Light Dependent Sensor (LDR) Tutorial

Introduction

As its name implies, the **Light Dependant Resistor** (LDR) is made from a piece of exposed semiconductor material such as cadmium sulphide (CdS) that changes its electrical resistance from several thousand Ohms in the dark to only a few hundred Ohms when light falls upon it by creating hole-electron pairs in the material. The net effect is an improvement in its conductivity with a decrease in resistance for an increase in illumination. Also, photo-resistive cells have a long response time requiring many seconds to respond to a change in the light intensity.

The most commonly used of all photo-resistive light sensors being **Cadmium Sulphide** (Cds). Cadmium sulphide is used in the manufacture of photoconductive cells because

its spectral response curve closely matches that of the human eye and can even be controlled using a simple torch as a light source. Typically then, it has a peak sensitivity wavelength (λp) of about 560nm to 600nm in the visible spectral range.

For most light-sentsitive applications like "is it light or dark out", "is there something in front of the sensor (that would block light)", "is there something interrupting a laser beam" (break-beam sensors), or "which of multiple sensors has the most light hitting it", photocells can be a good choice!

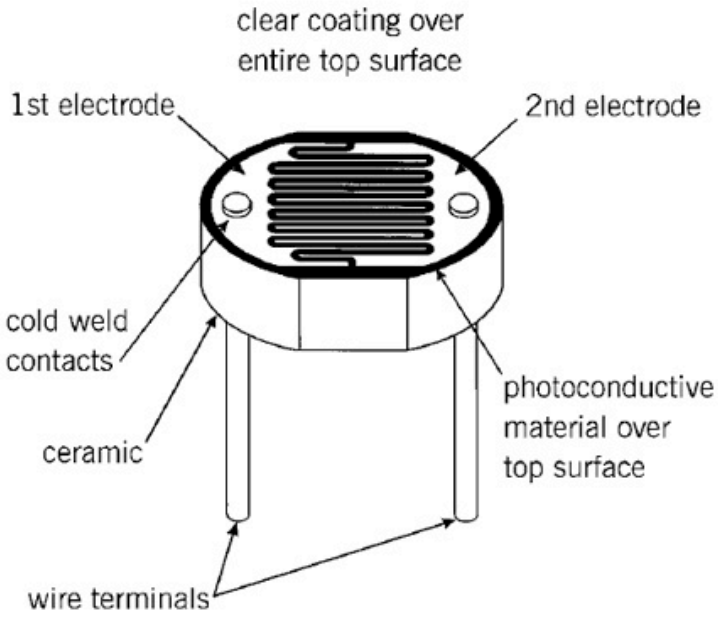


Figure 3
Typical Construction of a Plastic Coated Photocell

What is LUX?

Light level are normally measured in LUX. Formally, A Lux measurement is the measurement of light energy reaching a 1m² surface area per second. Simply, for human eye the higher the LUX reflected from an object, the better we can see details (of course up to certain level). Basically, dark is low LUX value and daylight is higher LUX value.

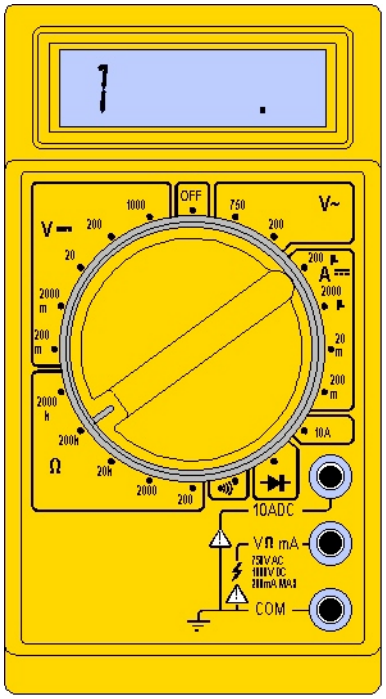
Another Example, When a Camera Specification refers to Lux level, it is an indication of the lowest light level at which the camera will produce adequate image capture.

The best way to have feeling of LUX is to check LUX table below.

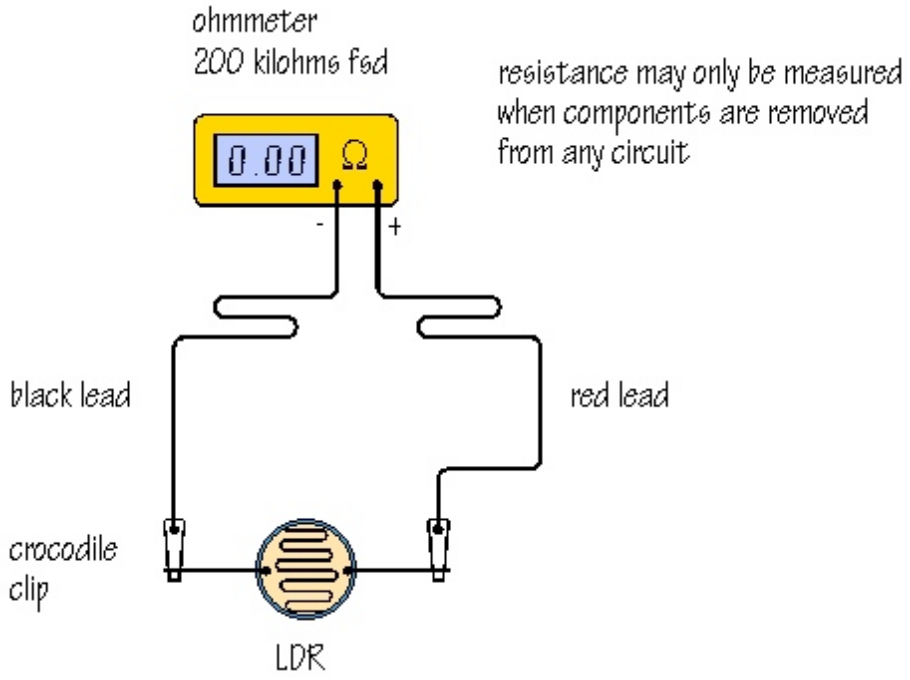
Lighting Condition	LUX Level
Sunlight	107,527
Full daylight	10,753
Main Road Light	30
Residential Street	3
Full Moon	0.108
Quarter Moon	0.0108
Star Light	0.0011

