Experiment 4

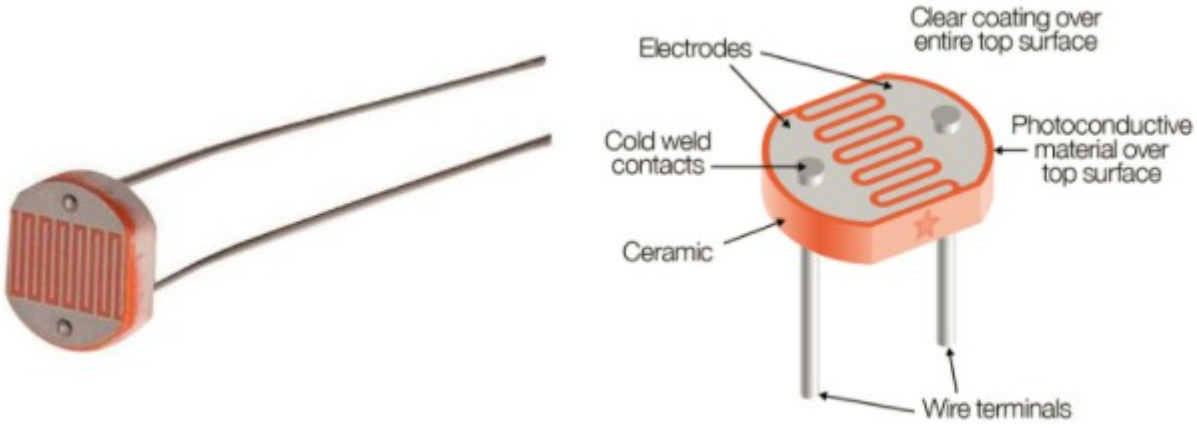
Photoresistor / Temperature Sensor

Outline

In this experiment, it is expected from you to,

1. Learn the photoresistor (LDR) structure and usage
2. Assemble and test the photoresistor circuit
3. Learn the temperature sensor structure and usage
4. Learn how to read temperature value
5. Assemble and test the temperature sensor circuit
6. Modification

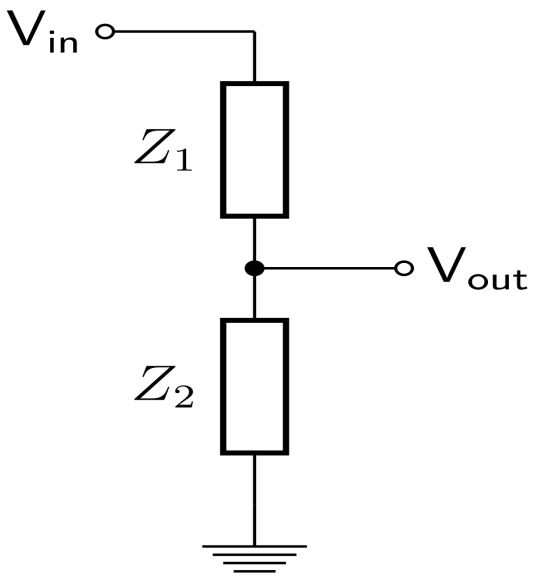
1. Photoresistor / Light Dependent Resistor (LDR)



Structure of the LDR

Light Dependent Resistors or LDRs are a kind of resistors those are consisting of light dependent semiconductor metarials. When these metarials are exposed to a light source they become more conductive which means they lose their resistance.

