Automatic Light Fence With Alarm

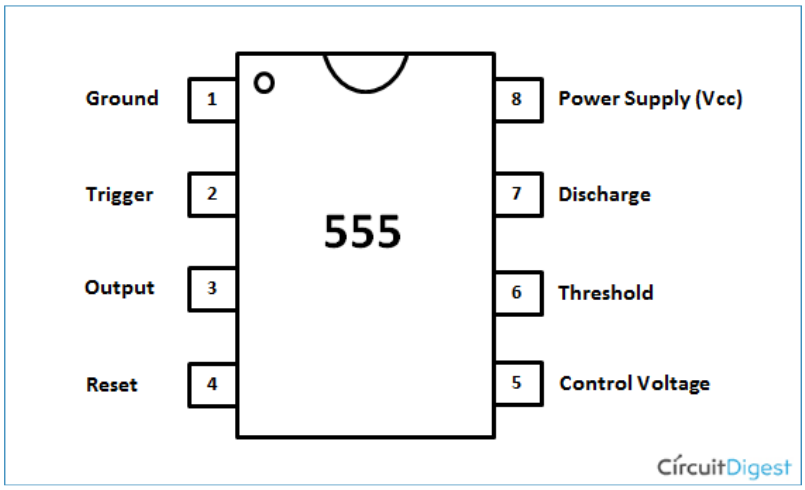
Objective :

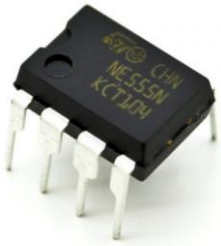
The project is based on purely analog components like op-amp transistor resistors capacitors and other equipment. The project construction of automatic light fence with alarm has been done primarily as a photo type design it could be further modified suit the situation where it will be used. This project will help us to upgrade our security system and show us a basic application of analog circuit using op-amp & 555 timer.

Components Required :

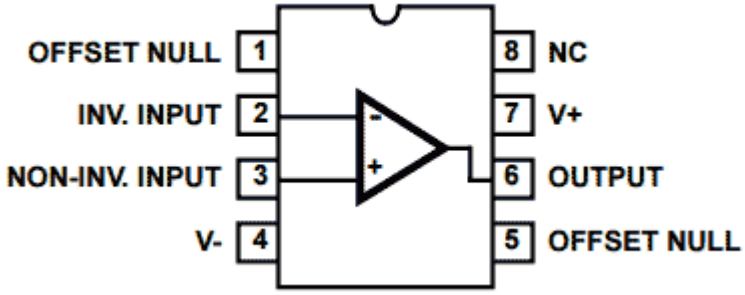
- UA741 Op-amp IC
- 555 timer IC
- BC557 – PNP Transistor
- LDR
- Resistor (210, 1K, 5.7K, 100k, 1M)
- Capacitor (0.1uf, 10uf)
- Potentiometer – 100K
- Buzzer
- LED
- Battery - 9V
- Breadboard

➢ 555 Timer IC.

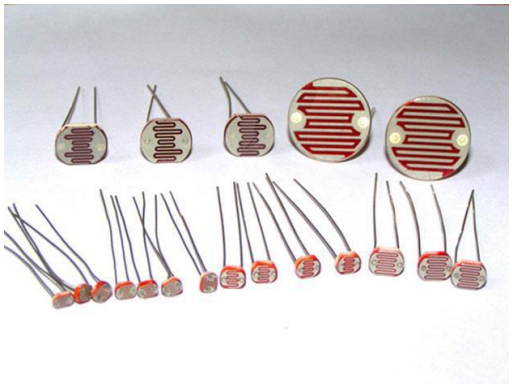


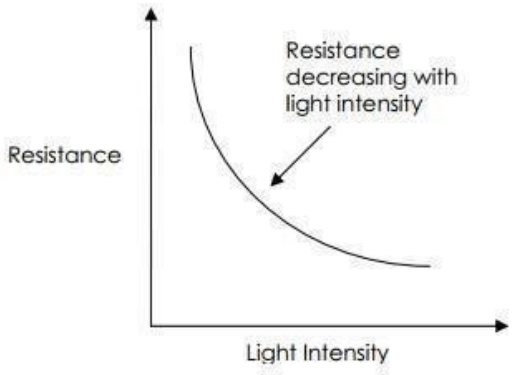


➢ Op-Amp IC.

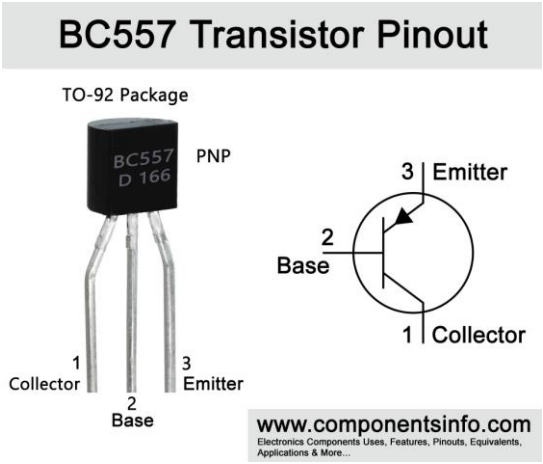


➢ LDR (Light Dependent Resistor)

