



## Arduino Lesson ( )

### Use of LDR (Light-Dependent Resistor)

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Objectives:** At the end of this lesson, you would be able to

1. Apply basic circuitry to the Arduino microcontroller and other basic hardware
2. Write sketches for a light sensing circuit

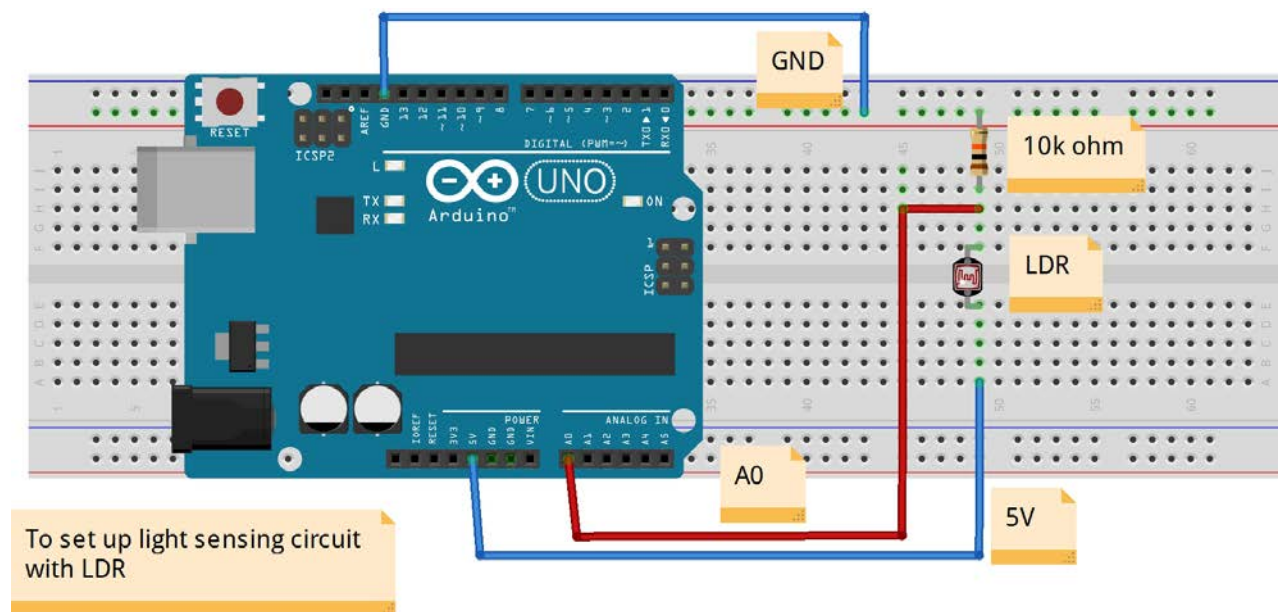
**Apparatus:**

- 01 Arduino UNO microcontroller
- 01 breadboard
- 01 USB cable
- 06 jumper wires

**New item:**

- 01 LDR (light dependent resistor)
- 01 resistor (10 kΩ) = R<sub>1</sub>

**Note:** The light intensity readings can be calibrated using a **light meter**.



fritzing

Above diagram created with fritzing.org software

Using **potential divider**: same current  $I = V_1 / R_1 = V_2 / R_2 = 5 V / (R_1 + R_2)$

$$\rightarrow V_1 = R_1 / (R_1 + R_2) \times 5 V$$

Light intensity (in environment of LDR)	High (bright)	Low (dim)
Resistance of LDR (R <sub>2</sub> )	Low	High
p.d. across LDR (V <sub>2</sub> )	Low	High
p.d. across 10 kΩ resistor (V <sub>1</sub> )	High	Low
A0: Reading on serial monitor	<b>High</b>	<b>Low</b>

**Assignment:** Set up a light sensing circuit using an LDR

1. Connect the LDR in series with a 10 k $\Omega$  resistor to GND (0 V) and 5 V.
  2. Connect the analog pin A0 to middle of LDR-resistor circuit. This arrangement is called a **potential divider** (or voltage divider). The p.d. of 5 V is shared between the LDR and resistor.
    - When the light intensity in the environment is high, the resistance of LDR will become low.
    - The p.d. across LDR will become low, so the voltage output to A0 will be high, showing high light intensity.
  3. Draw a simple circuit diagram for the LDR-resistor potential divider circuit.
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4. Write a sketch to control the light sensing circuit which provides continuous readings of the light intensity in the environment. Include:
    - `Serial.begin (9600);` //initialize the serial communication at 9600 bits/s
    - `Serial.print("light level =");` //output the light intensity detected by the LDR
    - `Serial.println(analogRead(A0));` //show light intensity readings from analog output A0
    - `delay (500);`
  5. Verify and upload the sketch.
  6. Click on the “**serial monitor**” icon (top right corner) to open another window.
    - Select “9600 baud” (bottom right corner menu).
    - View changes in the light intensity readings by covering the LDR.

### **Sample sketch**

```
/* Set up LDR to detect light intensity from the environment
*/

// the setup function runs once when you press reset or power the board
void setup() {
  Serial.begin (9600);           // initialize the serial communication at 9600 bits/s
}

// the loop function runs over and over again forever
void loop() {
  Serial.print("light level ="); // output the light intensity detected by the LDR
  Serial.println(analogRead(A0)); // show light intensity readings from analog output A0
  delay (500);                  // wait for 0.5 second
}
```