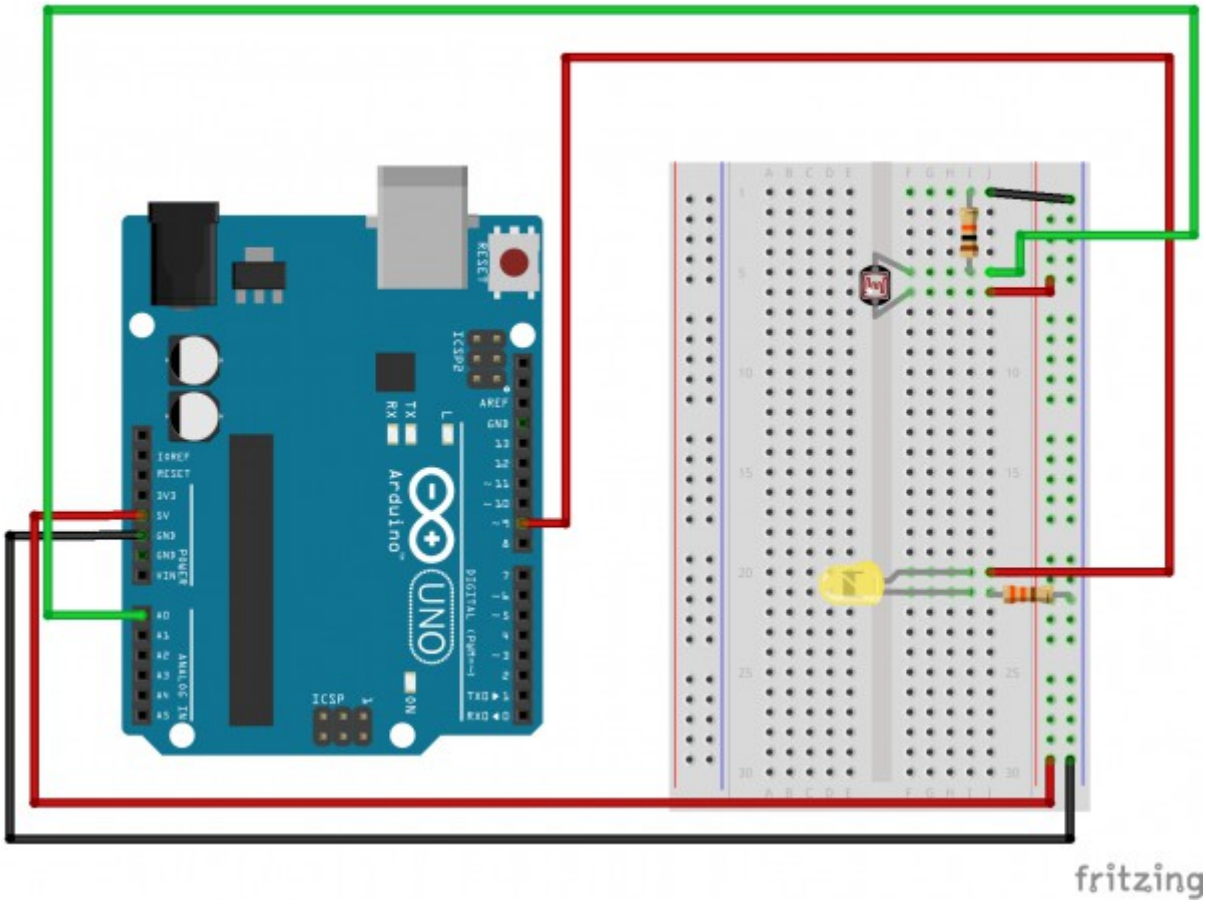
To be able to read any value from them by using Arduino you need a voltage divider. This is because LDRs mainly pose too high resistance values (millions of Ω) when they are not exposed to light which make it impossible to read the changes after a while. By using a simple voltage divider we will eliminate this problem since some of the voltage no matter what will be shared with the other elements.



Simple Voltage Divider

2. Assembling the LDR Circuit

Required Parts



Fritzing Diagram of the Circuit

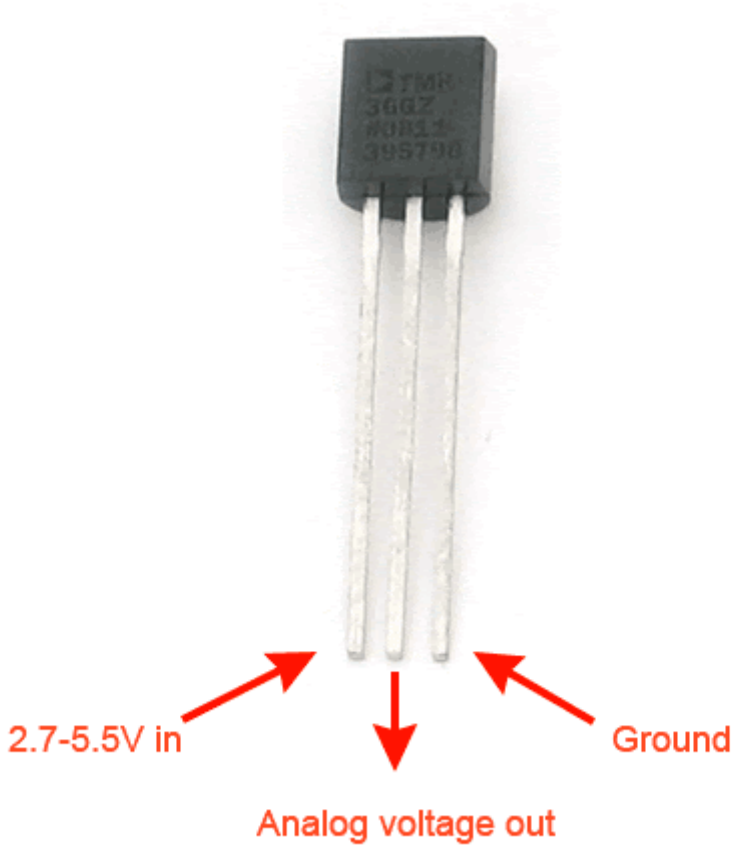
1. Select your resistors (330 Ω and 10k Ω) by using the color code table
2. Connect your LDR and LED as shown in the diagram
3. Verify and upload your code to the arduino board
4. Observe the result and compare it with the expected outcome

Expected Outcome: LED brightness should change according to the amount of light your LDR exposed.

3. Testing The RGB LED Circuit

1. Since LDRs are complex resistors, it is possible to measure the their resistance value with a multimeter
2. After measuring the resistance value calculate the current (A) value you can get when 5V voltage provided, assuming LDR is full exposed to a light.
3. After power up the circuit note the minimum and maximum values you can get from analog reading.

