

SHADOW DETECTOR USING IC741

ANALOG IC's (ELECTRONICS AND COMMUNICATION DEPARTMENT)

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Materials Required

- Breadboard
- 741 IC
- BC547 PNP Transistor
- LDR - 2
- Diode 1N4007 - 2
- LED - 1
- Capacitor 100nF(104) - 2
- Resistor 10k - 3, 1k - 2
- Push Button - 1
- Buzzer B-10 - 1
- 9v Battery - 1
- Battery Snapper - 1
- Connecting wires
- Buzzer
- Sliding Switch [1]

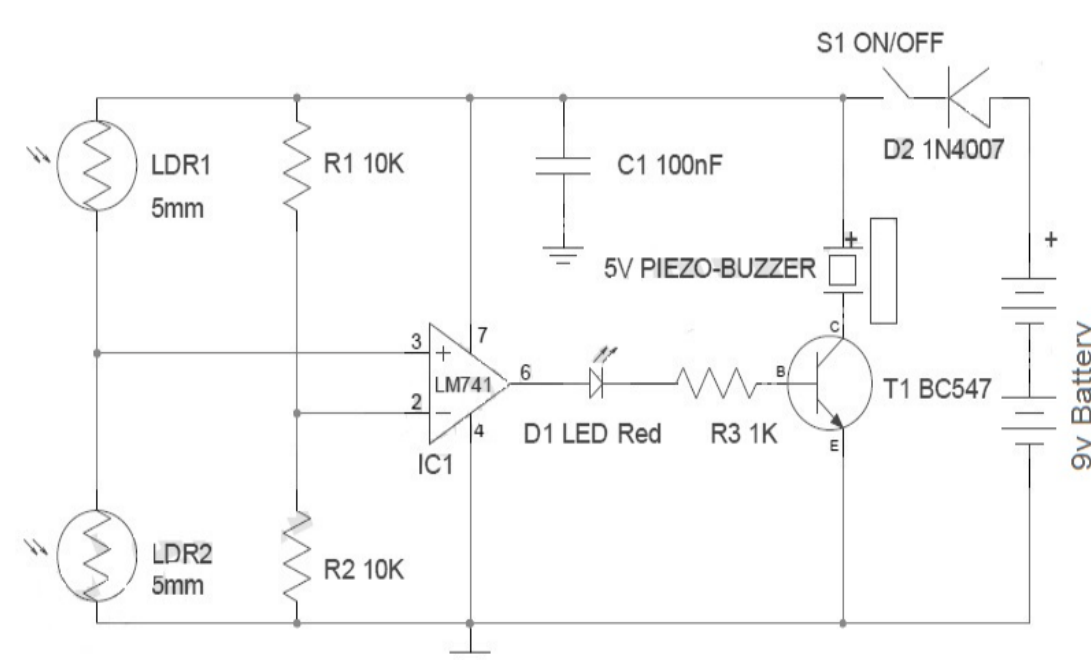


Fig. 1: Material Required

IC 741

- A LM741 is a 8 pin op-amp, meaning it has 8 pins all having their different functions.
- Out of these 8 pins 3 pins are most significant , pin 2 is inverting terminal , pin 3 is non-inverting terminal and pin 6 is output terminal.
- IC 741 mainly performs mathematical operations like addition, subtraction, division, multiplication, integration, differentiation etc.
- The voltage supply range for this IC ranges from $\pm 5V$ to $\pm 24V$ DC supply.
- IC 741 has three stages such as differential input, gain, and push-pull output.
- The pin configuration of this IC is shown in Fig.2.

