

Experiment 004 Light Sensor

OVERVIEW

In this experiment you will control how to read an analog value from the light sensor and display it on the computer's serial monitor window.

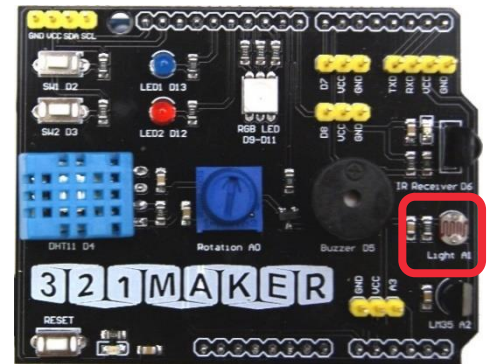
OUTCOMES

By the end of this assignment the student will be able to:

- Read an analog sensor value.
- Use the map function to change the scale of an analog value.
- Send data from an Arduino to the computer's Serial monitor.

REQUIREMENTS

- Arduino-Compatible board
- 321Maker Things Shield
- USB Cable
- Arduino Software



PREREQUISITES

- Getting Started Tutorial: <http://321maker.com/start>
- Source Code: <https://git.io/viQqV>

VIDEO TUTORIAL

<http://youtube.com/indevelopment>

BACKGROUND

Light Sensor

The light sensor is a photoresistor that changes its electrical resistance based on the amount of lights that the photocells are exposed to. The light sensor is connected to analog pin A1 on the Arduino. When the sensor is exposed to light the voltage on pin A1 will increase. The Arduino can read this voltage through the use of an internal analog to digital converter (ADC). The ADC maps the value of the voltage from zero to 1023. The brighter the light the higher the sensor value will be.

The map function

The map function is a programming command that can be used to transform the scale of variable. The general syntax for the map command is as follows.

map(variable, fromLow, fromHigh, toLow, toHigh)

If a variable called data contains a sensor value is in between 0-1023, you can map this to a value between 1-10 by using the following command.

```
map(data, 0, 1023, 0, 10);
```

If you wanted to map the data variable to a value between 0-100 using the following command

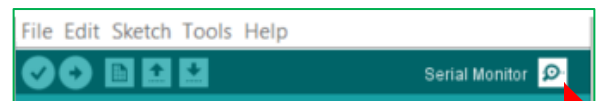
```
map(data, 0, 1023, 0, 100);
```

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LEVEL 1 PROCEDURE

- ☐ Connect your Arduino to your computer using the USB port. Open the Arduino software.
- ☐ Download the **Light Sensor** program code from here: <https://git.io/viQqV>
- ☐ Copy and paste the program code into the Arduino software editor.
- ☐ Make sure you have the correct Arduino Board and Communications port setup.
- ☐ Click the upload button in the upper left corner to compile and upload the code to the Arduino device. If you see an Orange error in the bottom of your screen, then something went wrong.

- ☐ From the Arduino program click the magnifying glass in the upper right of the screen to open the serial monitor.



Serial Monitor Button

- ☐ As you cover the light sensor with your finger you will notice the sensor value decreases, and when the light increases the sensor value will increase.
- ☐ Congratulations, you are now reading data from the light sensor.

LEVEL 2 PROGRAM MODIFICATION

- ☐ Add the following line after line 18 in the program to convert the sensor value to a percentage.

```
map(data, 0, 1023, 0, 100);
```

LEVEL 3 ADVANCED APPLICATION

- ☐ Write a program that will turn on both the red LED (D12) and blue LED (D13) at the same time when the sensor detects darkness. Such as covering it with your finger.

LEVEL 4 PROJECT CHALLENGE

- ☐ **Light Alarm Challenge-** Write a program that will output a short chirp using the buzzer (D5). When the light sensor detects light.
- ☐ **Light meter Challenge-** Write a program that will turn on the red channel on the RGB led (D9) when it is dark, the blue channel when there is some light, and the Green RGB channel when the light sensor detects a bright light.