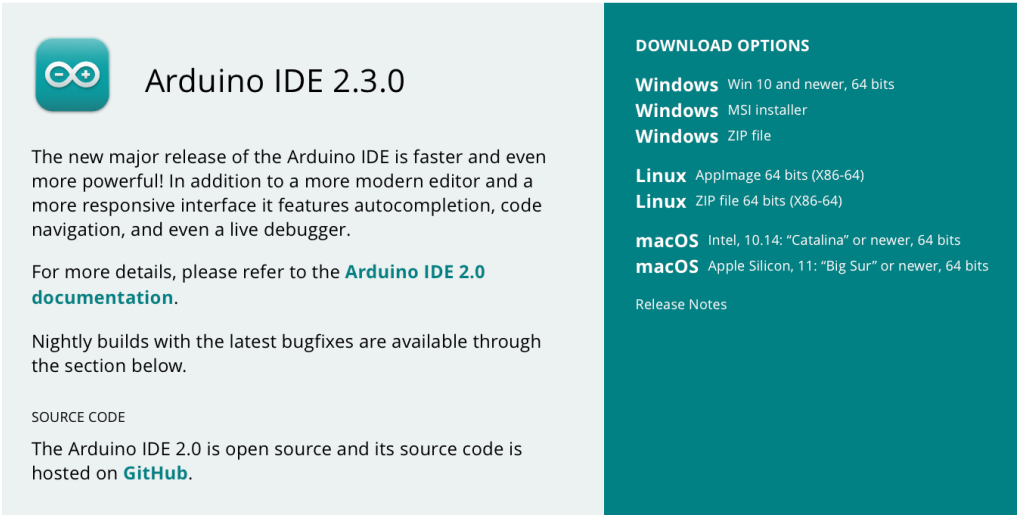
The RPI Pico in the Lab
Session 1 Tasks

Session 1 Lab Tasks
Install Software

Arduino IDE
https://www.arduino.cc/en/software

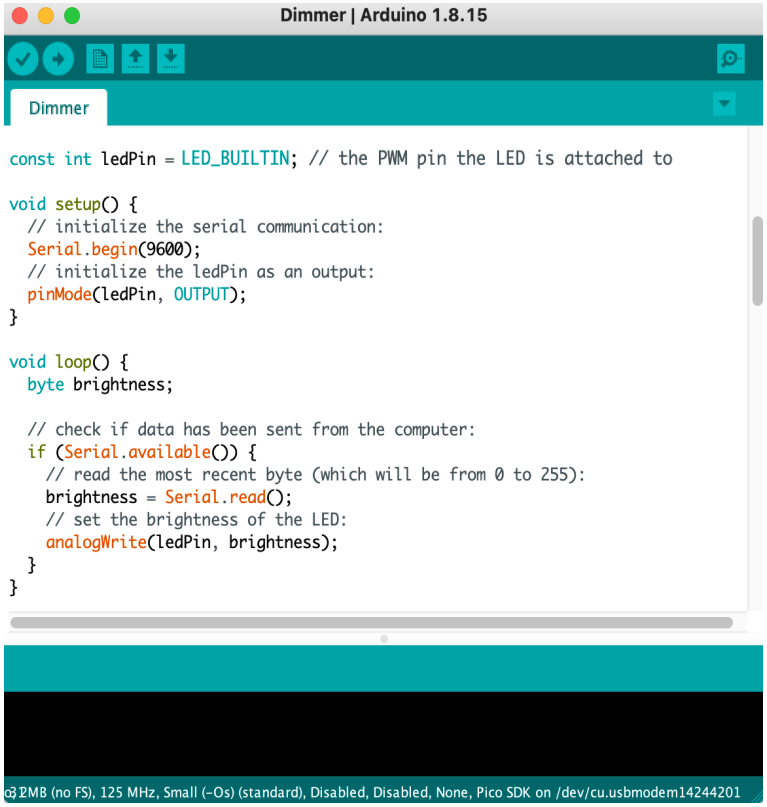


Arduino-core for RPI Pico Installation
https://arduino-pico.readthedocs.io/en/latest/