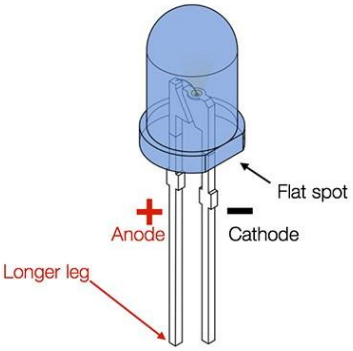




➢ PNP Transistor



➢ LED



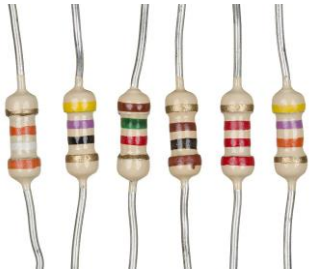
➢ PIEZEO BUZZER

➢ **Others Components**

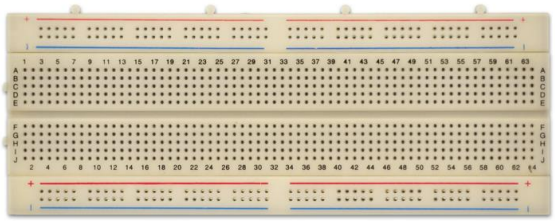
Capacitor

POT

9V Battery

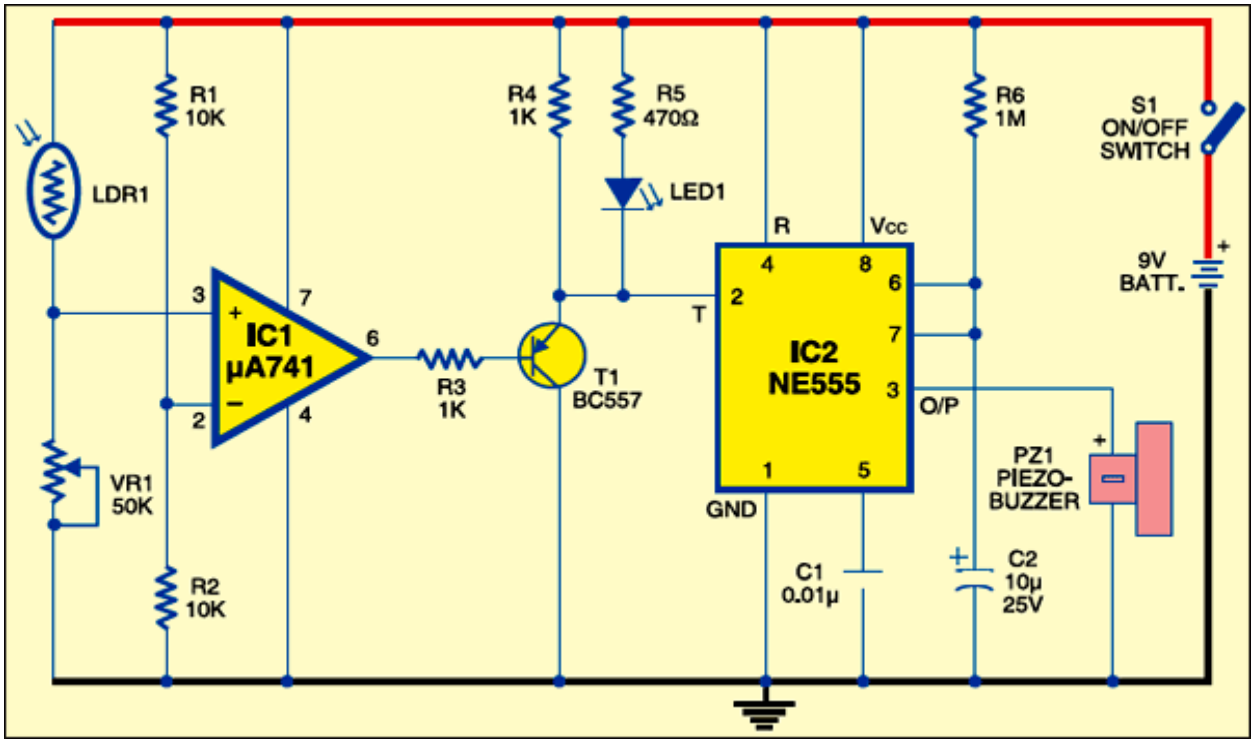


Resistor



Breadboard

Circuit Diagram:



Working Principle:

Basically, a voltage comparator compares a signal voltage on one input of op-amp with a known voltage called reference voltage on the other input. This circuit is also called non-inverting comparator because Vin (input voltage signal) is given to non-inverting pin (pin 3).Reference voltage of about ½ of supply voltage which is 4.5V is available at inverting input (pin 2) and signal voltage to be compare is available at non-inverting input (pin 3) from the potential divider network build using LDR and Potentiometer. The output may be high (+) and low (-) saturation voltage, depending on with input is the larger. When Vin at pin 3 is greater than V_{ref} at pin 2 then the output of Op-Amp will be high, which drive PNP transistor in off state. As a result, LED become off and 555 Timer IC is also stop from oscillation. Similarly, when light is interrupted on LDR, the voltage (Vin) at pin 3 is less than V_{ref} voltage (voltage at pin 2) as a result the output of Op-Amp become low which turn PNP transistor on and as a result LED start to shine. This low output also trigger timer IC 555 which activate piezo buzzer for definite time interval which is determined by resistor R6 and C2.

Advantages:

Light fence circuit is used to detect the presence of any human or object in a particular area. The detecting range of Light Fence Circuit is about 1.5 to 3 meters. It's quite simple to design the circuit. 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**.**

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