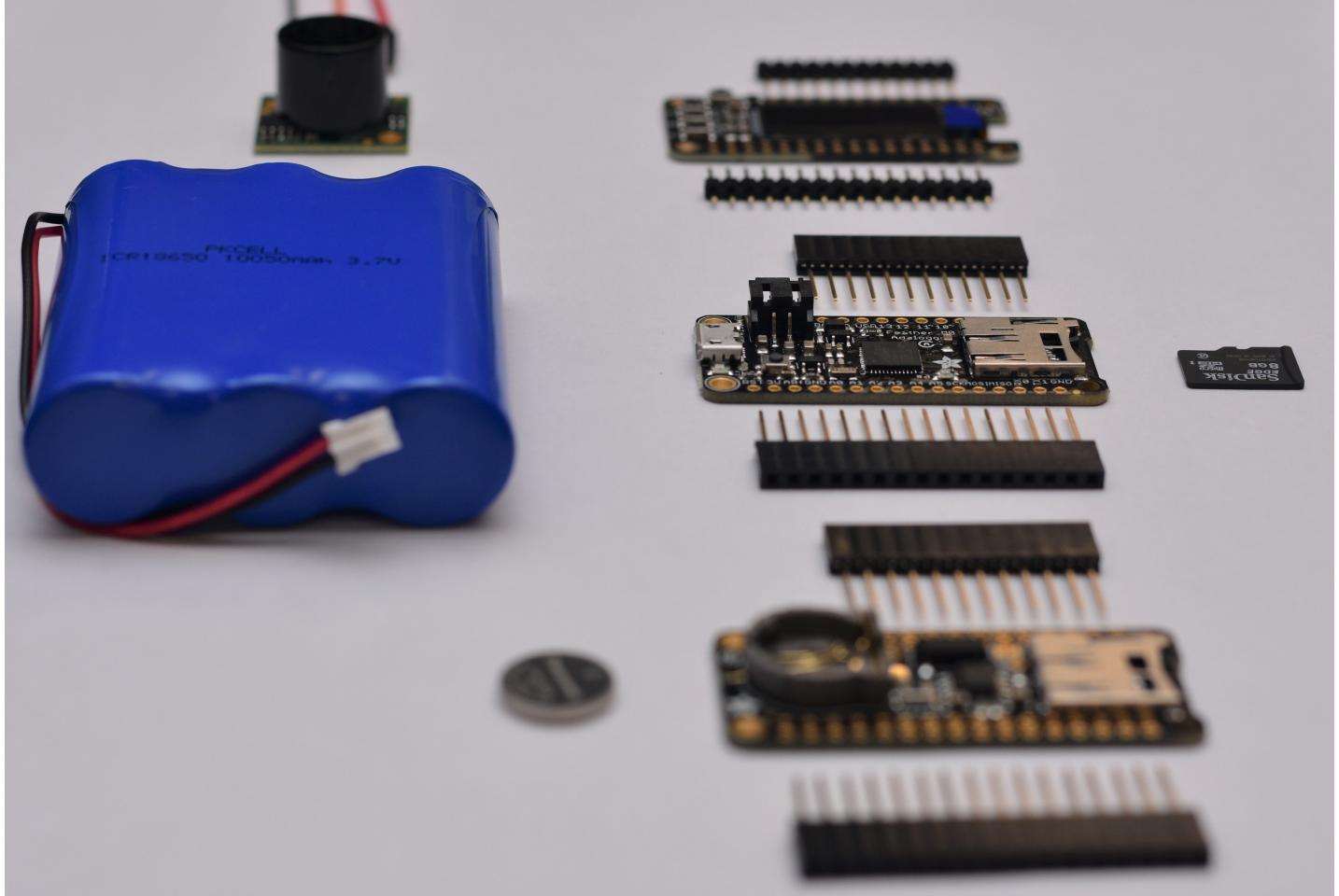
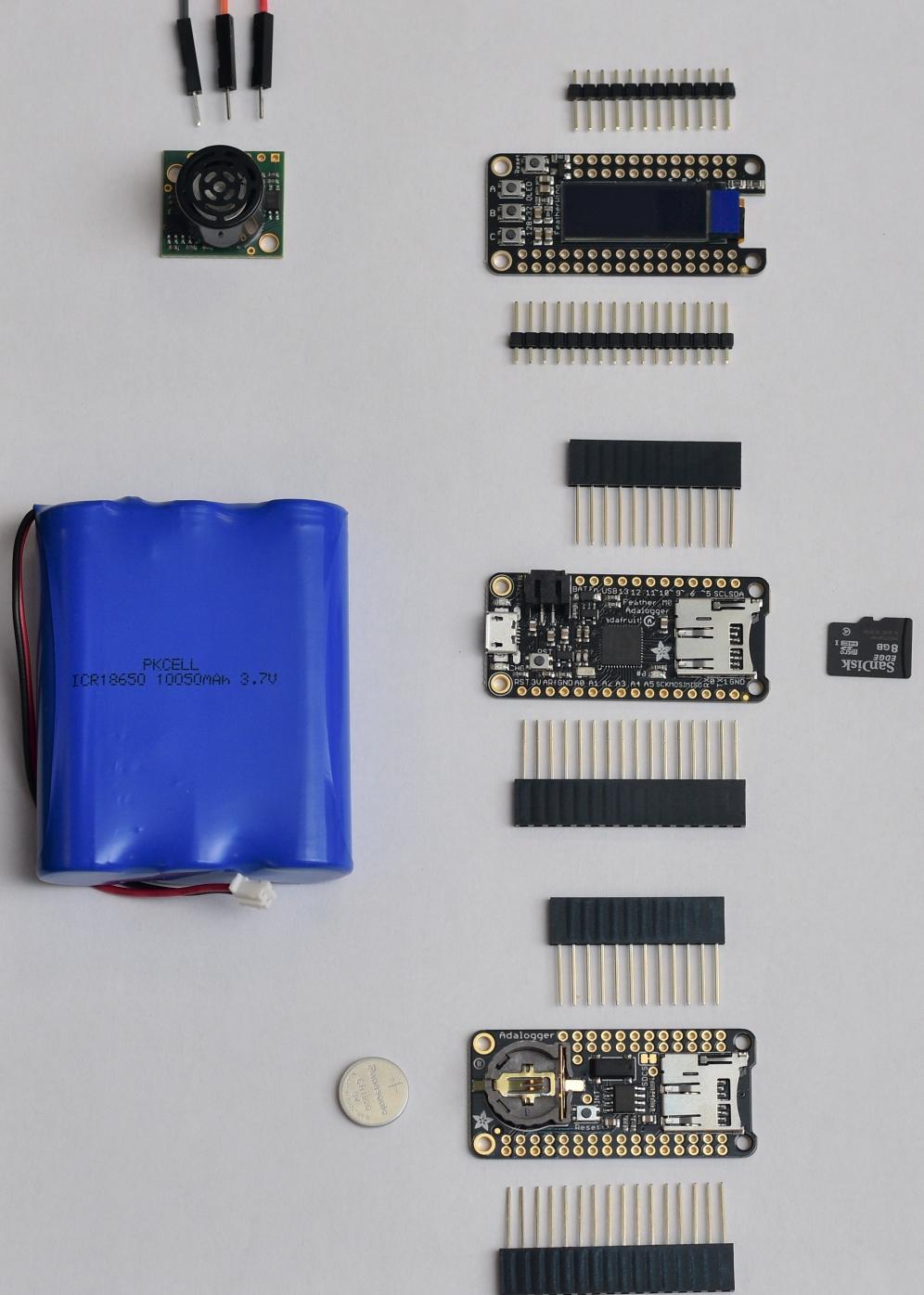