Testing your LDR (Resistance measurement)

1) Switch your Multimeter to resistance scale



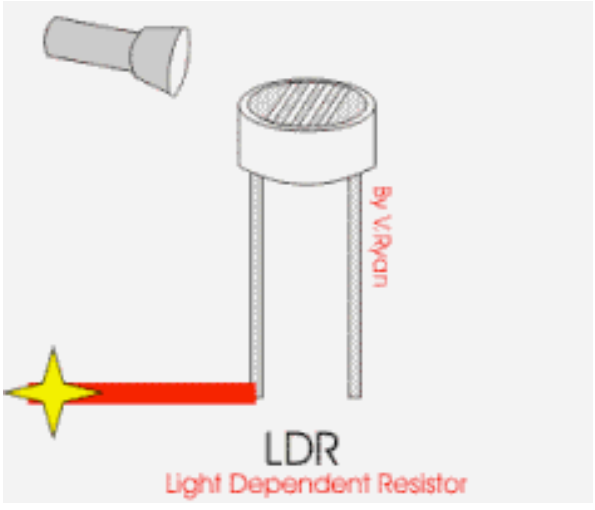
2) Connect your photo-resistor as indicated in the figure below:



3) Write down the resistance value (For example in daylight)
4) Make a show using your hand and note the change in the value of resistance due to LUX change (It should increase)
5) repeat in different lighting conditions and you basically able to construct your own resistance chart for the photo-resistor sensor you have.

Using Light Dependent Diode with LED

Basically, you can use light sensor as photodetector for led light as shown in the figure below



The real question is which LED is most detectable by the LDR. Of course it depends on the type of LDR. The spectrum response for the LDR will determine the best LDR - LED combination that work together.
However for the most common type which is cadmium sulphide (CdS) the spectrum response is shown Blow. This spectrum response indicates that green LED is the best suitable for detection by LDR.

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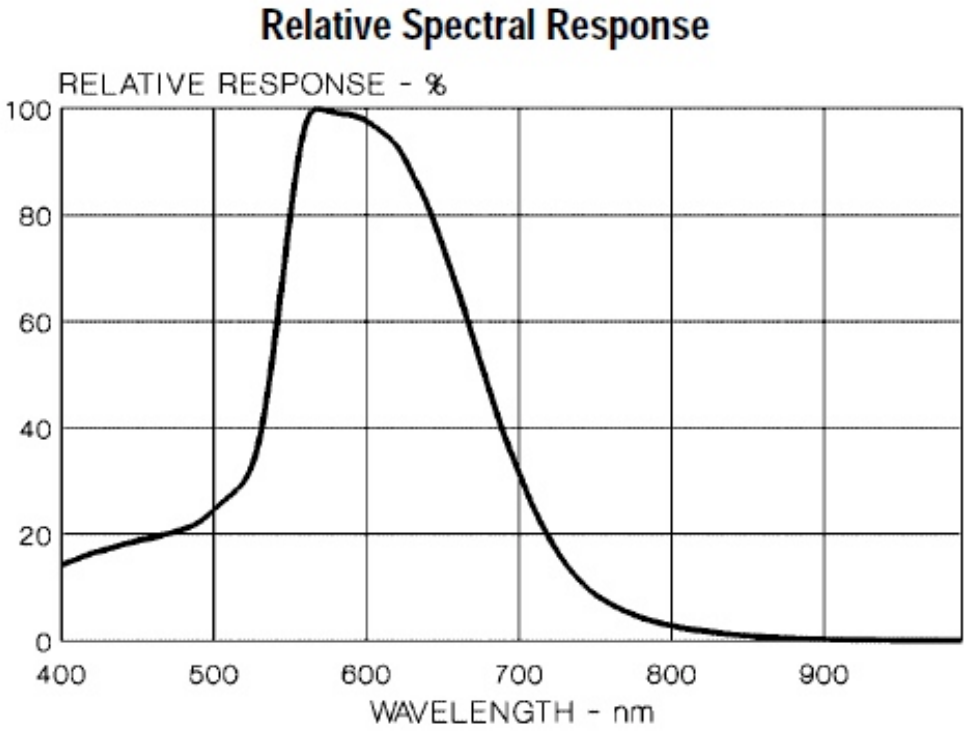

For more Information, Please contact Future Electronics Egypt (Arduino Egypt)