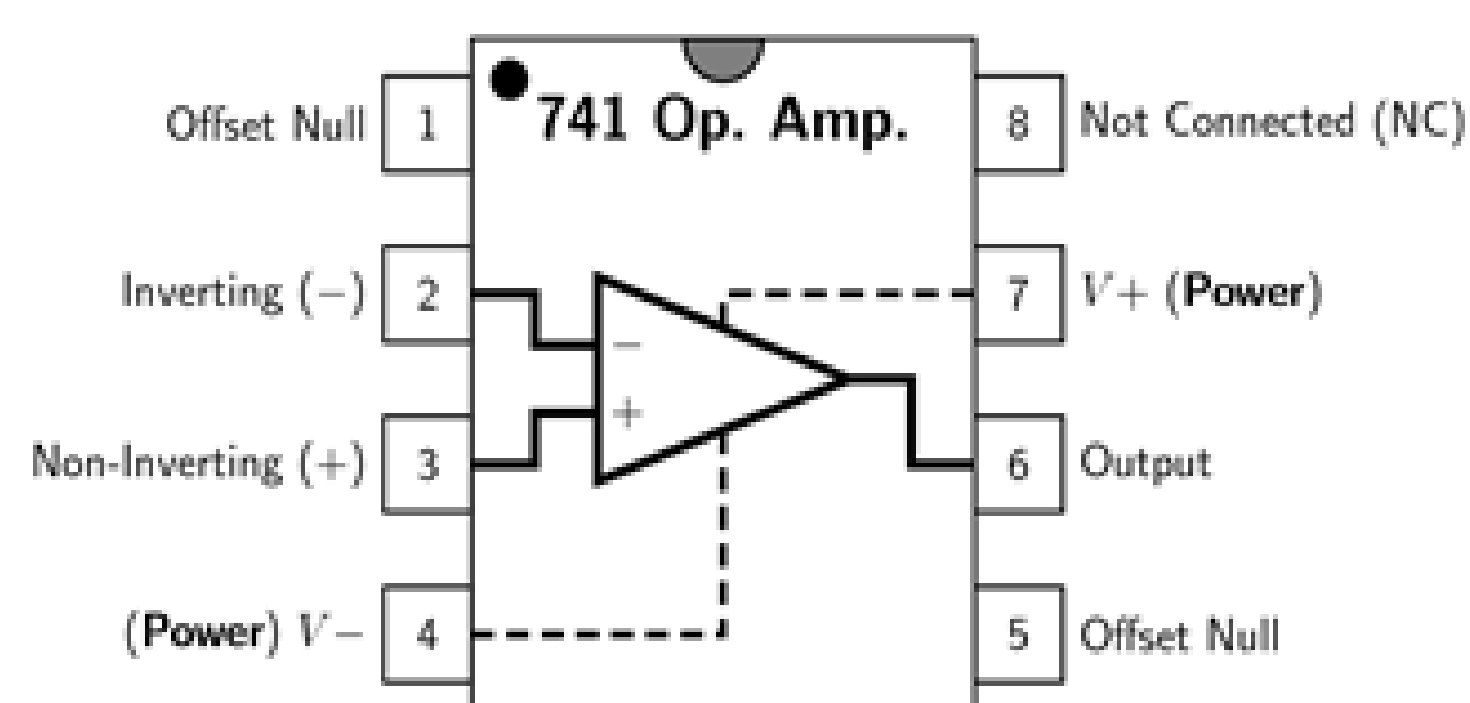


Fig. 2: 555 Timer IC

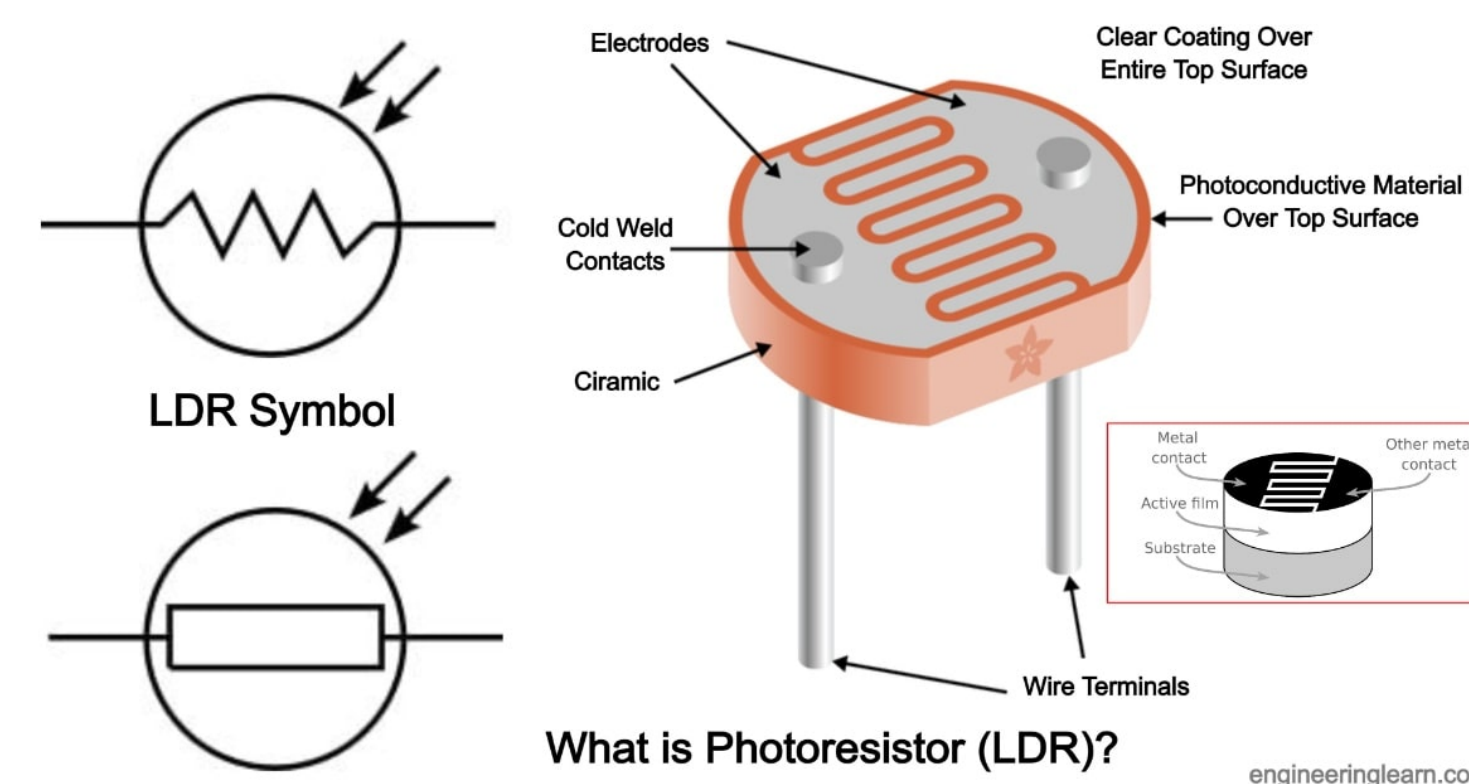
- The IC741 generally has 3 differential stages:
 - (i) Input
 - (ii) Gain
 - (iii) Push-pull output

LDR [Light Dependent Resistor]

Light dependent resistors, LDRs or photoresistors are electronic components that are often used in electronic circuit designs where it is necessary to detect the presence or the level of light.