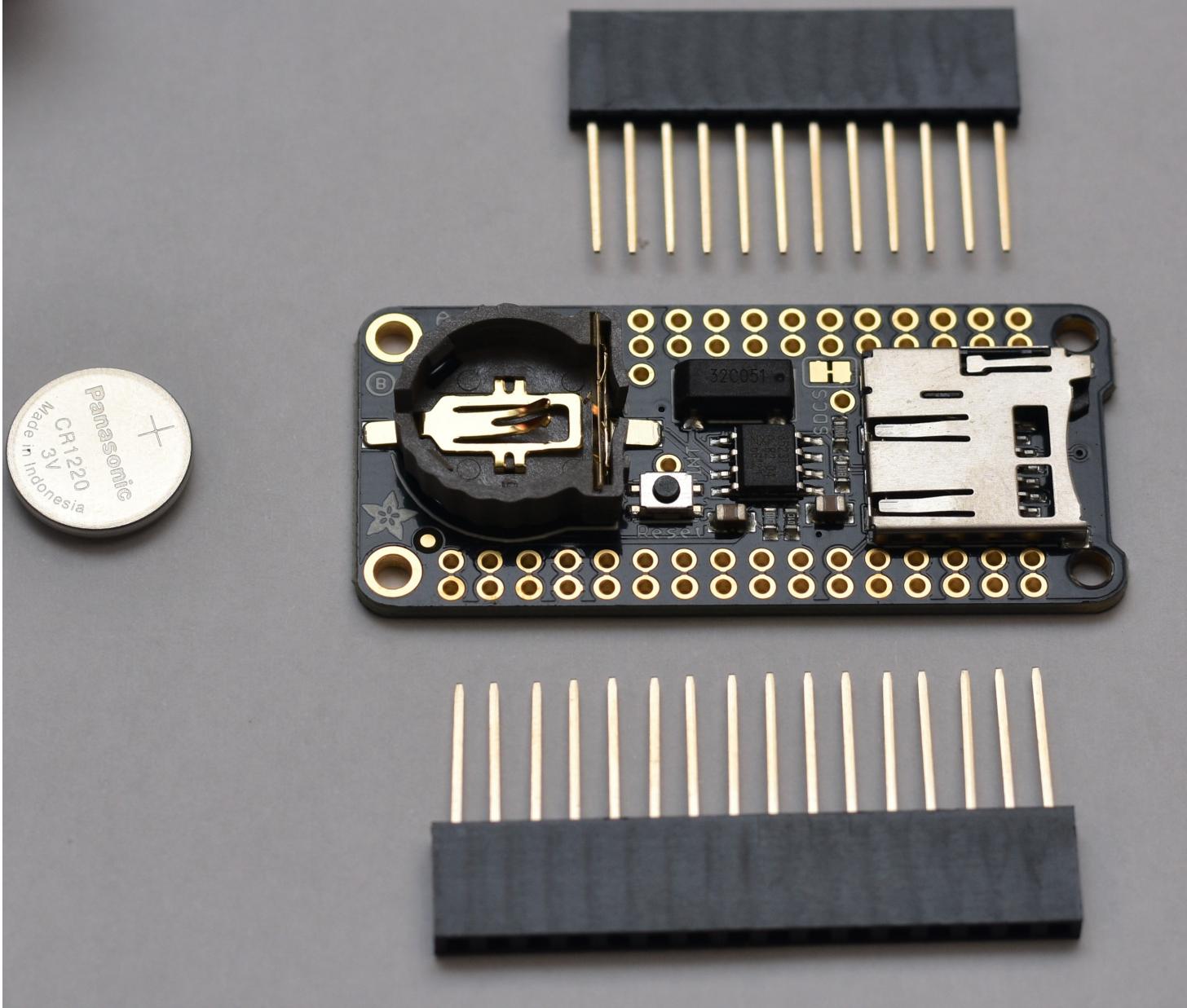
DIY TIDE SENSOR



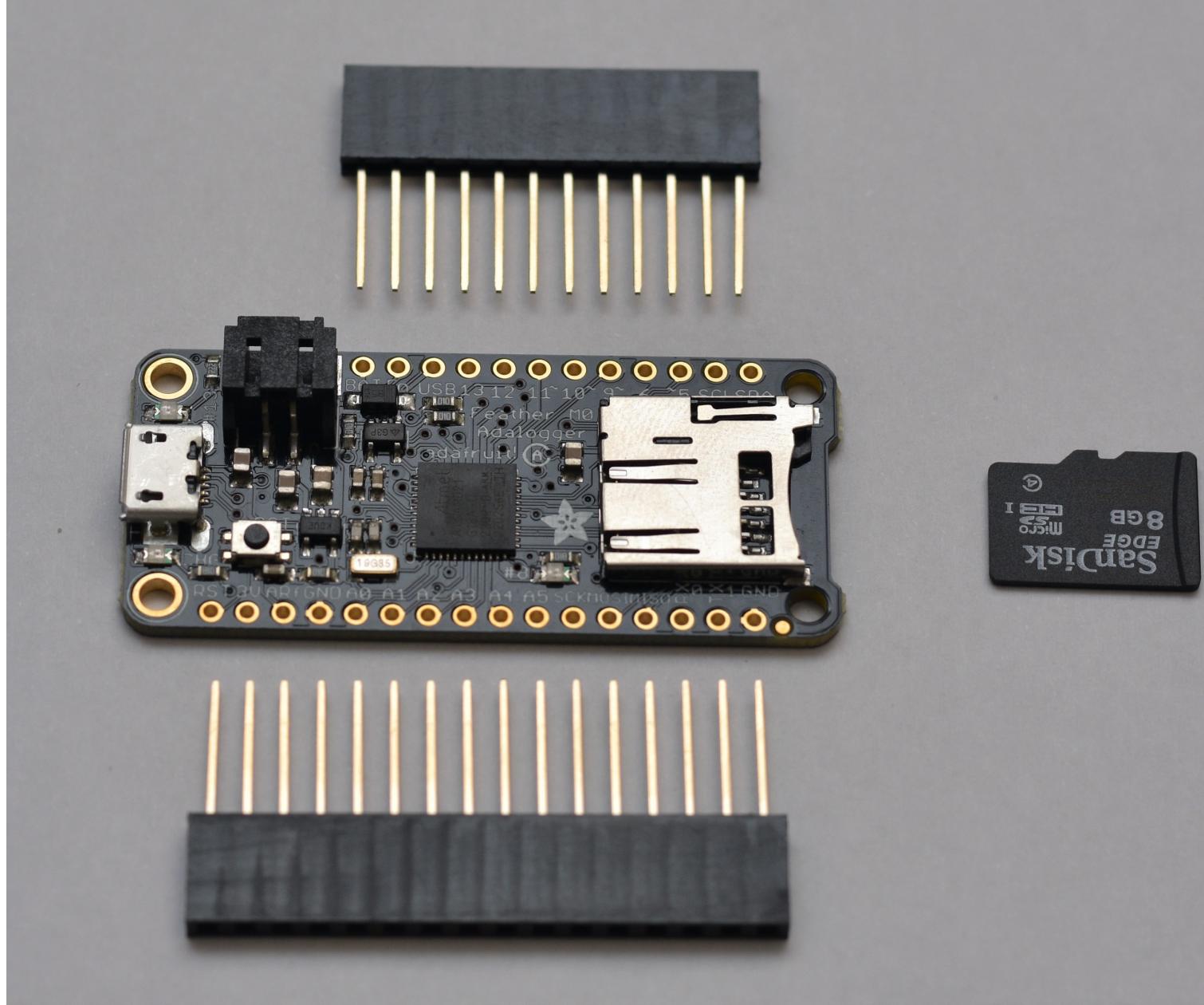


Parts List

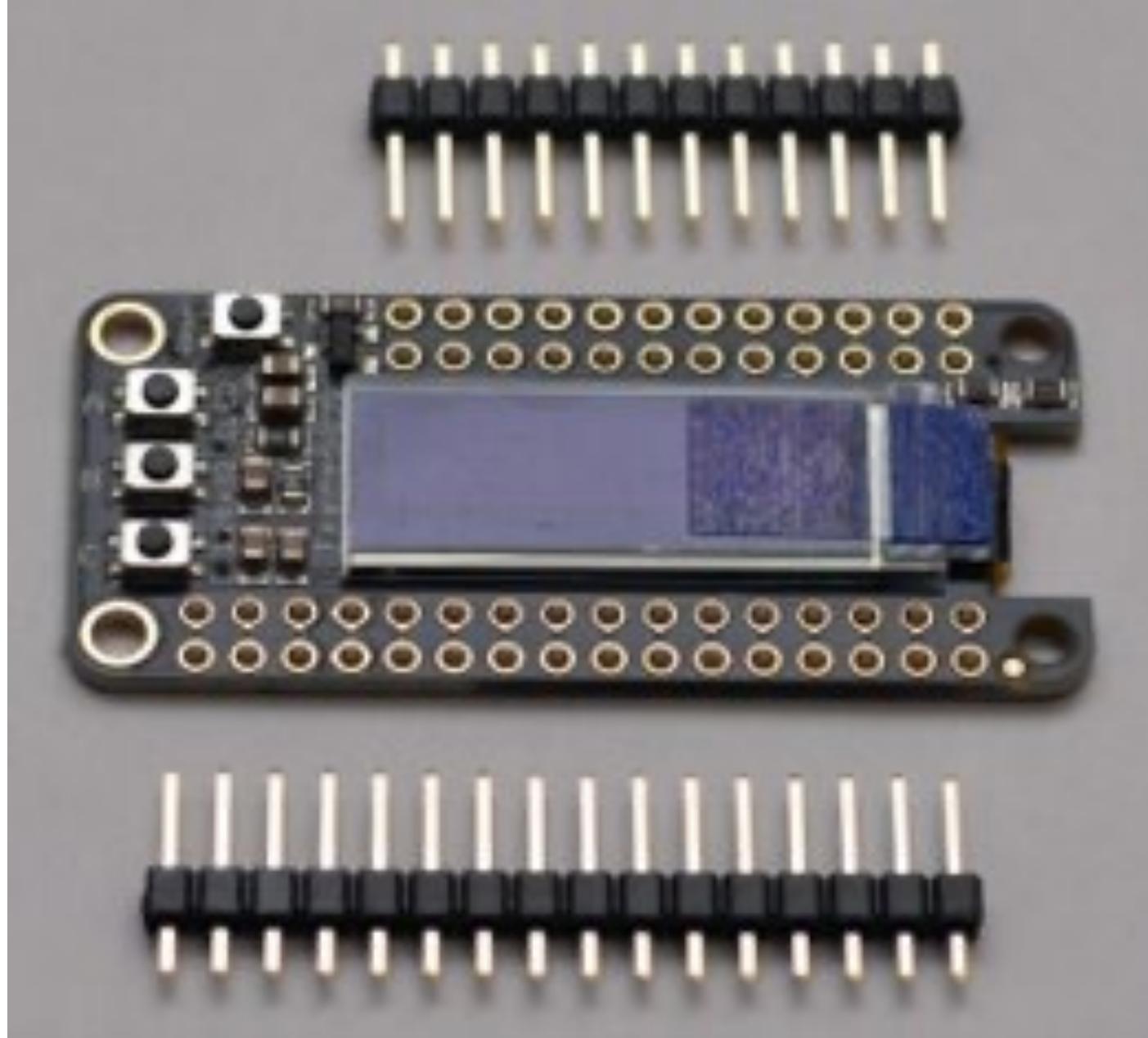
- Adafruit Feather M0 Adalogger
- Adalogger FeatherWing - RTC + SD Add-on
- Maxbotix Ultrasonic Rangefinder LV-EZ4
- Adafruit FeatherWing OLED 128x32
- MicroSD Memory Card
- 2 header strips
- 4 stacking headers
- 3 Solid-Core Wires, 22 AWG
- CR1220 battery
- 10050mAh 3.7 volt lithium battery



Adalogger FeatherWing - RTC + SD Add-on, CR1220 battery and stacking headers



Adafruit Feather M0 Adalogger, SD card and stacking headers

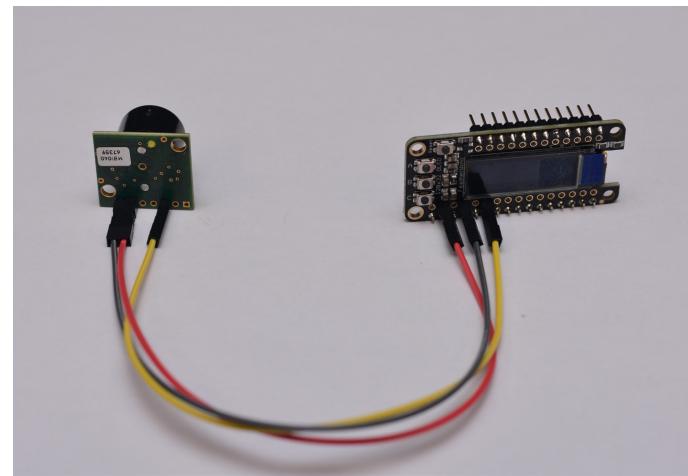
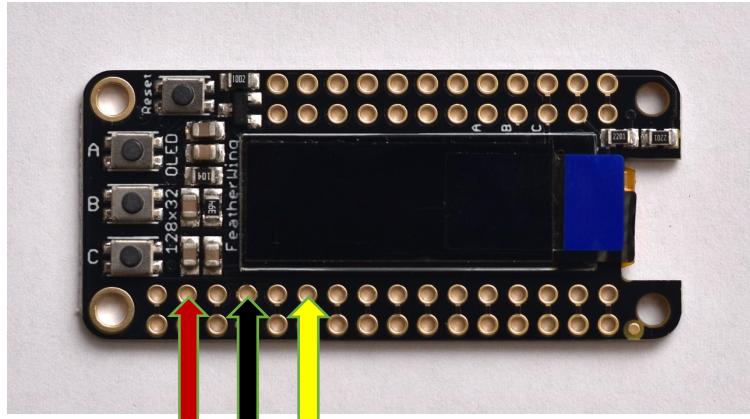
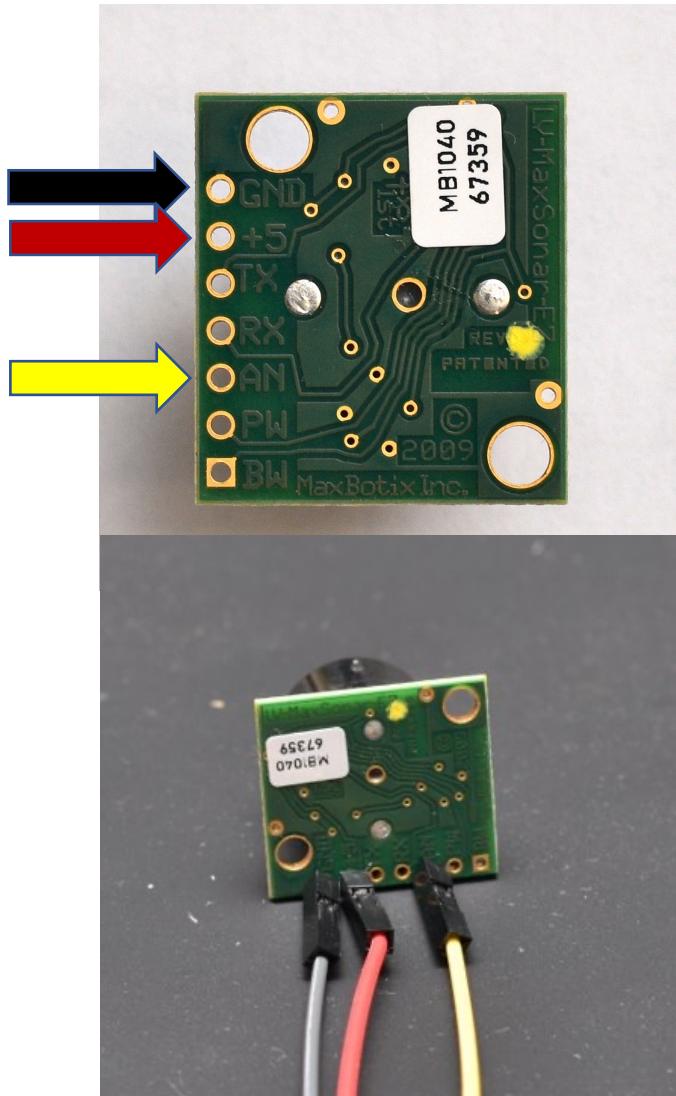