Session 1 Lab Tasks

Write your first RPI pico program

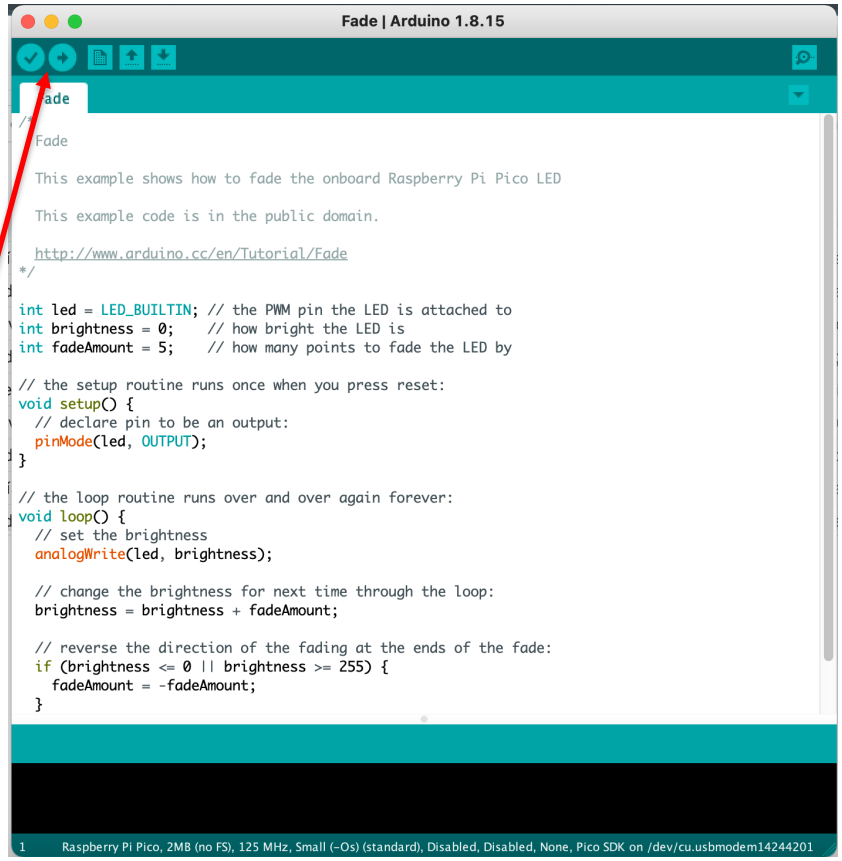
- Look at menu "File/Examples". Try out some sketches that use serial comms between PC and pico to become familiar with the programming environment, e.g. Dimmer and Temperature.



Session 1 Lab Tasks
Load Firmware

The first upload requires holding the BOOTSEL button before powering up the microcontroller (connecting to USB).

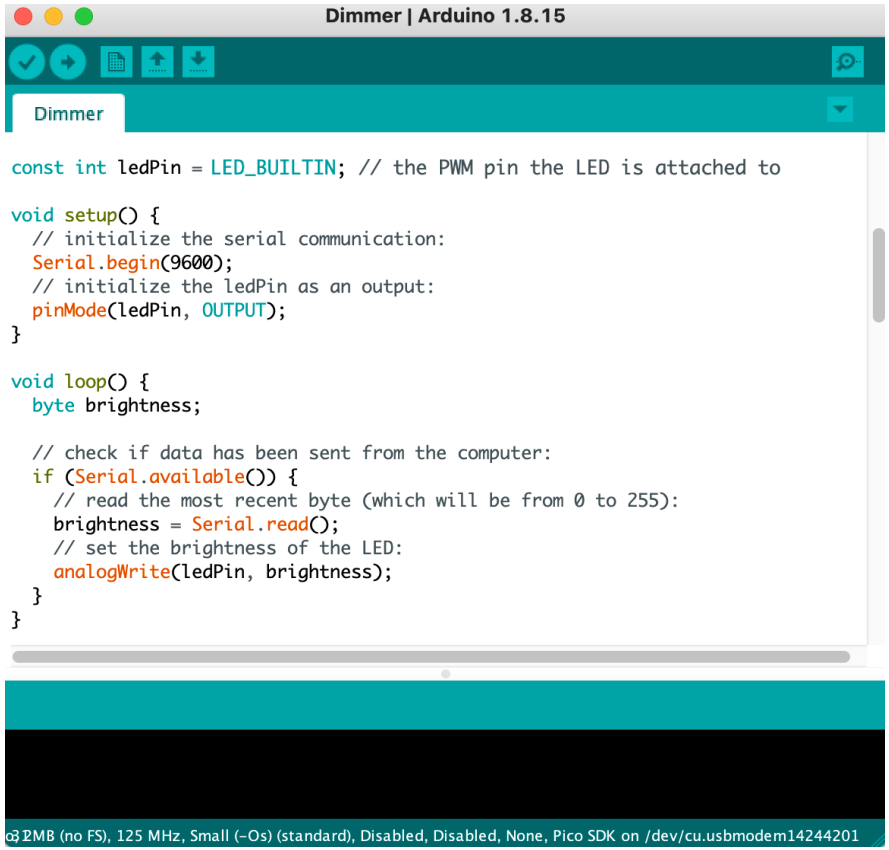
For the next times, just hit the upload button.