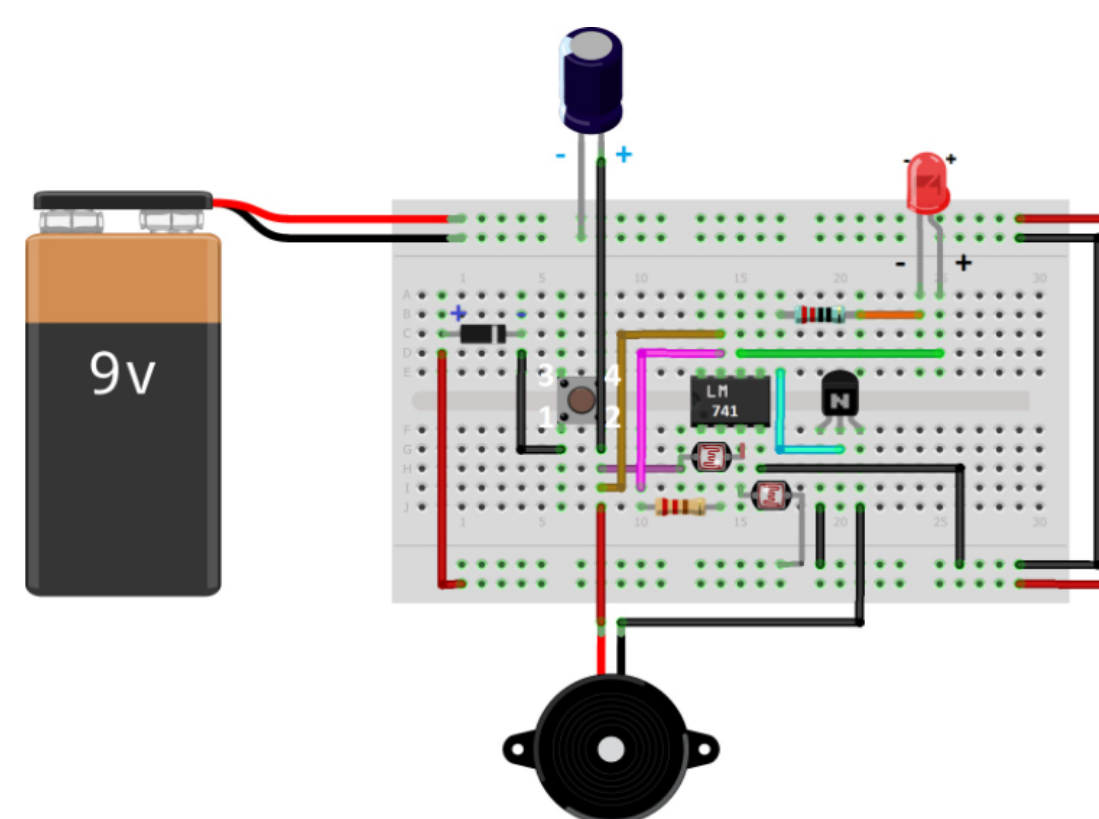
LDRs are very different to other forms of resistor like the carbon film resistor, metal oxide film resistor, metal film resistor and the like that are widely used in other electronic designs. They are specifically designed for their light sensitivity and the change in resistance this causes.

These electronic components can be described by a variety of names from light dependent resistor, LDR, photoresistor, or even photo cell, photocell or photoconductor.



Connections

1. LM 741 IC connected to the Breadboard.
2. Diode 1N4007 positive leg connected to the positive supply and negative leg connected to the Push Button 1st leg.
3. Push Button 2nd leg to connected Buzzer positive leg and Buzzer negative leg connected to the BC547 Transistor leg 2nd(C-right).
4. Transistor BC547 Middle leg to connected 1K Resistor and Resistor 2nd leg connected to the LED negative leg , LED positive leg connected to the LM 741 IC Pin No. 6.
5. Transistor BC547 1st leg(E-left) is GND.
6. Push Button 2nd leg to connected 100nF(104) capacitor and capacitor 2nd leg is GND.
7. Push Button 2nd leg to connected LDR 1st leg and LDR 2nd leg connected to the LM 741 IC Pin No. 3 OR Pin No. 3 to connected another LDR leg 1st and LDR 2nd leg is GND.
8. LM 741 IC Pin No. 4 is GND and Pin No. 2 to connected 10K Resistor and Resistor 2nd leg is GND.
9. LM 741 IC Pin No. 2 to connected 10K Resistor and Resistor 2nd leg connected to the Pin No. 7 and Pin No. 7 connected to the Push Button 2nd leg.



Working Explanation

Shadow sensors are widely used to detect the movement of a person in a confined area. Described here is a simple but improved circuit of a smart shadow sensor alarm, which can register a shadow when there is a light difference. Here two 5mm LDRs are used with the popular Op-amp LM741CN to drive an active piezo-sounder when a "valid" shadow is detected. The whole shadow sensor circuit can be powered from four 1.5V AA cells (6VDC), or similar dc supply sources.

Applications

- It can be used in bank and vault, for very high and sensitive security.
- It can be used in prison, home for total lock down. Anyone trying to break through can be sensed by placing the device in a suitable place.
- It can be used as a sensor device to identify any kind of movement.

Conclusion

A darkness detector circuit using LDR is a very simple circuit which can have many applications in the real world. This project requires very few components and is a cool system for our first electronics project. We can use this circuit as a subsystem and integrate it in our future projects.

References

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2. <https://engineeringreport.wordpress.com/2013/10/02/10-shadow-detector/>
3. <https://www.slideshare.net/siddharthjadav12/shadow-alarm>

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