Adafruit FeatherWing OLED 128x32 with headers

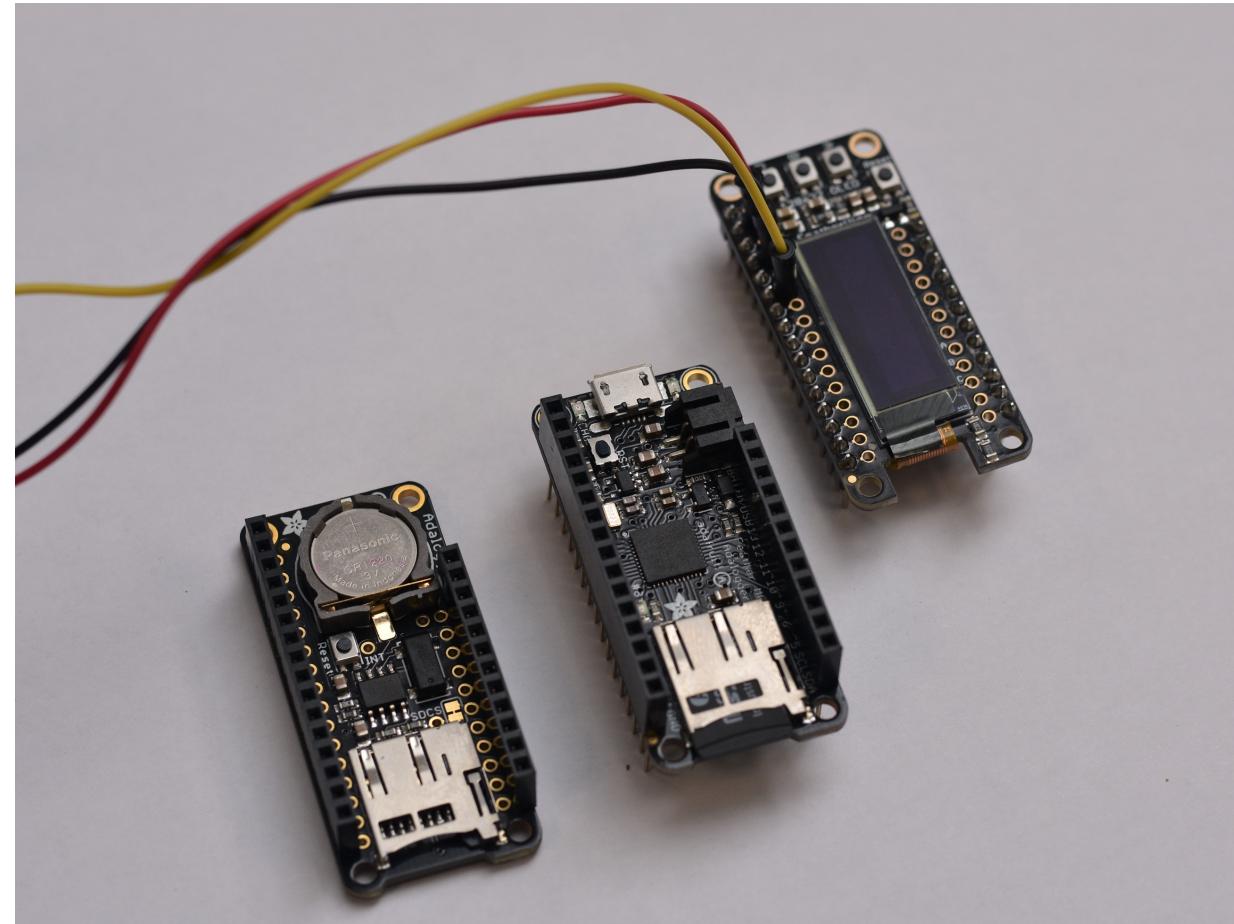
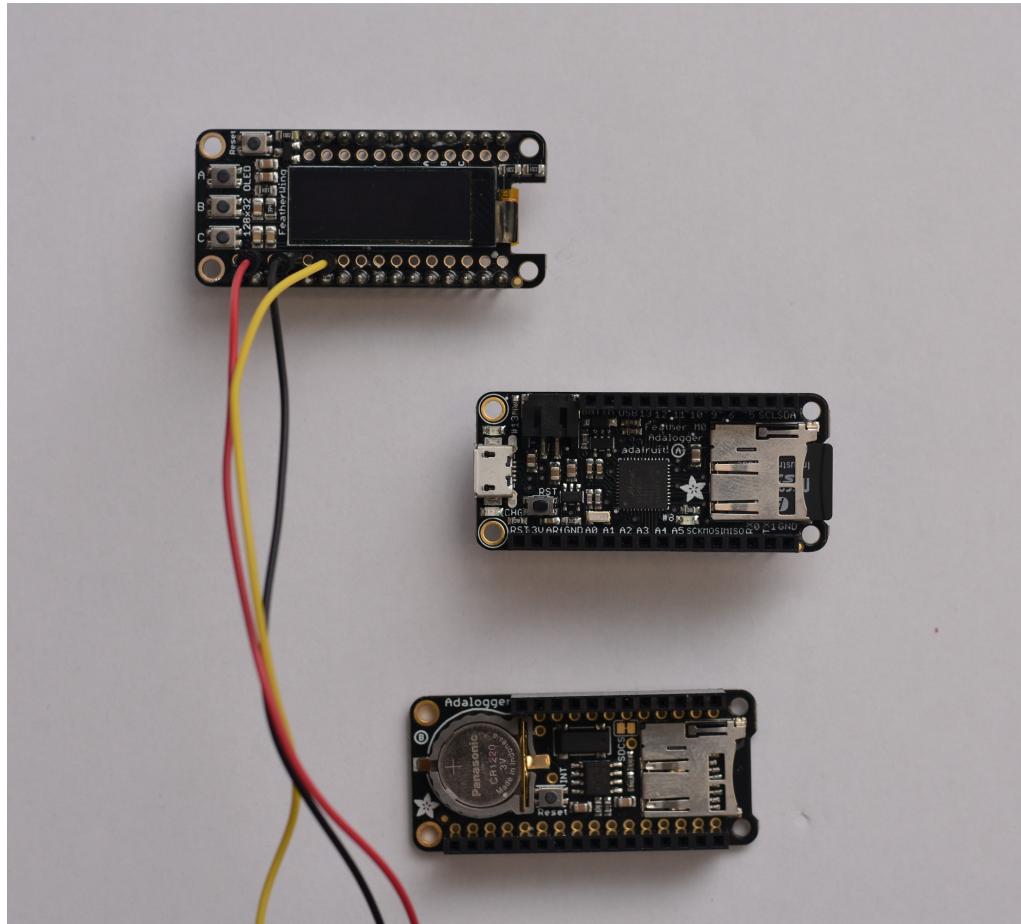


Maxbotix Ultrasonic Rangefinder LV-EZ4 and wires

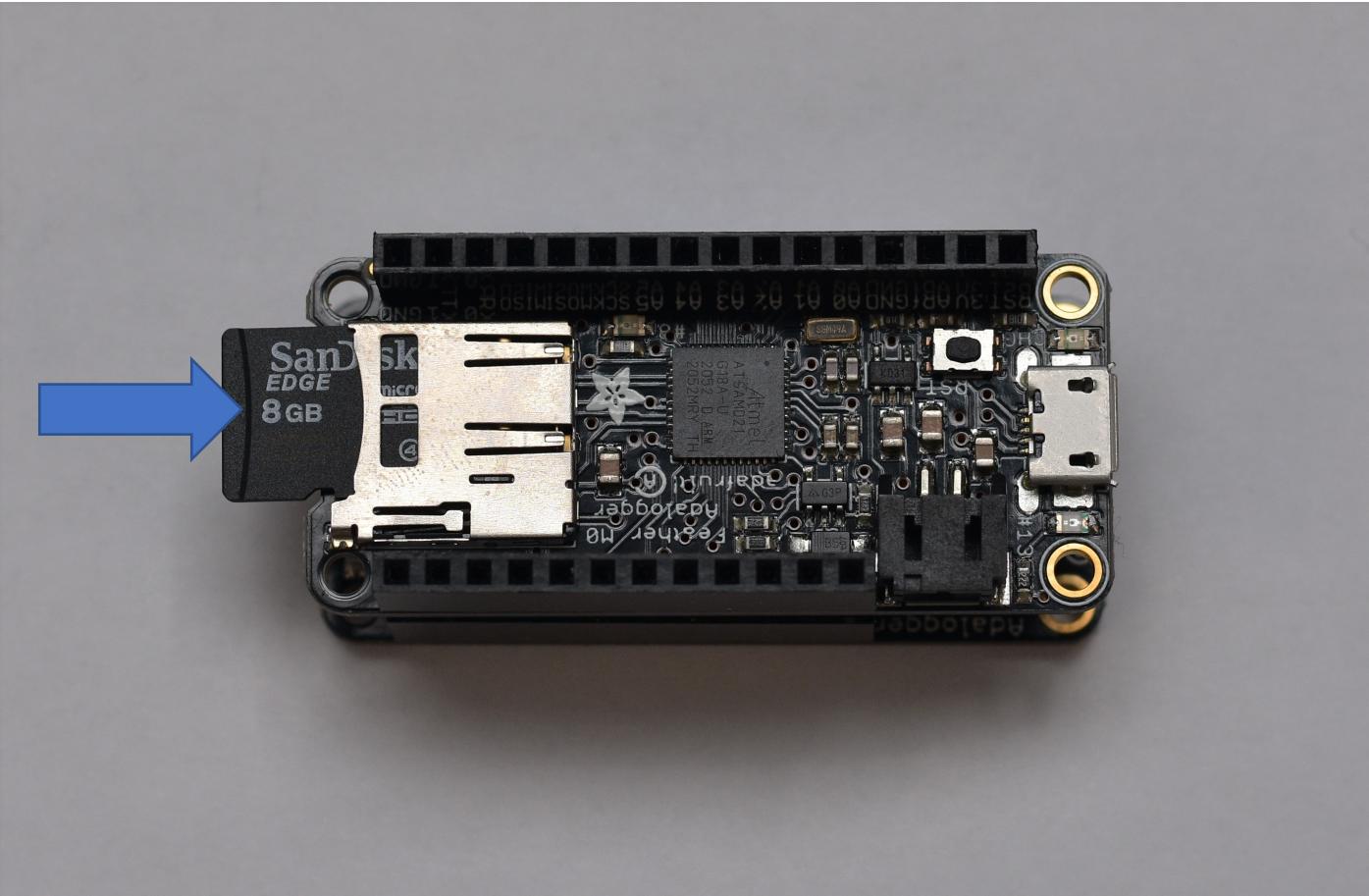
Connecting the sensor wiring



Assembled components

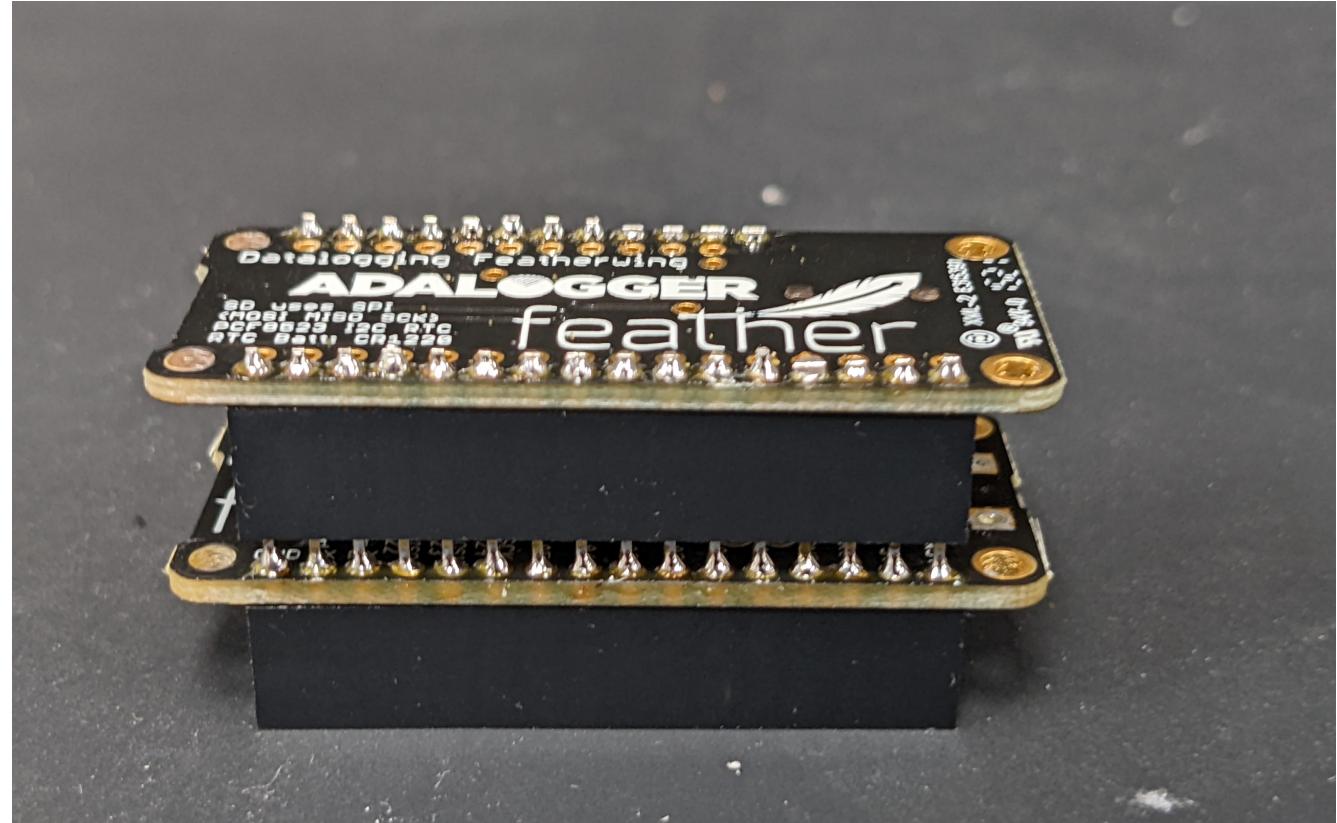
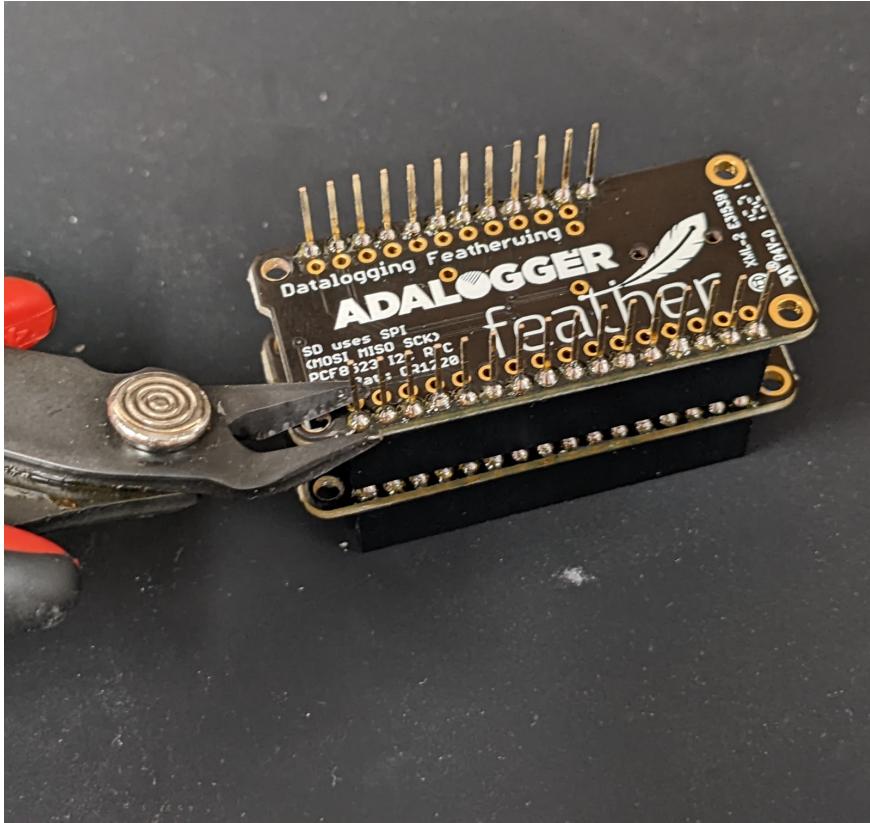