Week 1 Lab Tasks

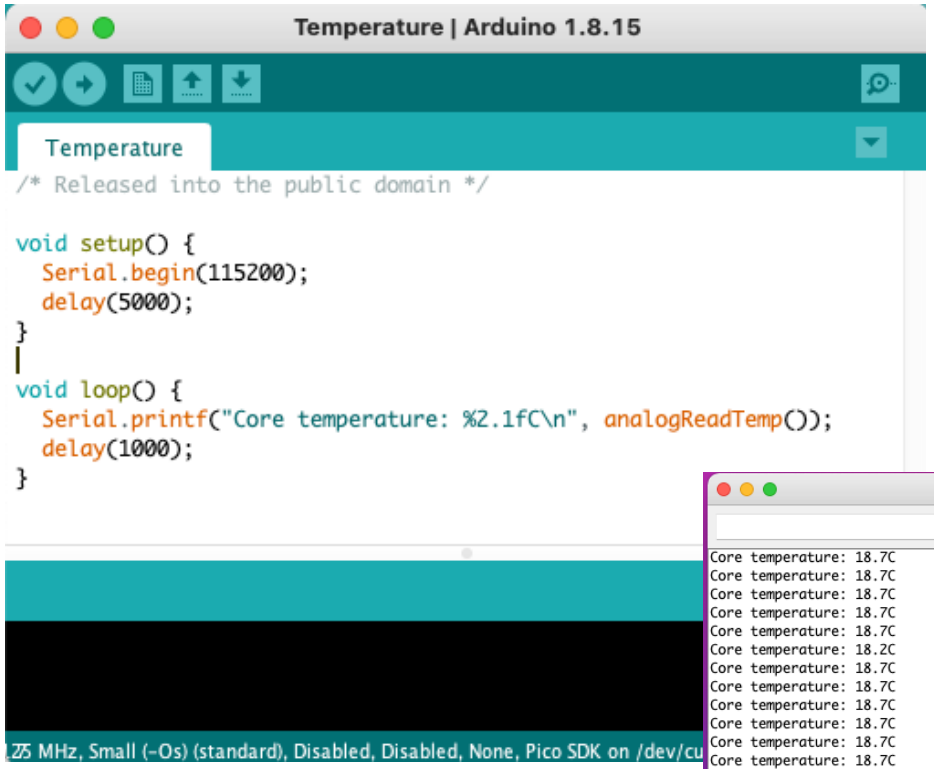
Serial USB Interface

- Look at some exemples that use serial communication between PC and pico, e.g. Dimmer and Temperature.

