the inverting pin of the Op-amp IC. The non-inverting pin is connected with supply through a 5.7Kohm resistor, so the voltage value at the non-inverting is fix.
- We can adjust the sensitivity of the device by using the potentiometer VR1 connected in series with the LDR. When the voltage at non-inverting input is greater than or equal to the reference voltage the output (at pin 6) of the op-amp IC output (PIN 6) goes HIGH.
- According to the circuit diagram, when LDR detects any activity the output of the Op-amp IC goes LOW, and PNP transistor T1 start conducting. Hence, the LED starts glowing and the 555 timer IC get triggered. Here, 555 timer IC is in Astable mode and a preset time delay is provided by R3, R5 and C1.

Applications

- Object detector along with some other elements can be used to make "PIR based Burglar Alarm Circuit"
- Object detector along with some other elements can be used to make "IR based Security Alarm"
- "Laser Security Alarm Circuit" is also a vital application the object detector circuit.
- Magnetic Door Alarm Circuit using Hall Sensor

Conclusion

Object detector circuit detects the presence of any object or human in a particular range of area and produces a buzzer sound for indication.

References

- <https://circuitdigest.com/electronic-circuits/-fence-circuit-diagram-alarm>
- <https://technoreview85.com/object-detector-circuit-using-sensor-need/>
- <https://www.electronicsforu.com/electronics/555-timer-specifications>

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