Install SD card

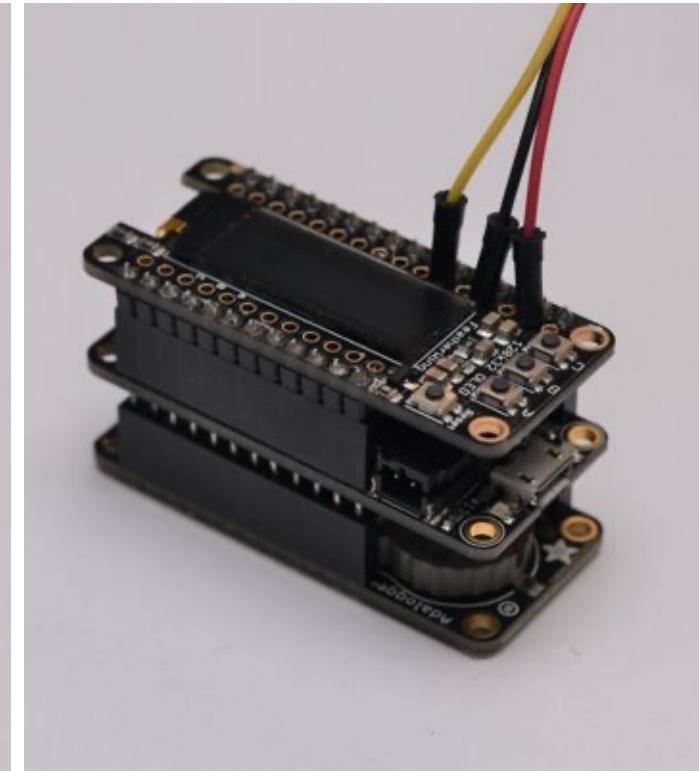


Clip bottom pins

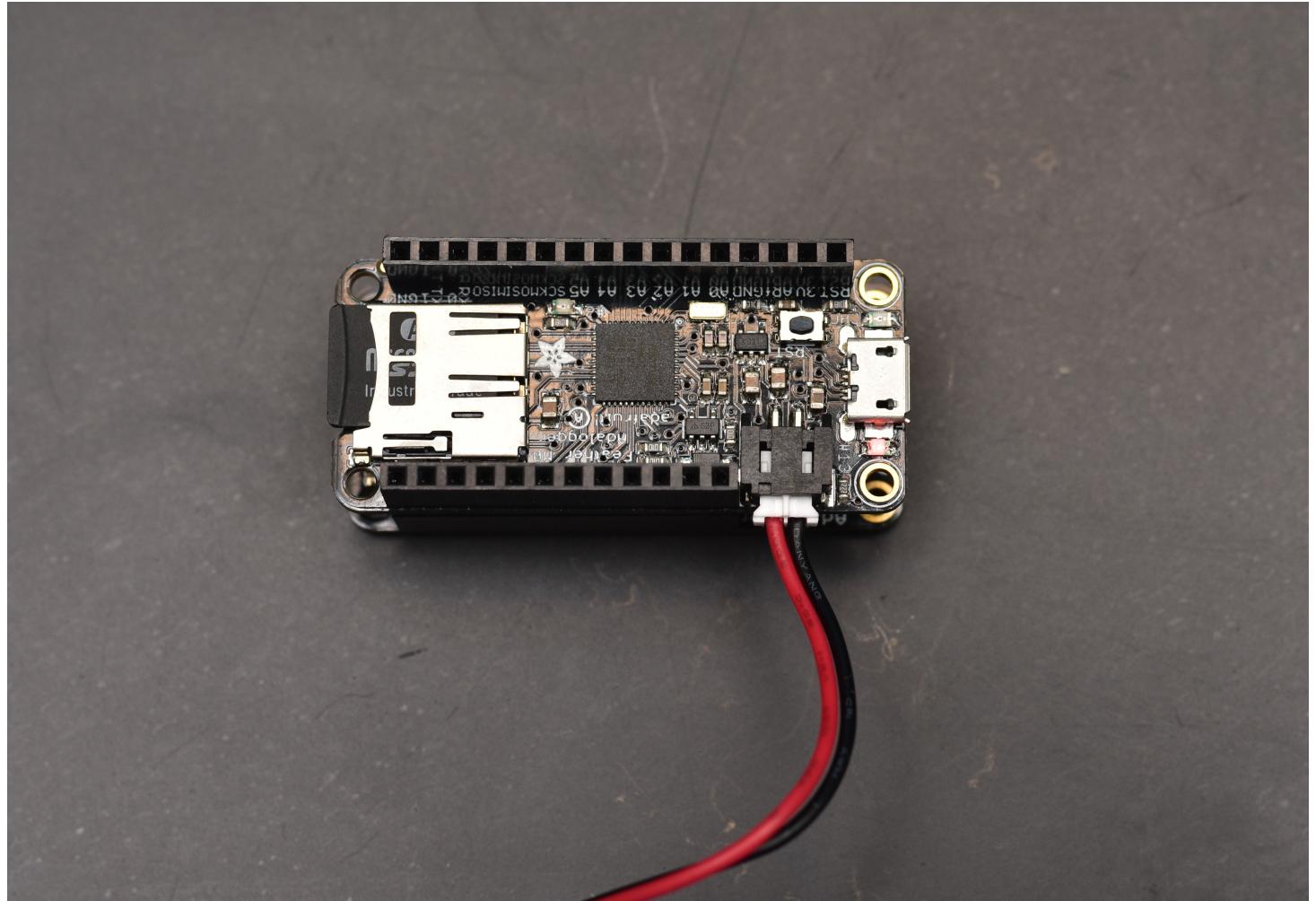
- This step is optional, but it makes the hardware easier to insert into the housing.