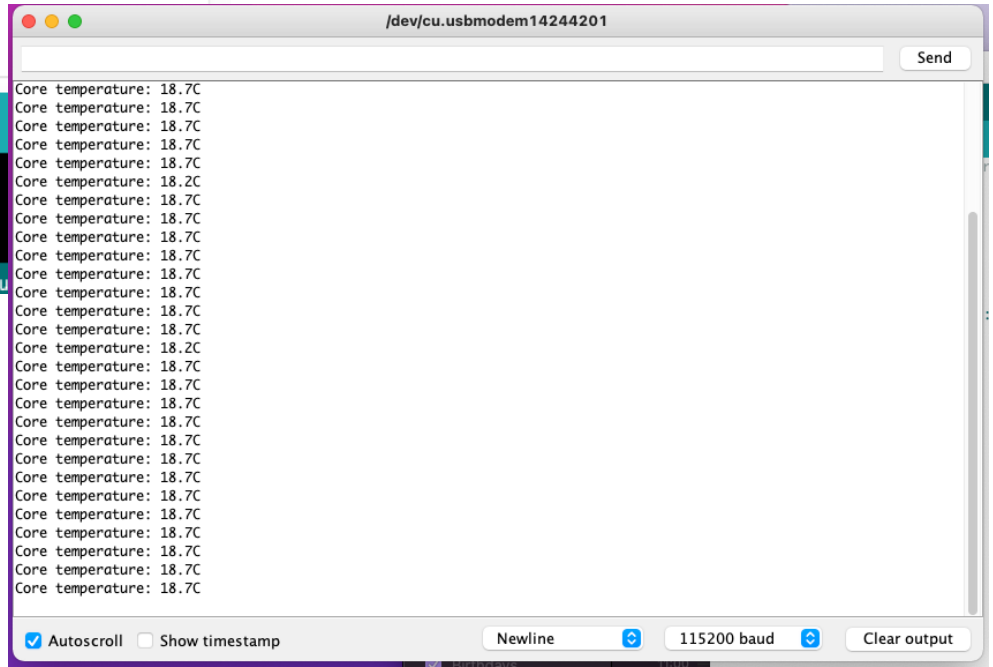


Session 1 Lab Tasks

Serial USB Interface



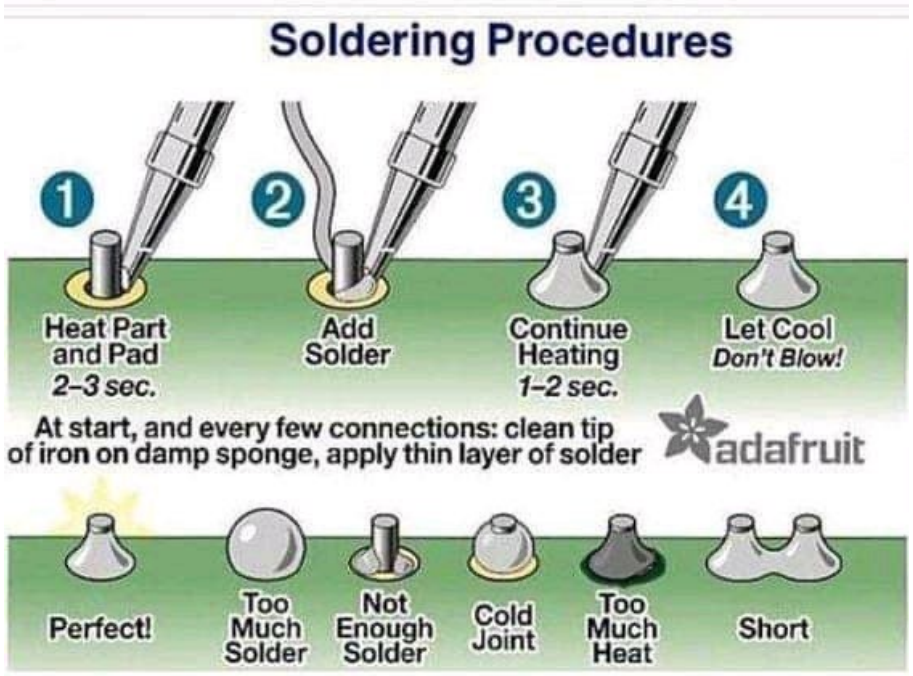
Tools / Serial Monitor

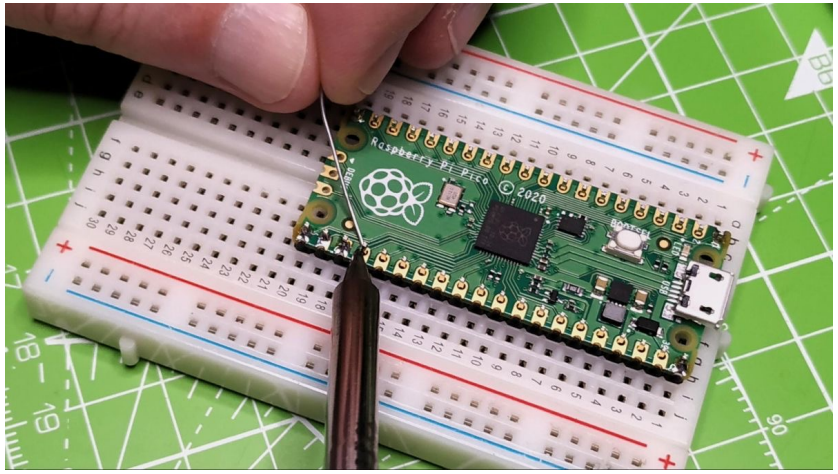


Session Lab Tasks

Prepare the Pico

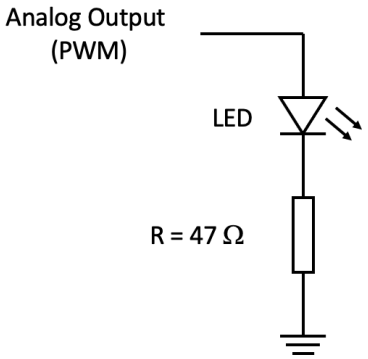
- Solder the header pins of rpi-pico and put it on the breadboard.