4. Temperature Sensor

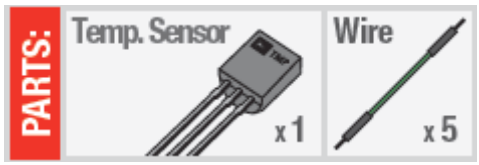


TMP36 Sensor Structure

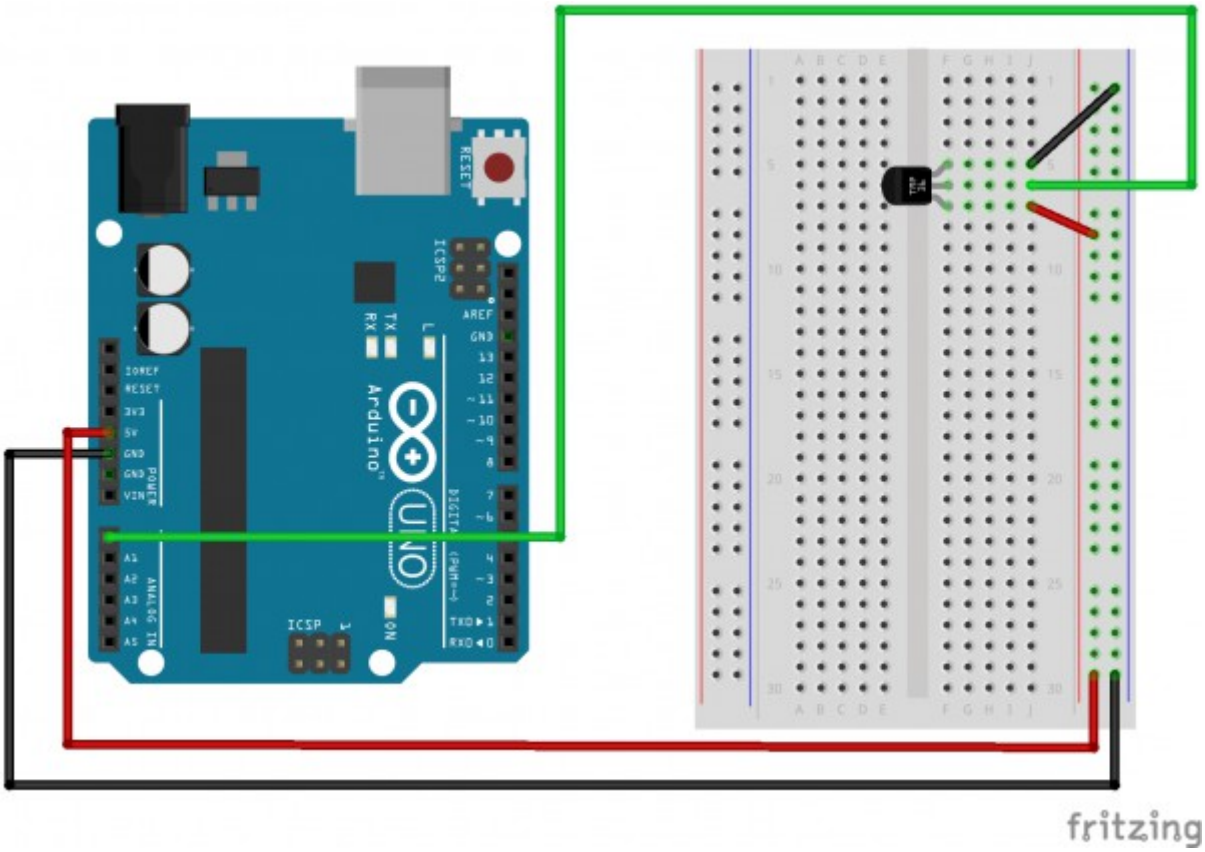
TMP36 is one of the temperature sensors that you can use. All of the temperature sensors have their own specified reading ranges, so before using them you need to read the datasheet provided by the manufacturer. TMP36 can measure the temperature in range of -40°C <= *T* <= 125°C with accuracy of ±2°C .

To activate the TMP36 you need to provide a voltage between 2.7V to 5.5V. At minimum temperature of -40°C TMP36 outs 0.1V and at maximum 1.75V.

5. Assembling the Temperature Sensor Circuit



Required Parts



Fritzing Diagram of the Circuit

1. Connect your temperature sensor according to diagram, care for the legs (Vin, Vout, GND)
2. Verify and upload your code to the arduino board
3. Observe the result and compare it with the expected outcome

Expected Outcome: You should see the changes in temperature in Celcius Degrees on Serial Monitor.

6. Testing The Push Button Circuit

1. Discuss why we are multiplying the value we get from analog pin with a constant of 0.004882814
2. Discuss why we are substract 0.5 from the voltage value we found

Modification

Use a LDR and a temperature sensor in blinking LED circuit as follows

1. LDR will be responsible of frequency of the blinking process
2. Temperature sensor will be responsible of the intensity of the LED
    - Since you can not cool the sensor in practical way, use the room temperature value for minimum intensity level of the LED.
    - You should already figure out the maximum value you can get in Celcius degree with temperature sensor during lab usage. Use it to determine the value that sets the maximum intensity level of the LED.