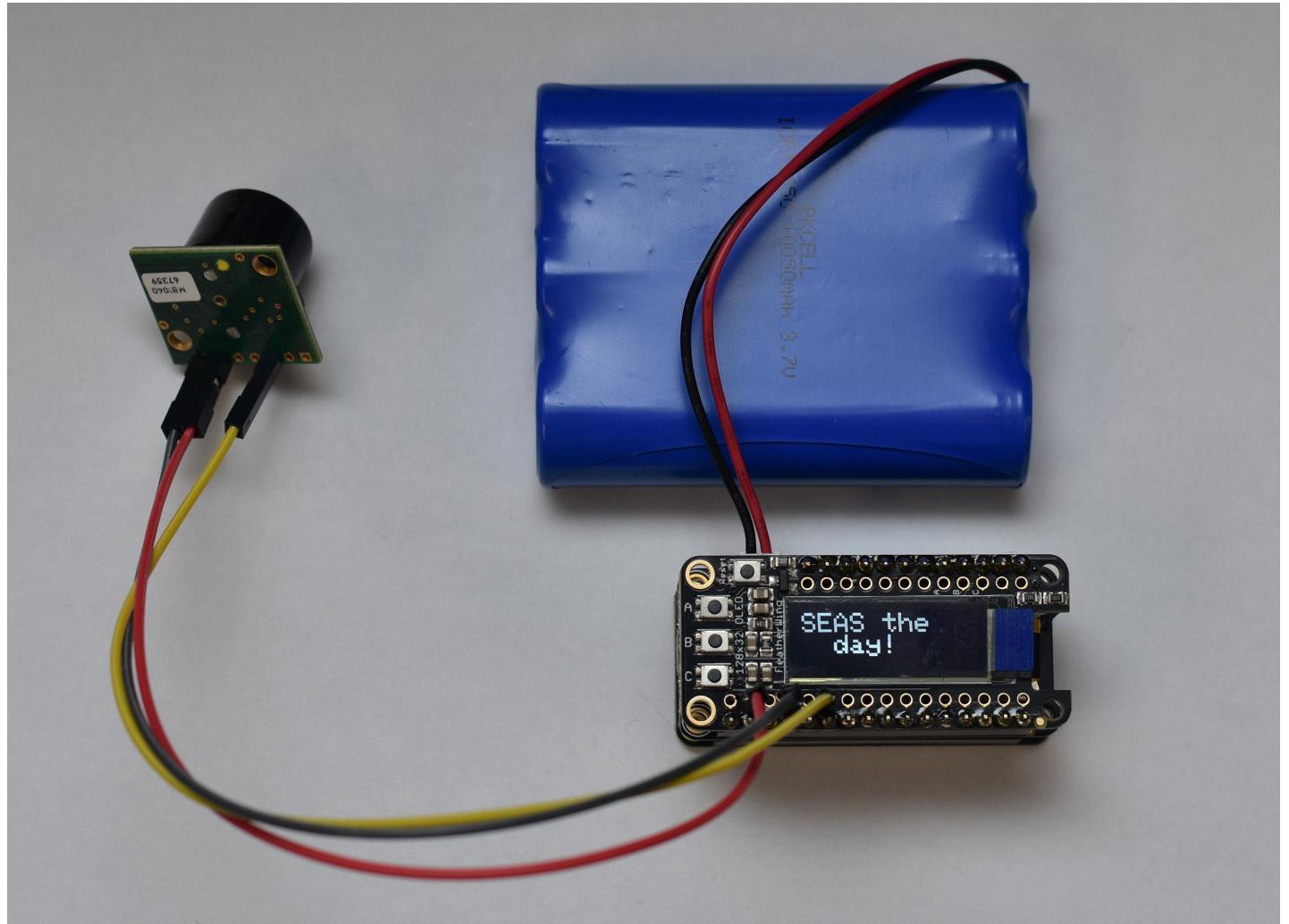
Stack finished components



Location of
battery port

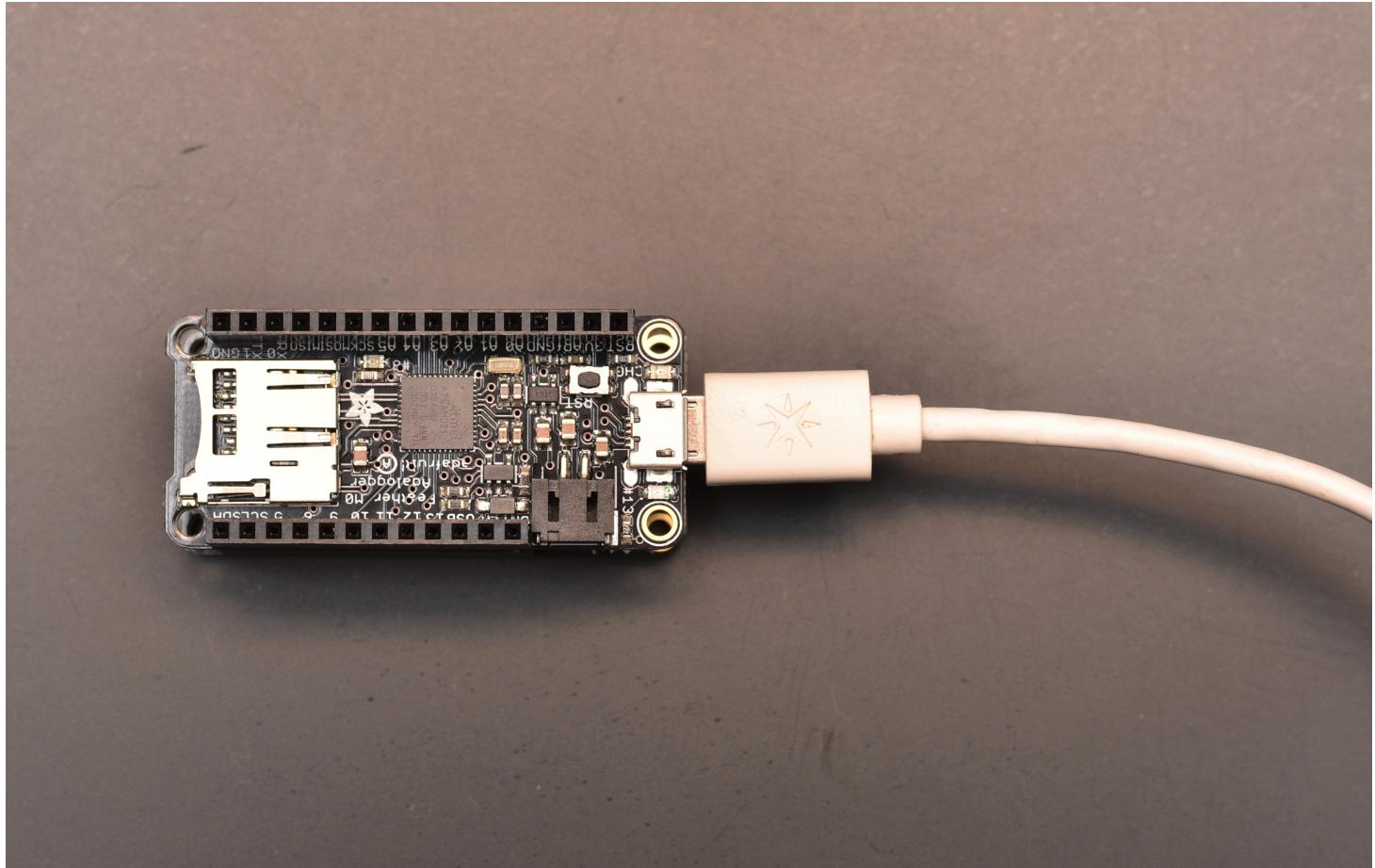


Complete
sensor



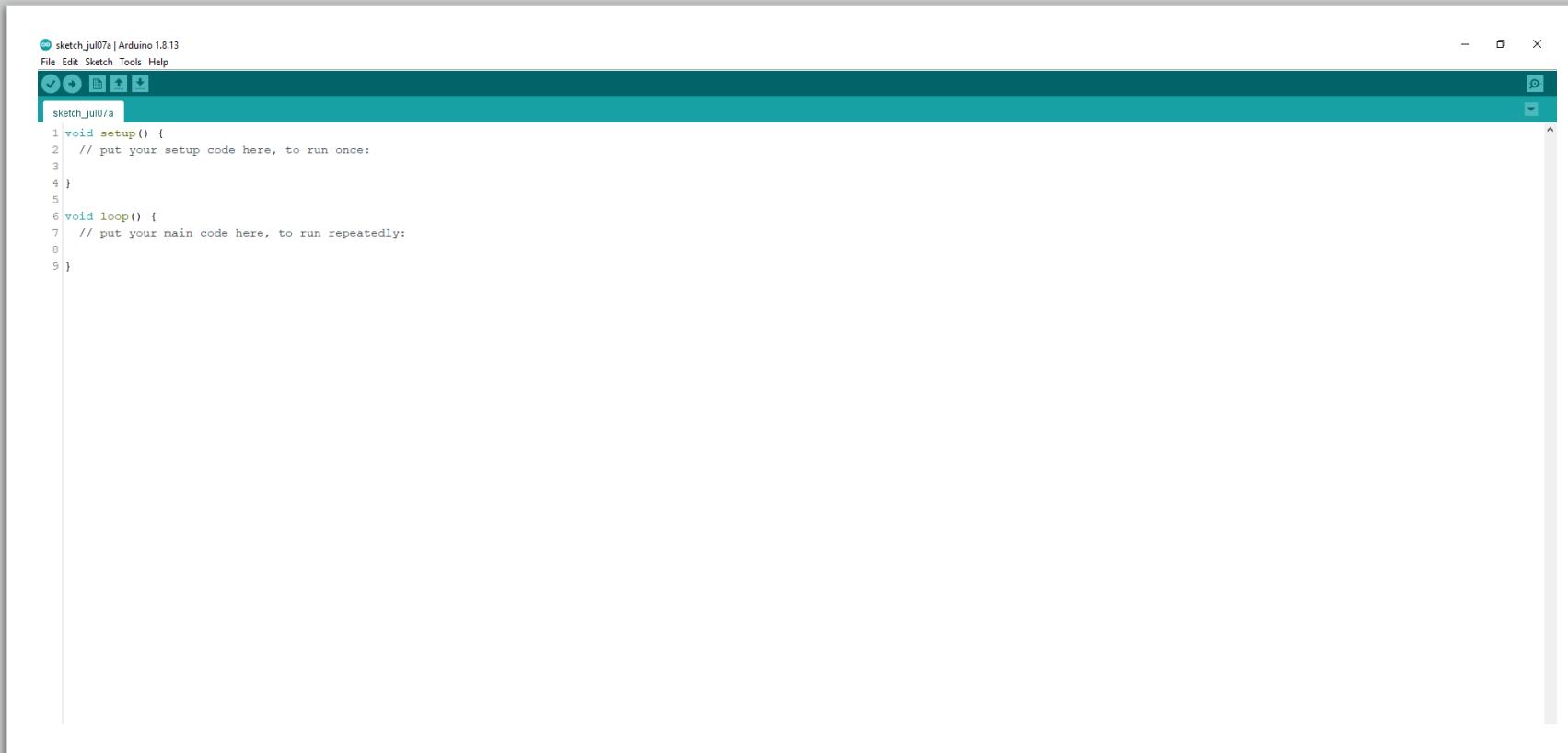
Location of USB port

- Connect USB cable to PC to upload code.



