# Light Meter

Created by Dan Malec


https://learn.adafruit.com/light-meter

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# Overview & Parts

I recently needed to measure how different materials affect light transmission for a gardening project.  This seemed like a perfect fit for an Arduino project based around the TSL2561 Light sensor.

It can display the raw "Visible light" count from the sensor and then the calculated Lux.

I used the following parts in this project:

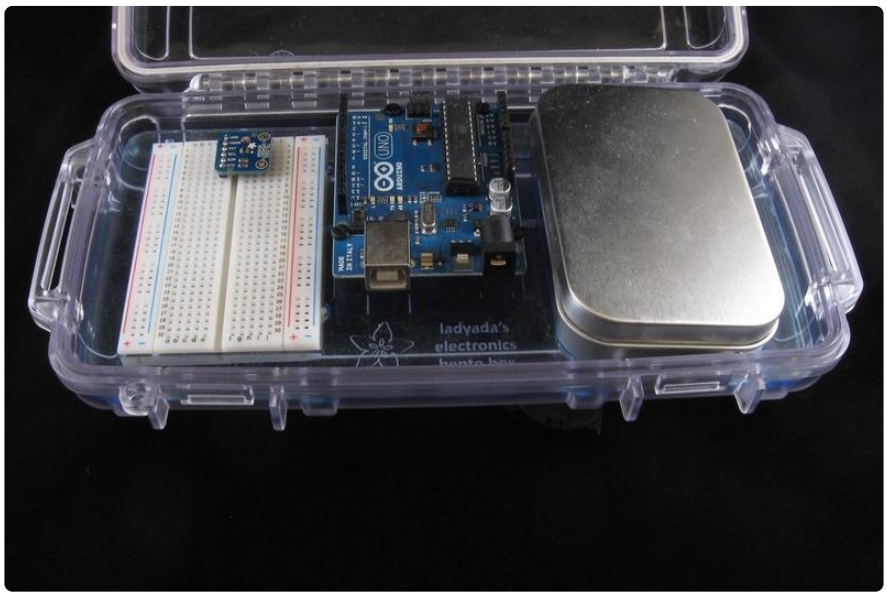
- Arduino Uno (http://adafru.it/50)
- TSL2561 Digital Light Sensor (http://adafru.it/439)
- 16×2 LCD (http://adafru.it/181)
- LCD I2C / SPI Backpack (http://adafru.it/292)

Optional (but definitely helps keep everything tidy):

- Lady Ada's Bento Box (http://adafru.it/765)

# Code & Wiring

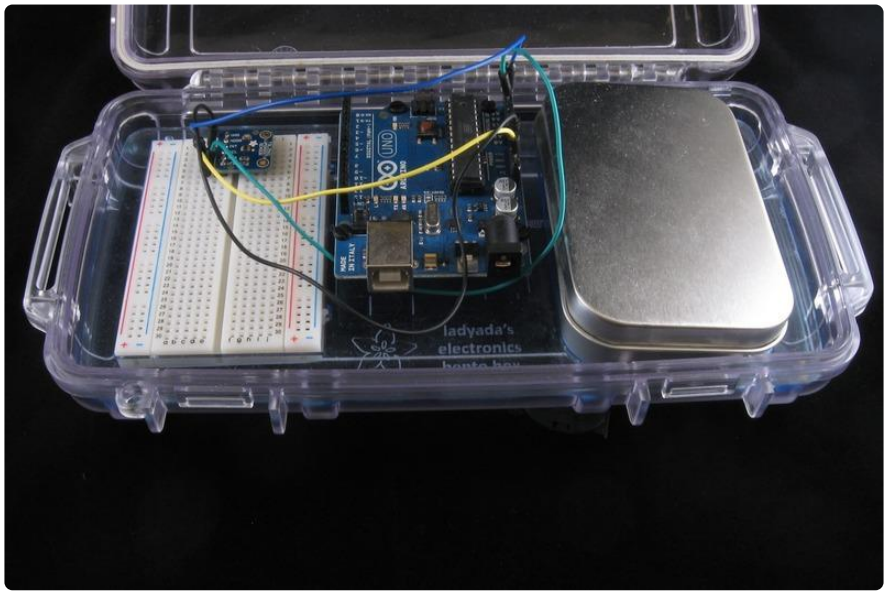
First up is plugging the light sensor into the breadboard.



The next step is connecting the sensor to the Arduino:

