

Sensing the light

You are going to design and test a simple light sensor circuit.

1. Put together an LDR and 10 k Ω resistor as a voltage divider between 0 V and +5 V. Its output (the light signal) must be high in bright light and low in dim light.
2. Use a 4.7 k Ω resistor and a 2.2 k Ω resistor to generate a reference voltage of about +1.6 V.
3. Use 10 k Ω and 22 k Ω resistors to generate another reference voltage of about +3.4 V.
4. Use an op-amp to compare the light signal with +1.6 V. Arrange it so that an LED (via a 220 Ω resistor) glows when the light signal goes above +1.6 V.
5. Use another op-amp to make another LED glow when the light signal goes above +3.4 V.
6. Add a third op-amp to make a third LED glow when the light signal goes above +2.5 V. You will have to decide on the resistors for the voltage divider.
7. The number of glowing LEDs on your breadboard tells you how much light is falling on the LDR. As the amount of light increases, so does the number of LEDs. Adapt your circuit so that only one LED glows at any one time, according to this table.

light level on the LDR	colour of glowing LED
low	red
medium	yellow
high	green

It may help you to study this circuit. The LED glows when the thermistor is warm, but doesn't glow when it is hot or cold.