Arduino IDE

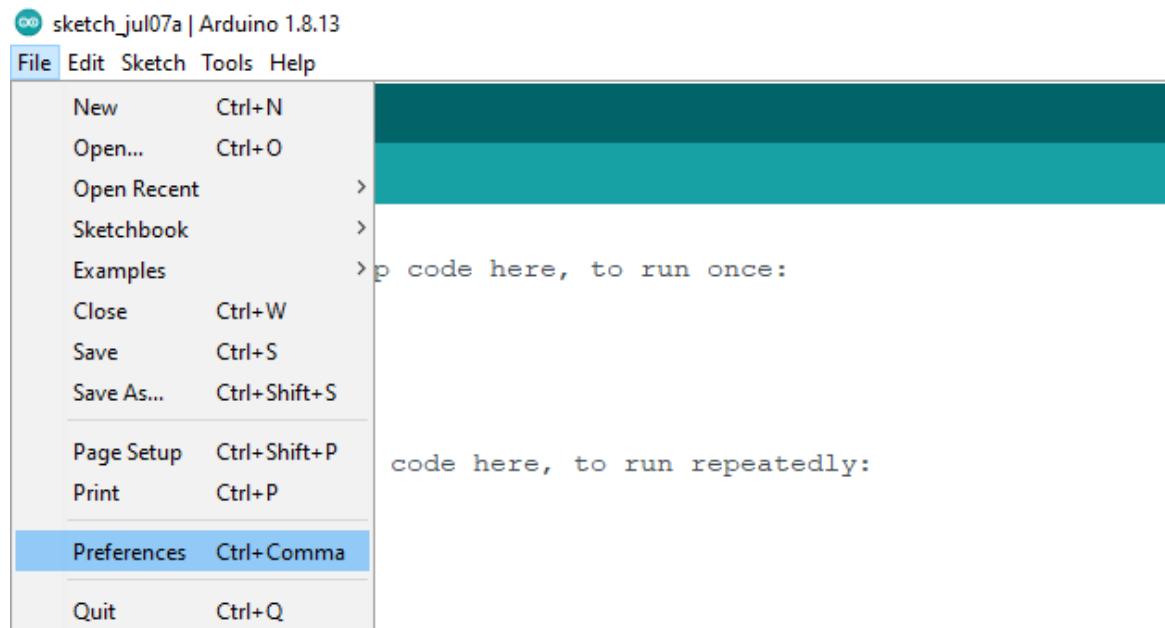




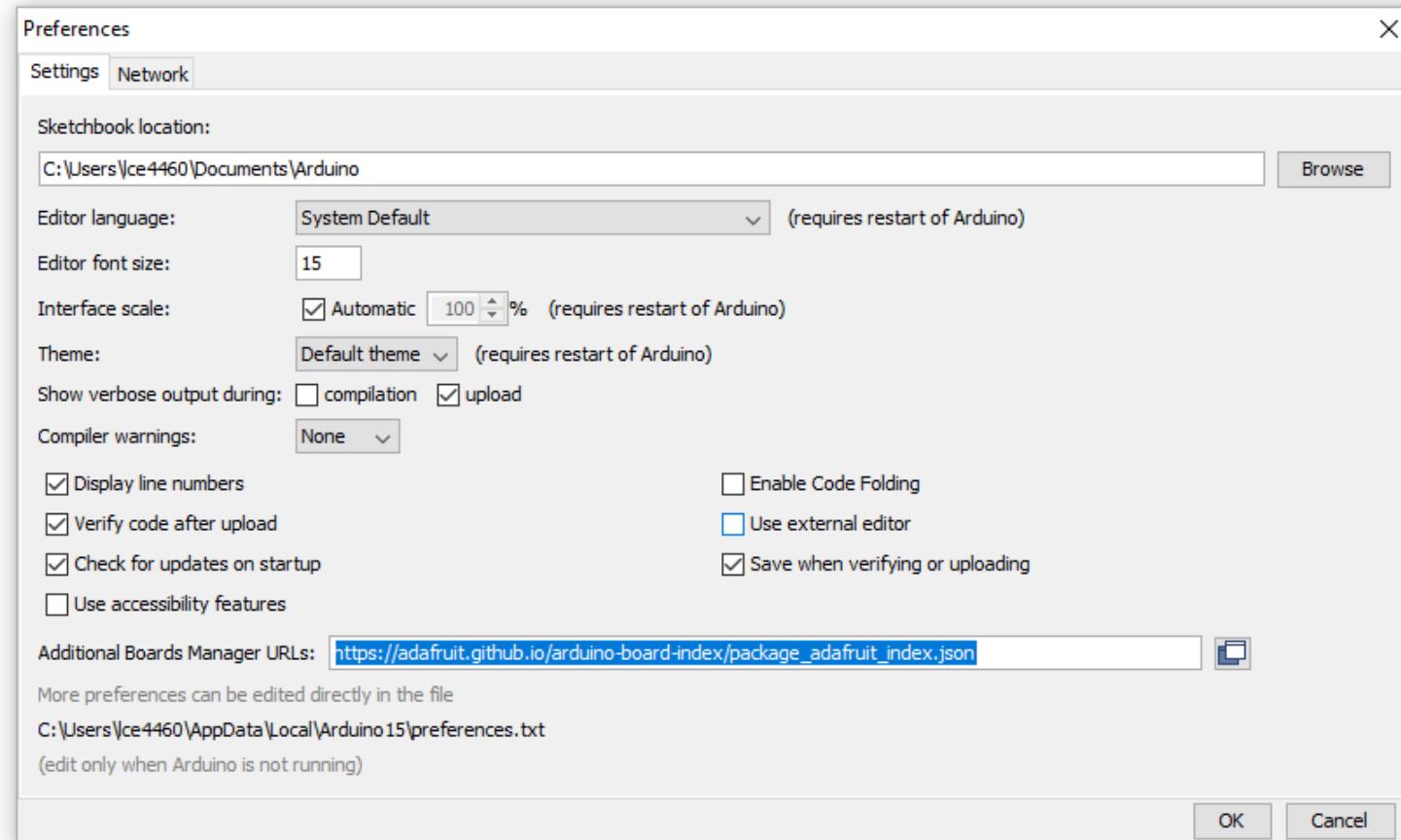
IDE interface

Where the coding happens

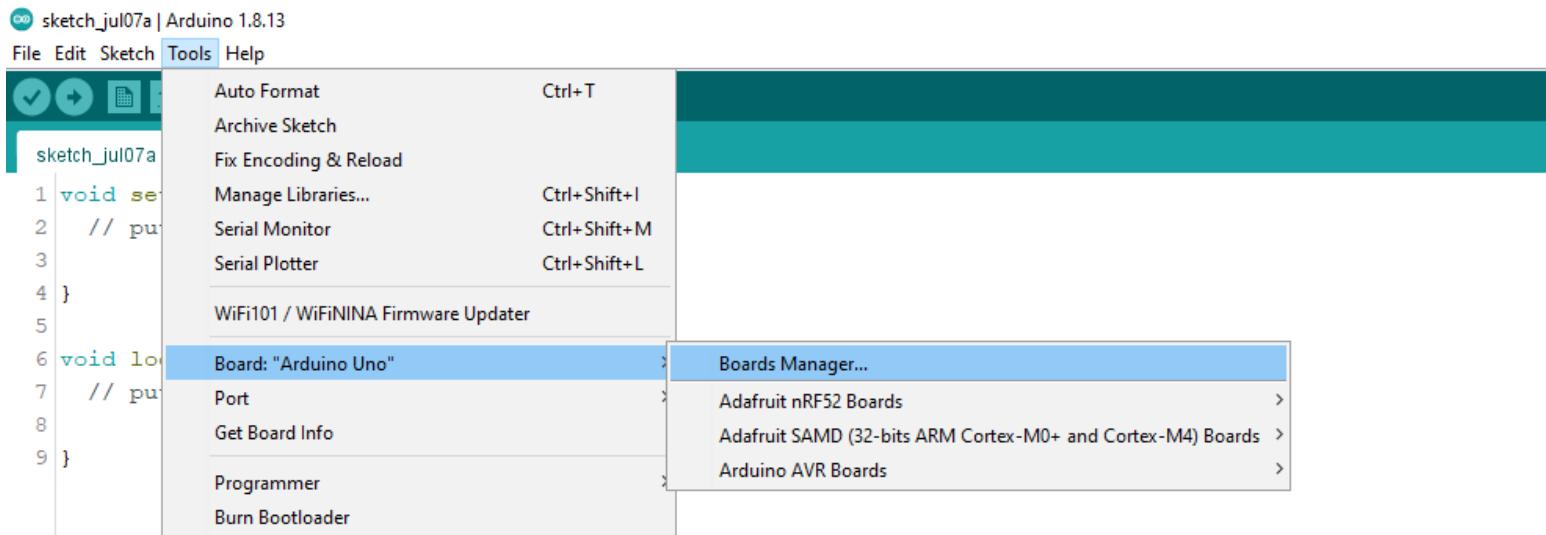
Open preferences



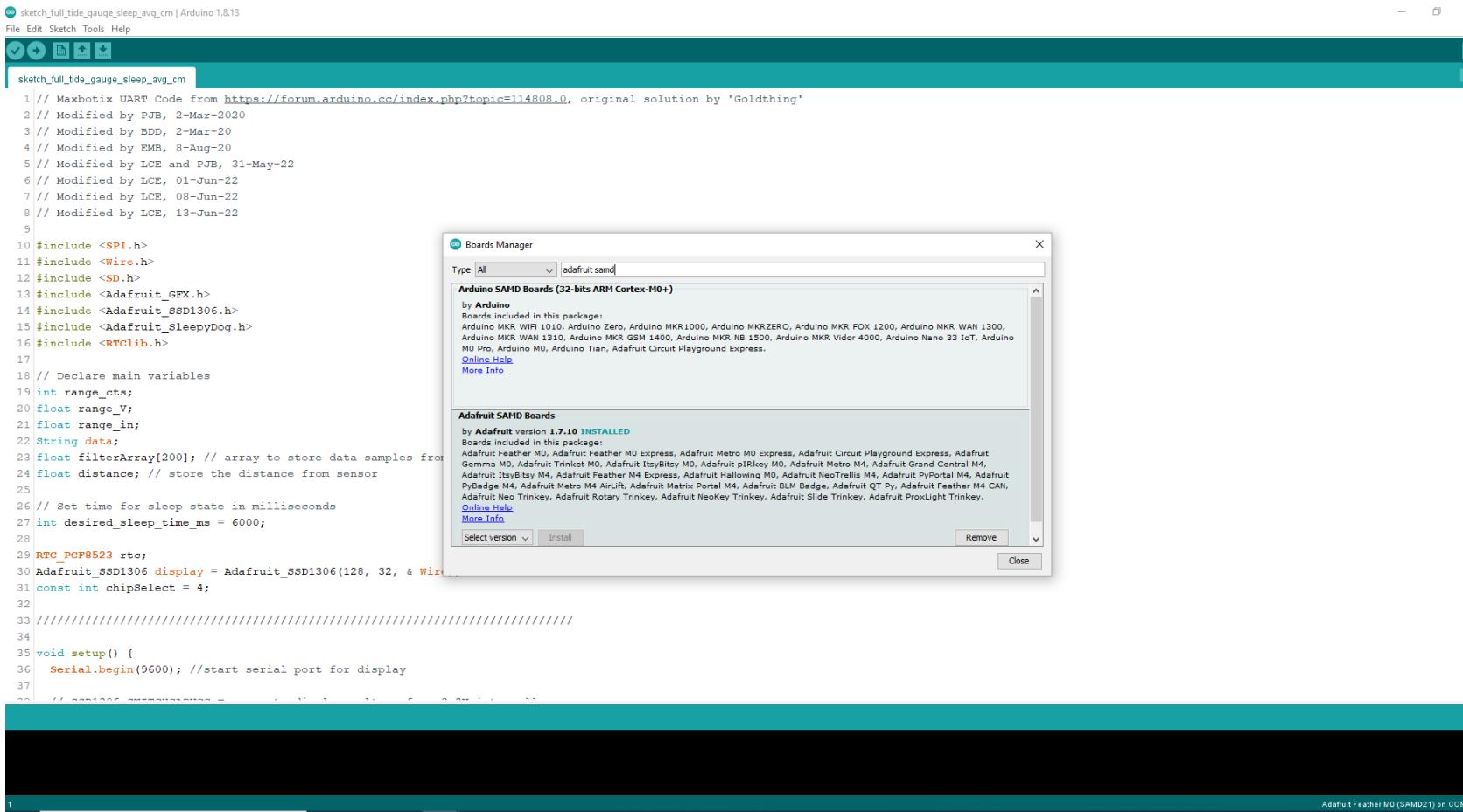
Add URL to access additional boards



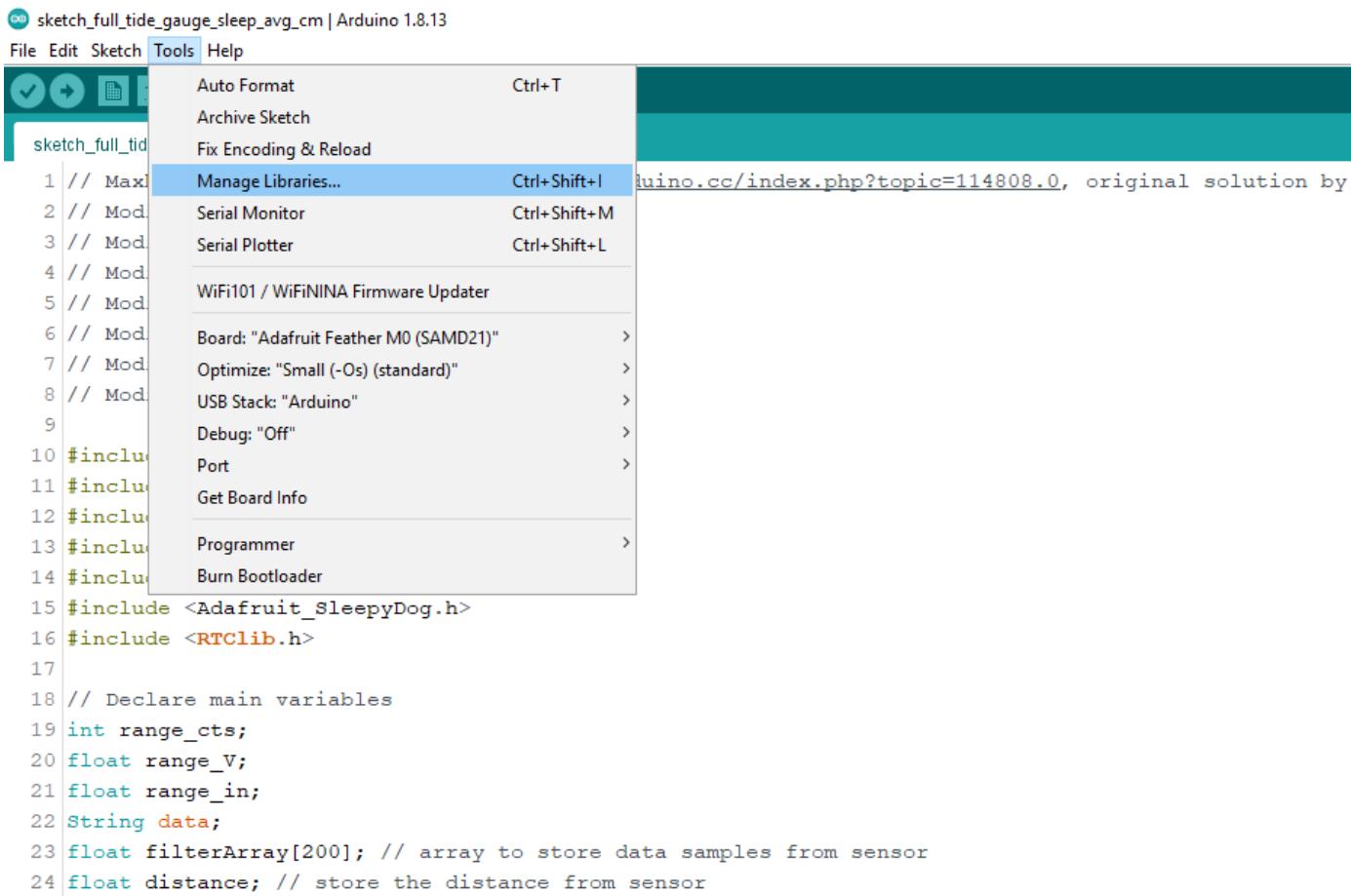
Open board manager



