Testing of LDR Circuit

Components Required:

-Light Dependent Resistor (LDR)

-Light Source

-12V Battery

-1K Potentiometer

-LED

-DC Voltmeters (Volts)

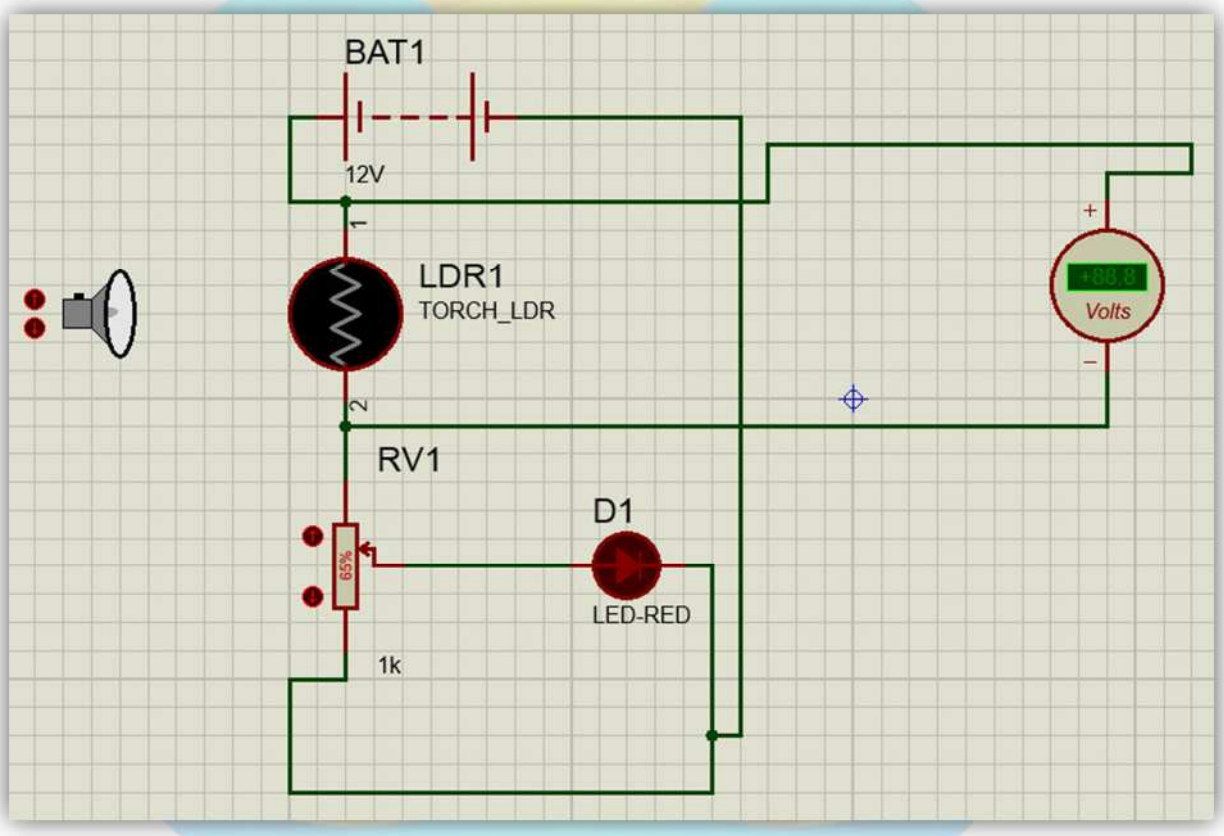


Fig 1

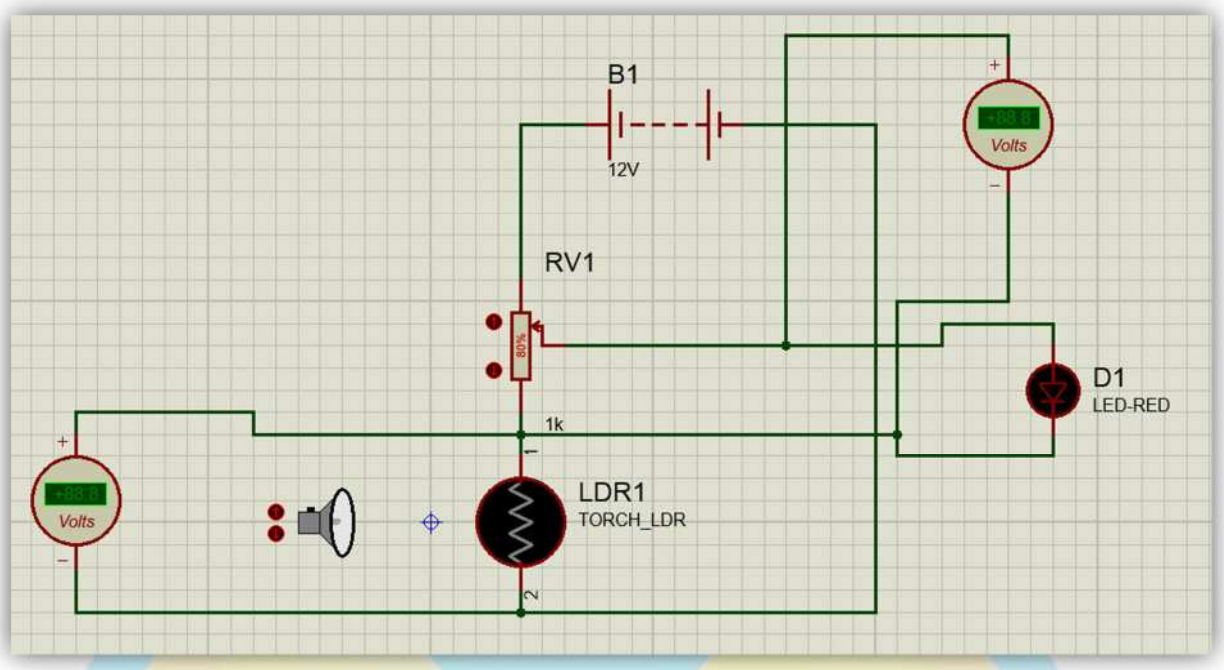


Fig 2

Circuit Connection:

-both the connections are of a voltage divider circuit.

-in fig 1, one terminal of the LDR is connected to the supply while the other terminal is connected to the 1k potentiometer whose other end is connected to ground.

-the output is taken across the output leg of the potentiometer and ground (by connecting a led across it) because in the circuit 1, ground is kept fixed and the supply voltage is divided.

-in fig 2, one terminal of the LDR is connected to the ground while the other terminal is connected to the 1k potentiometer whose other end is connected to the supply.

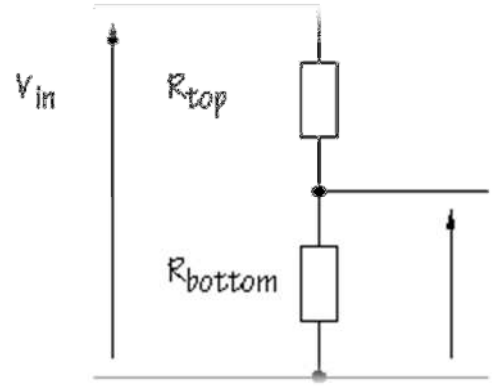
-the output is taken across the output leg of the potentiometer and the centre tapping of LDR and potentiometer (by connecting a led across it) because in the circuit 2, supply is kept fixed and the ground voltage is divided.

Technical description:

LDR stands for Light Dependent Resistor. The light-sensitive part of the LDR is a wavy track of cadmium sulphide. Light energy triggers the release of extra charge carriers in this material, so that its resistance falls as the level of illumination increases.