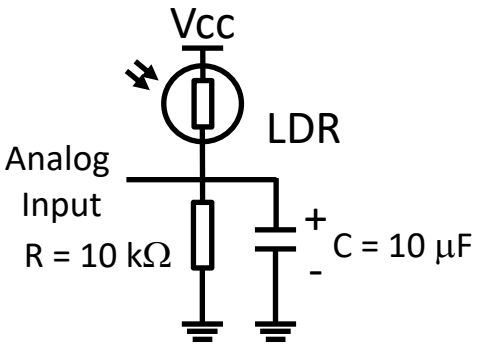


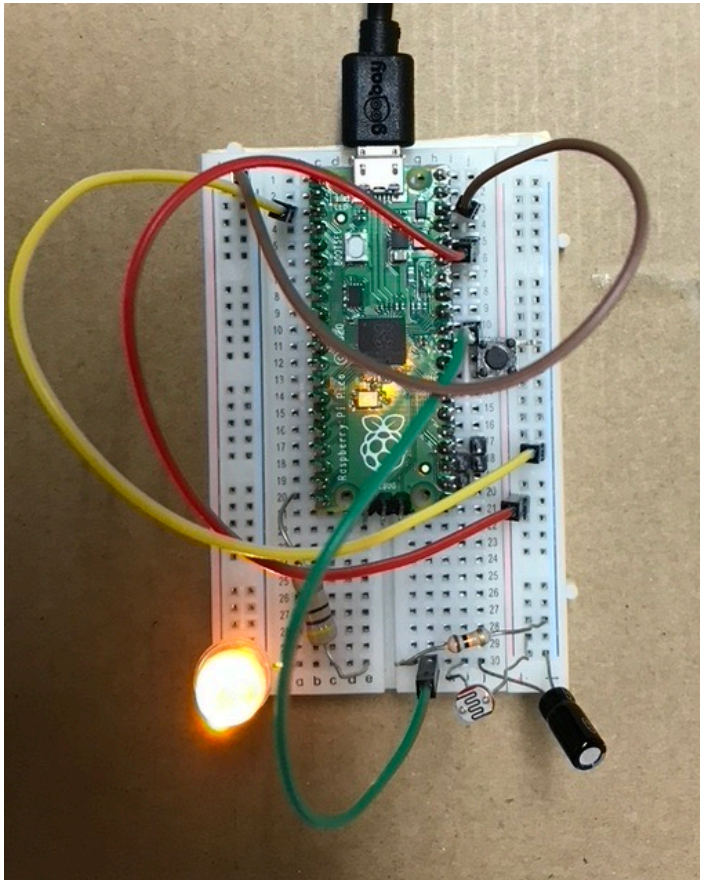


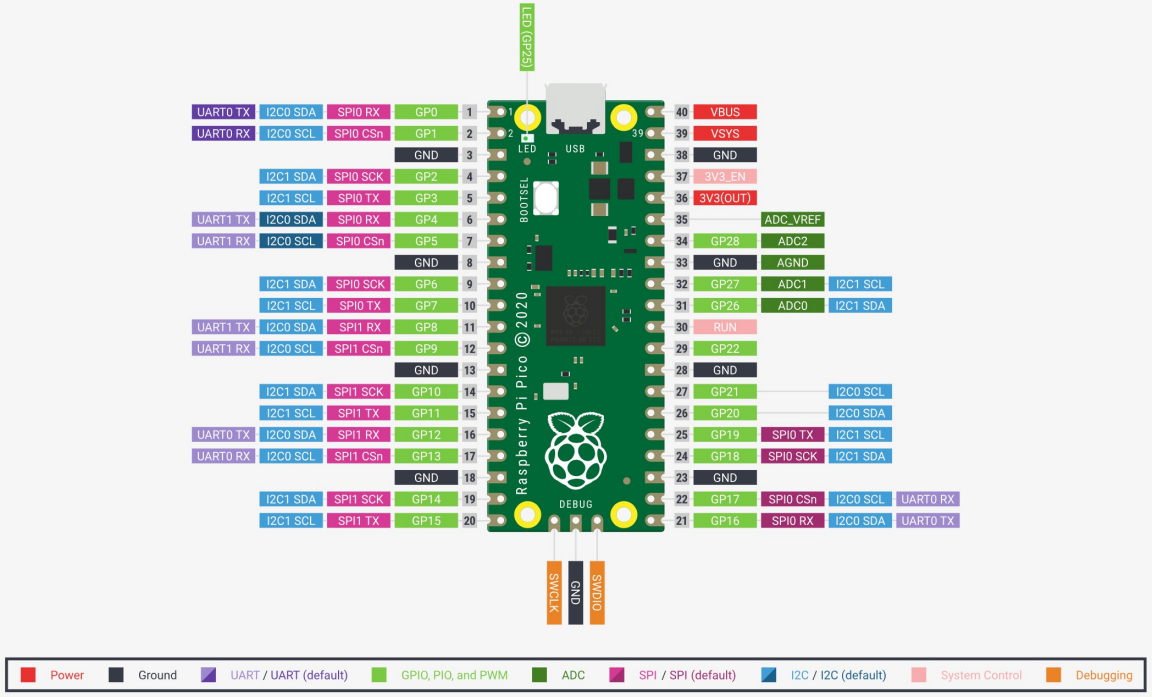
Session 1 Lab Tasks

Assemble the Breadboard Components







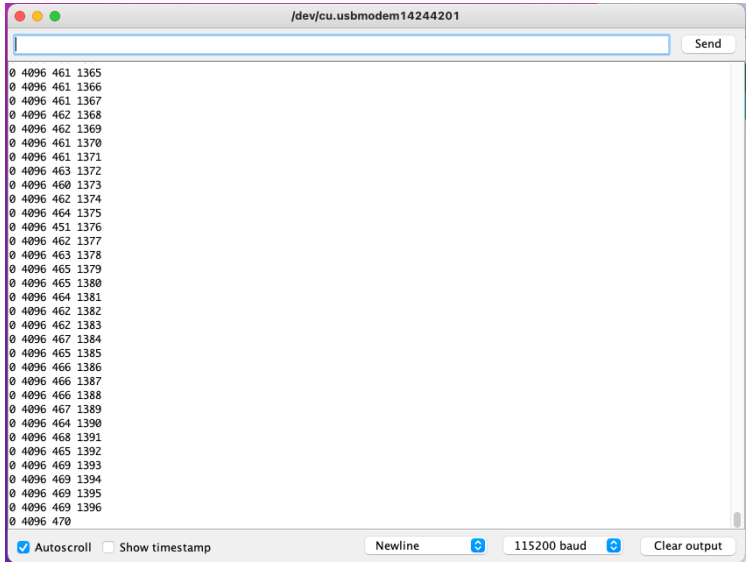


Session 1 Lab Tasks

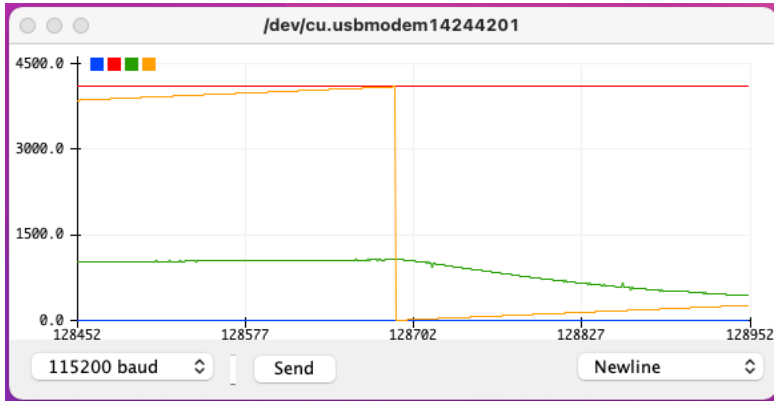
Basic IO

```
const int LED_PIN = 15;
const int DAC_RANGE = 4096;
int counter = 0;
void setup() {// the setup function runs once
  Serial.begin(115200);
  analogReadResolution(12);    //default is 10
  analogWriteFreq(60000);      //60KHz, about max
  analogWriteRange(DAC_RANGE); //100% duty cycle