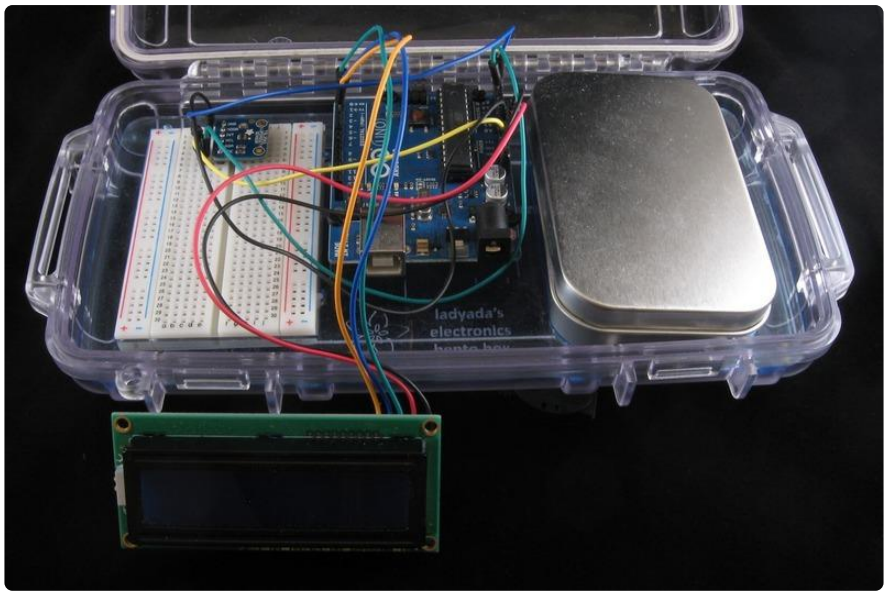
- Sensor GND pin - black wire – Arduino ground pin
- Sensor VCC pin - yellow wire – Arduino 3.3v pin
- Sensor SCL pin - green wire – Arduino analog pin 5 (i2c clock line)
- Sensor SDA pin - blue wire – Arduino analog pin 4 (i2c data line)

If you're using only the TSL2561 on your Arduino and no other I2C devices, its fine to connect it directly. If you have other I2C devices that run on 5V connected at the same time you should use a i2c-compatible level shifter such as this one (http://adafru.it/757) to shift both the SCL and SDA data. Connect the HV pin to 5V, the LV pin to 3.3V, grounds to ground, and connect A1 and B1 channels to the TSL SDA/SCL pins and A2 and B2 to the matching Arduino I2C pins

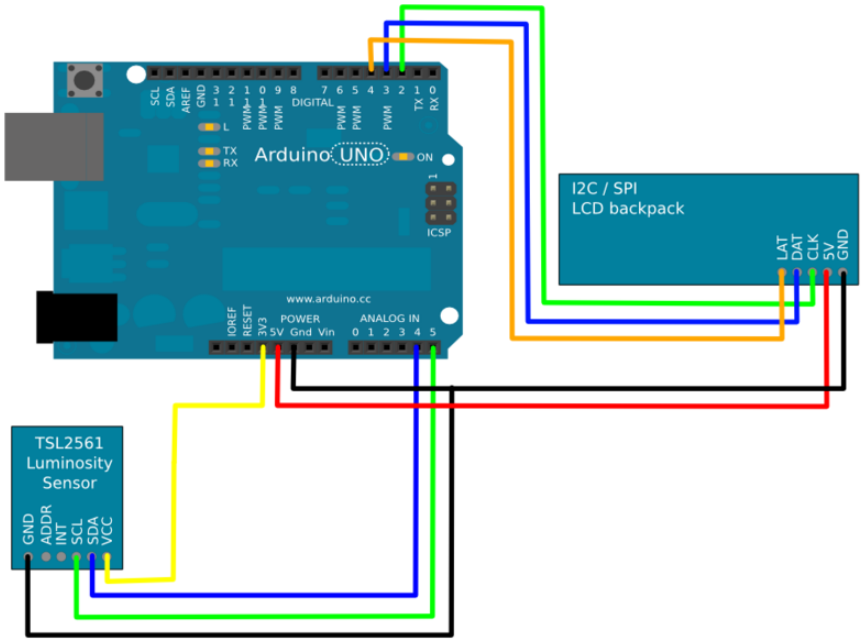



The LCD can now be added to the circuit.  Since this project uses SPI mode to talk to the LCD, make sure the SPI solder enable jumper has been soldered.

- LCD backpack GND pin - black wire – Arduino ground pin
- LCD backpack 5V pin - red wire – Arduino A5V pin
- LCD backpack LAT pin - orange wire – Arduino digital pin 4 (SPI latch pin)
- LCD backpack DAT pin - blue wire – Arduino digital pin 3 (SPI data pin)
- LCD backpack CLK pin - green wire – Arduino digital pin 2 (SPI clock pin)



With all components added, the block diagram of the circuit looks like this:




Arduino Uno image courtesy of Fritzing

For my project, I'm gathering data at reasonably high light levels; so, I went with the following settings:

```
tsl.setGain(TSL2561_GAIN_0X);
tsl.setTiming(TSL2561_INTEGRATIONTIME_13MS);
```

If you are measuring low light levels, you may want to adjust these two lines accordingly:

```
tsl.setGain(TSL2561_GAIN_16X);
tsl.setTiming(TSL2561_INTEGRATIONTIME_402MS);
```

An additional area to highlight is how the sketch is printing the light level values:

```
snprintf_P(output_buffer, 6, PSTR("%5d"), (full_spectrum - ir_spectrum));
```

snprintf_P is a variant of sprintf that adds a couple of nice features. The 'n' indicates that you can specify a maximum number of bytes to write into the buffer; this helps protect against accidental buffer overruns. The '_P' indicates that the format string is read from program memory; this helps conserve RAM. In the invocation above, I'm using the companion macro PSTR() to keep the format string parameter in program memory.

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# Downloads

Download the latest code on GitHub ()