A light sensor uses an LDR as part of a voltage divider.

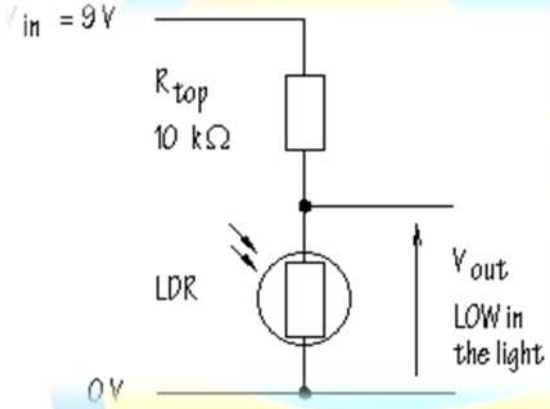
The essential circuit of a voltage divider, also called a potential divider, is:



$$V_{out} = \frac{R_{bottom}}{R_{bottom} + R_{top}} \times V_{in}$$

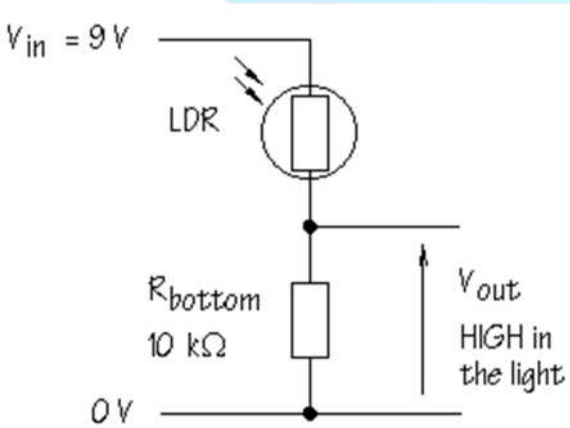
Here, two resistors are connected in series. With V_{in} , which is often the power supply voltage, connected above R_{top} . The output voltage V_{out} is the voltage across R_{bottom}.

For fig.1, if one of the resistors in the voltage divider is replaced by an LDR & R_{top} is a 10kΩ resistor, and an LDR is used as R_{bottom} :



the supply voltage is divided keeping the ground voltage common. This circuit gives a LOW voltage when the LDR is in the light, and a HIGH voltage when the LDR is in the shade. The voltage divider circuit gives an output voltage which changes with illumination.

For fig.2, if one of the resistors in the voltage divider is replaced by an LDR & R_{top} is a LDR, and a 10kΩ resistor is used as R_{bottom} :



the ground voltage is divided keeping the supply voltage common. The action of the circuit is reversed, i.e. output voltage becomes HIGH when the LDR is in the light, and LOW when the LDR is in the shade