}
void loop() {// the loop function runs cyclically
  int read_adc;
  analogWrite(LED_PIN, counter); // set led PWM
  delay(1);                      //delay 1ms
  read_adc = analogRead(A0); // read analog voltage
  counter = counter + 1;
  if (counter > DAC_RANGE) // if counter saturates
    counter = 0;                        // reset counter
  //format that Serial Plotter likes
  Serial.print(0); Serial.print(" ");
  Serial.print(DAC_RANGE); Serial.print(" ");
  Serial.print(read_adc); Serial.print(" ");
  Serial.print(counter); Serial.println();
}
```

Serial Monitor



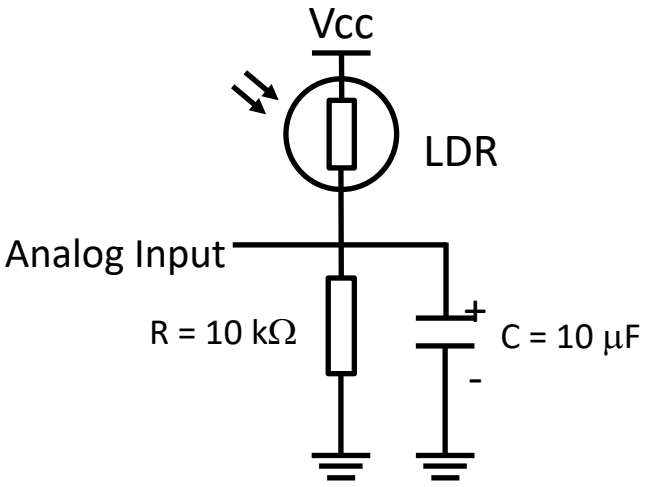
Serial Plotter



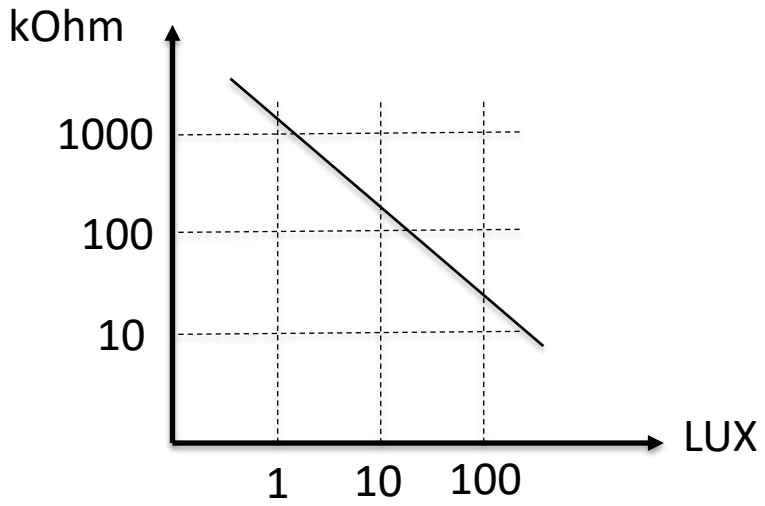
Session 1 Lab Tasks

Luxmeter Function

Implementation of a function that converts the voltage read at the analog input port to LUX.



The photo resistance of
the provided LDR at 10lux is
150kOhm ~ 300kOhm



R-LUX characteristic curve is linear in log-log scale:

$$log10(LDR) = m\ log10(LUX) + b$$

From datasheet: m = -0.8 (plus or minus 0.1)

Use the formulas of the voltage divider and the LDR characteristic to obtain a formula to convert the values read at the analog input to LUX.