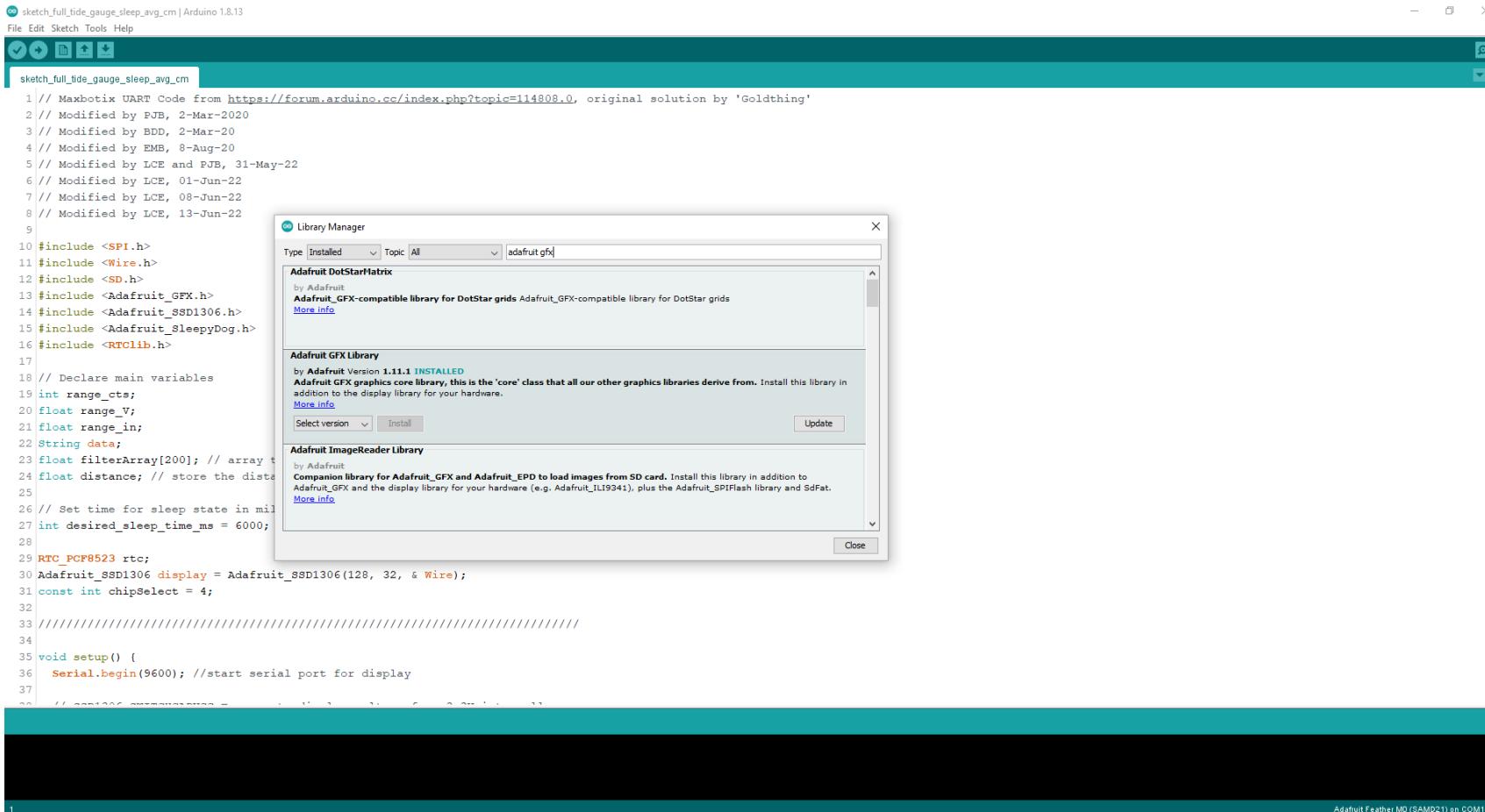
Install boards



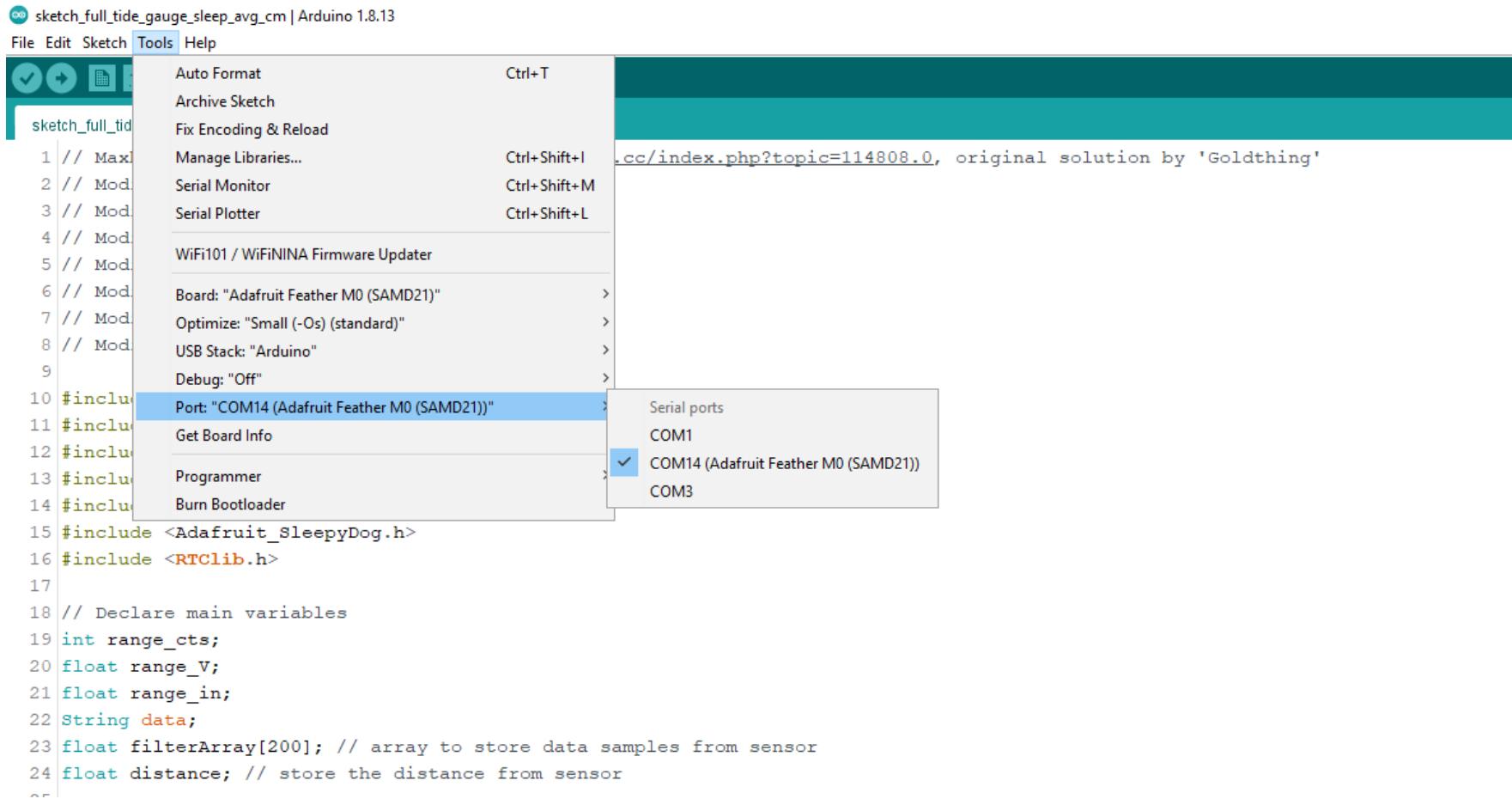
Open Manage Libraries



Install libraries



Select correct port

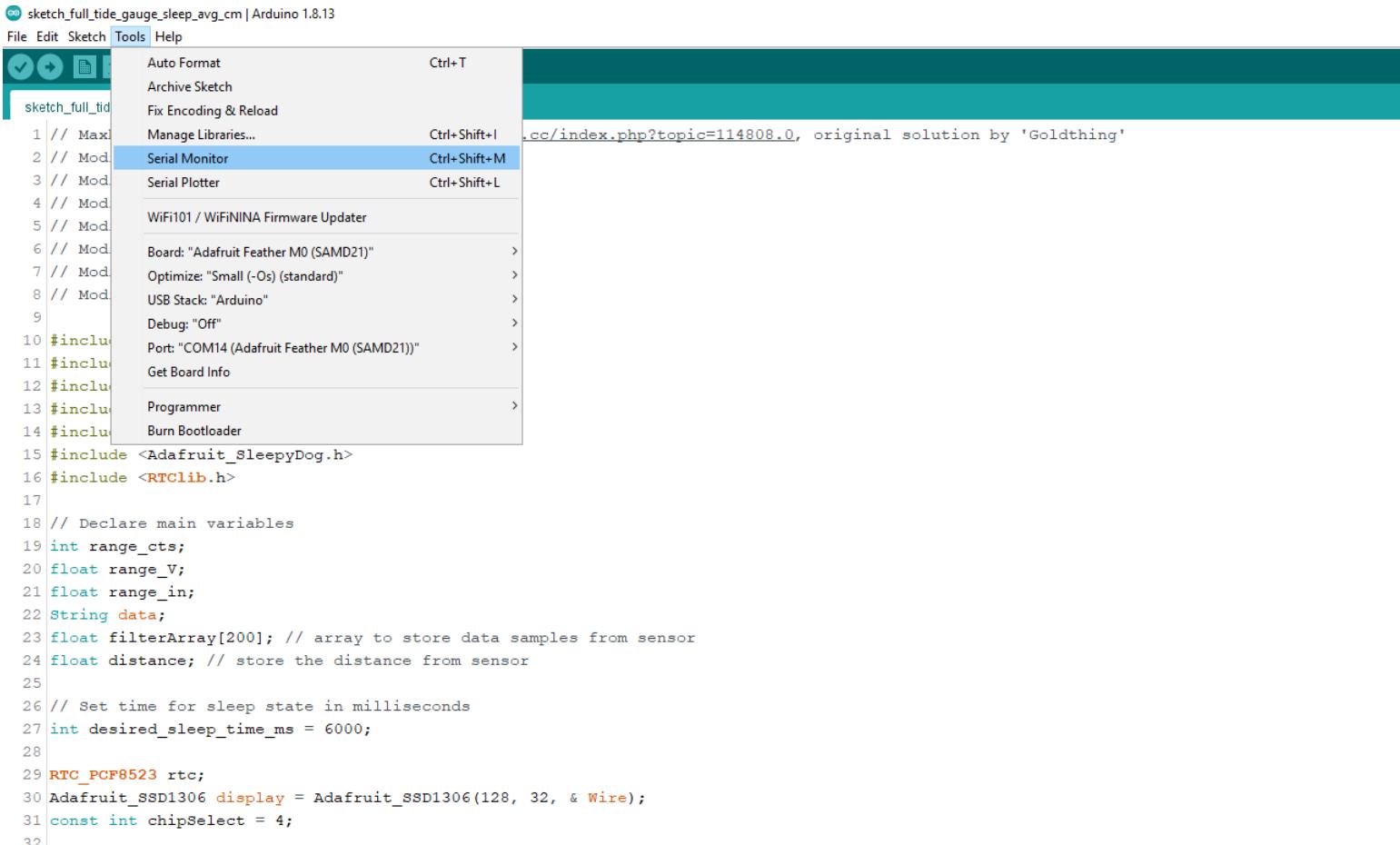


Upload Real Time Clock code

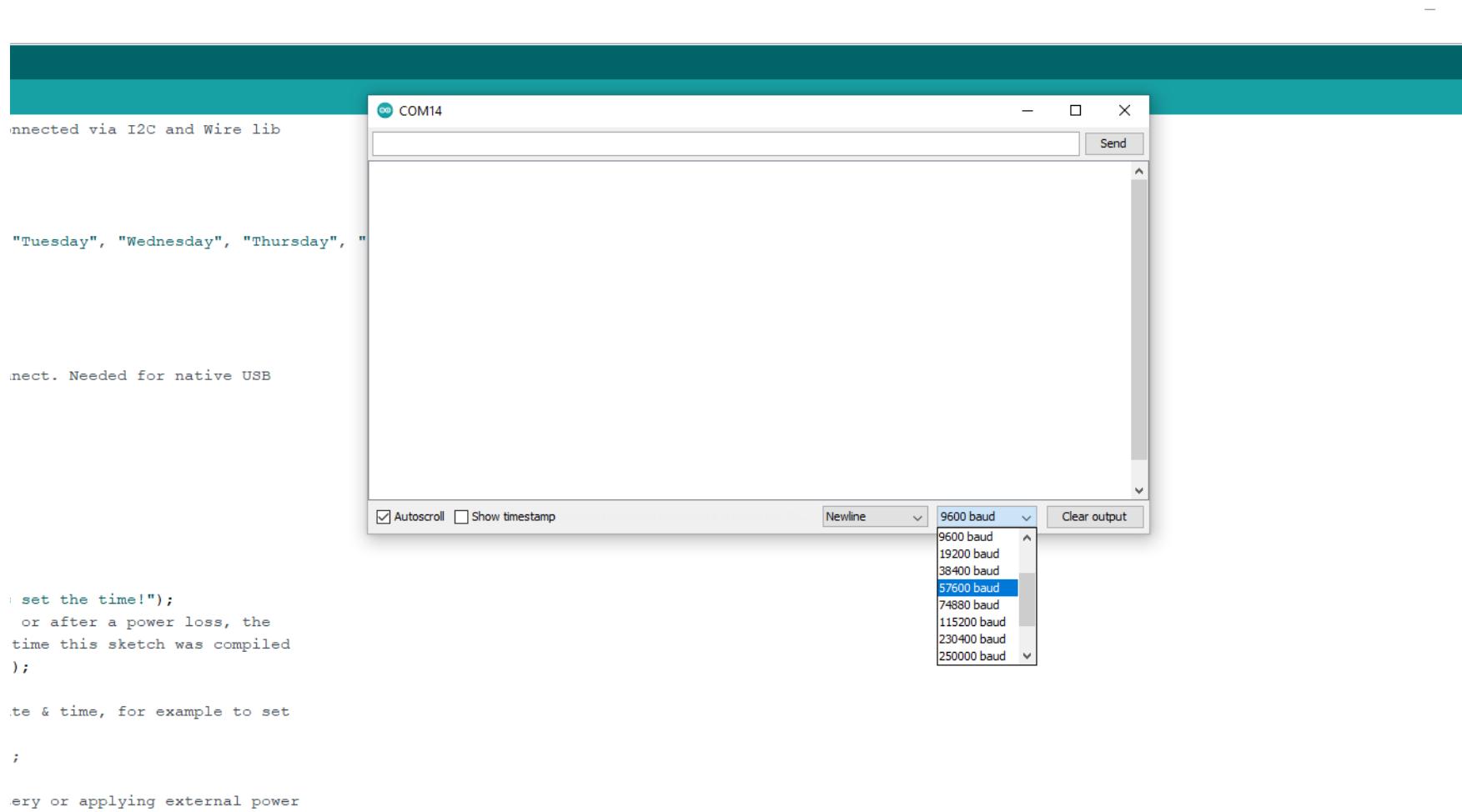
The screenshot shows the Arduino IDE interface with the following details:

- Title Bar:** pcf8523_rctimesetup | Arduino 1.8.13
- Menu Bar:** File Edit Sketch Tools Help
- Sketch Name:** pcf8523_rctimesetup
- Code Area:** The main code area contains C++ code for setting up a PCF8523 RTC. It includes comments explaining the setup process, such as connecting via I2C and using the Wire library, and initializing the RTC with specific dates and times.
- Serial Monitor:** The bottom section shows the serial communication between the IDE and the board. It displays the progress of the upload, starting with "Done uploading.", followed by several lines of hex data being read from memory locations 0xa680 and 0xa6c0, and finally a "Verify successful" message.

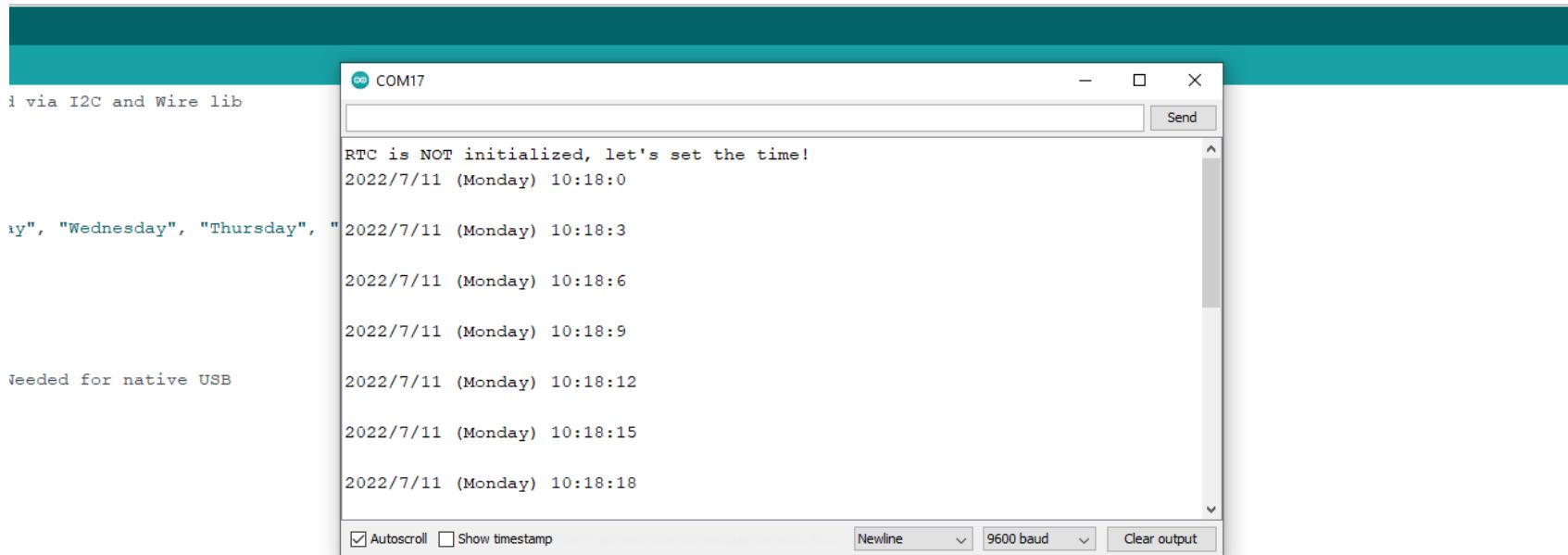
Open serial monitor



Select serial

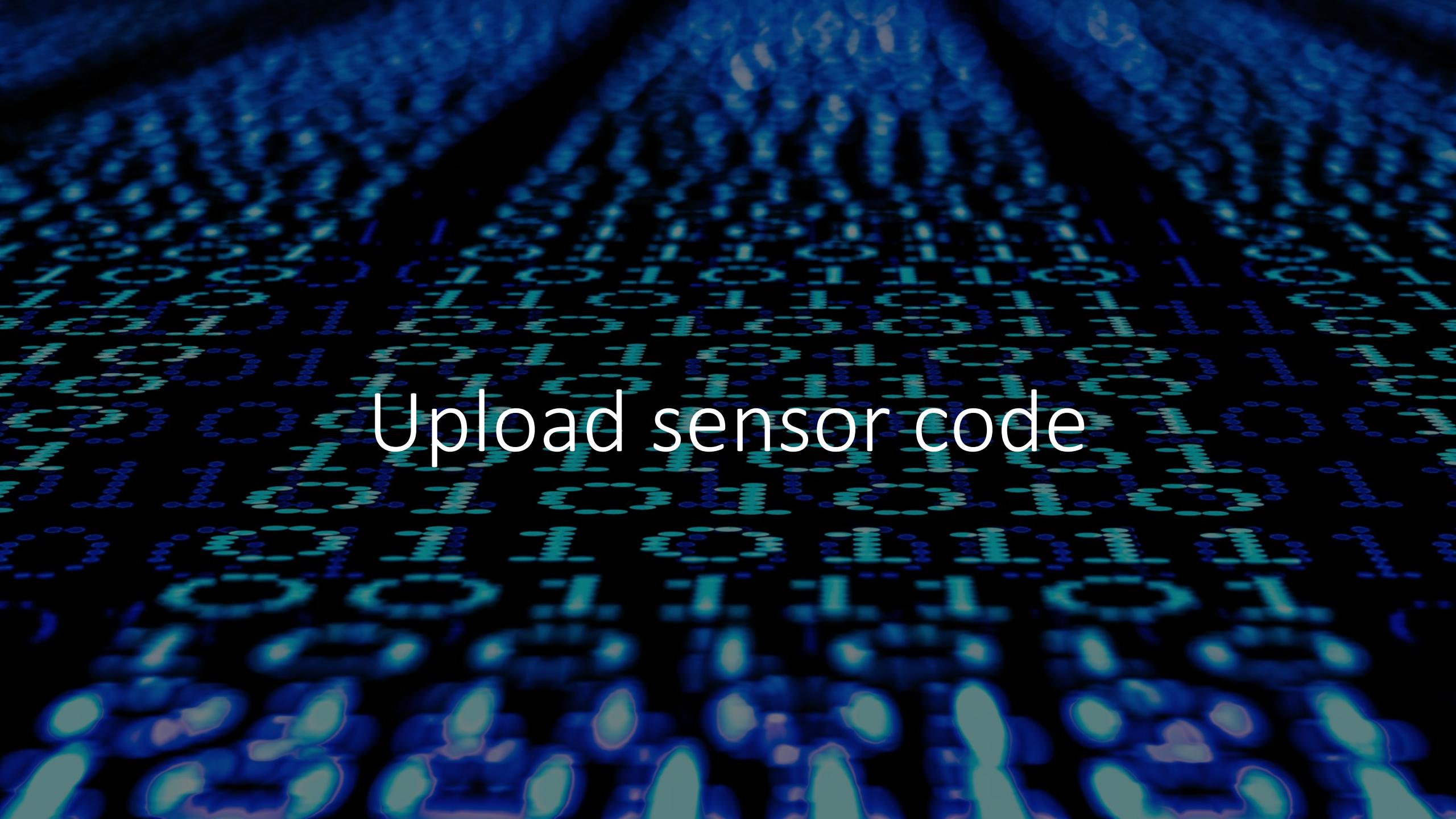


Confirm that clock is set



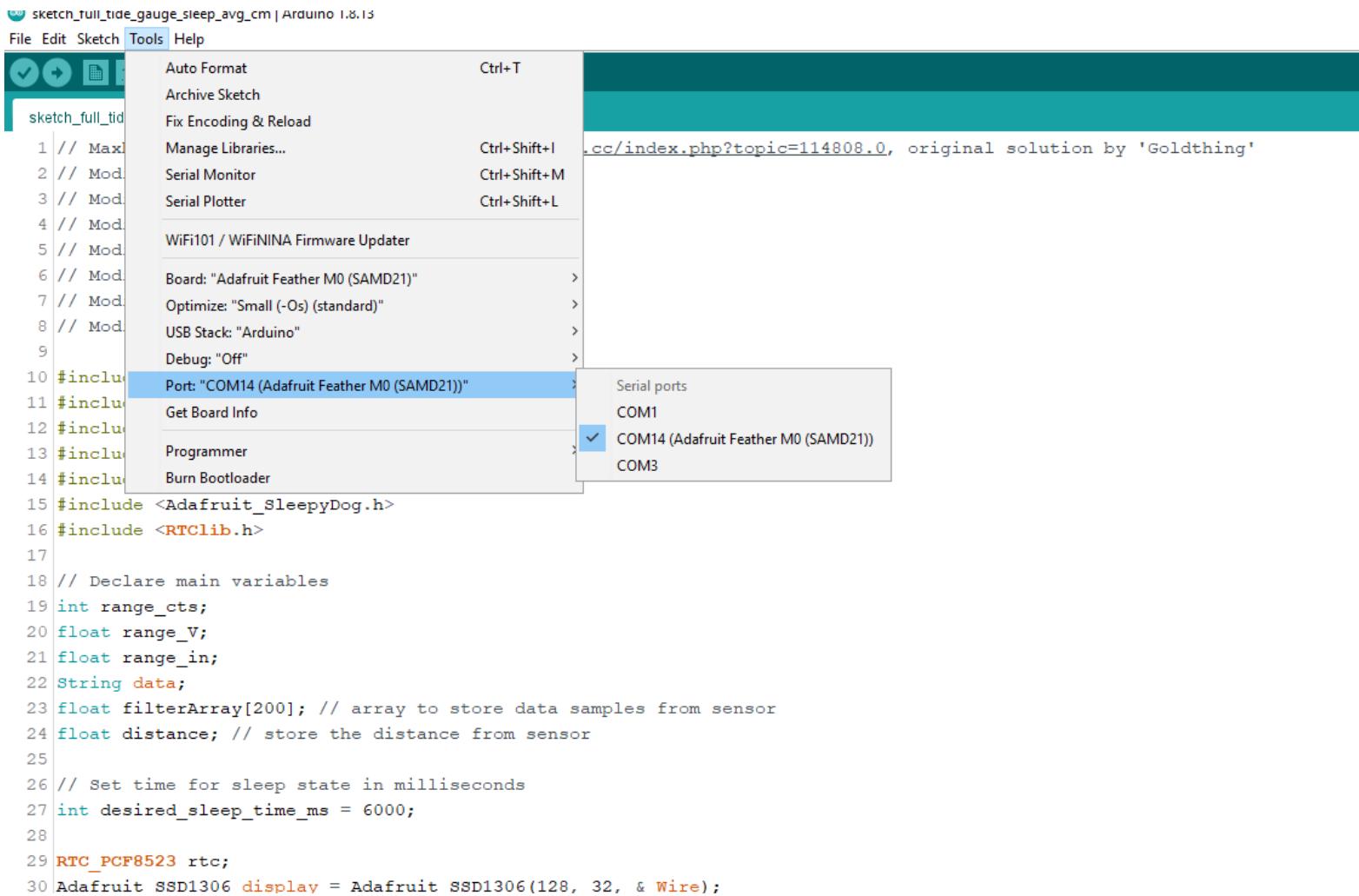
```
ie time!");
After a power loss, the
this sketch was compiled
```

time, for example to set

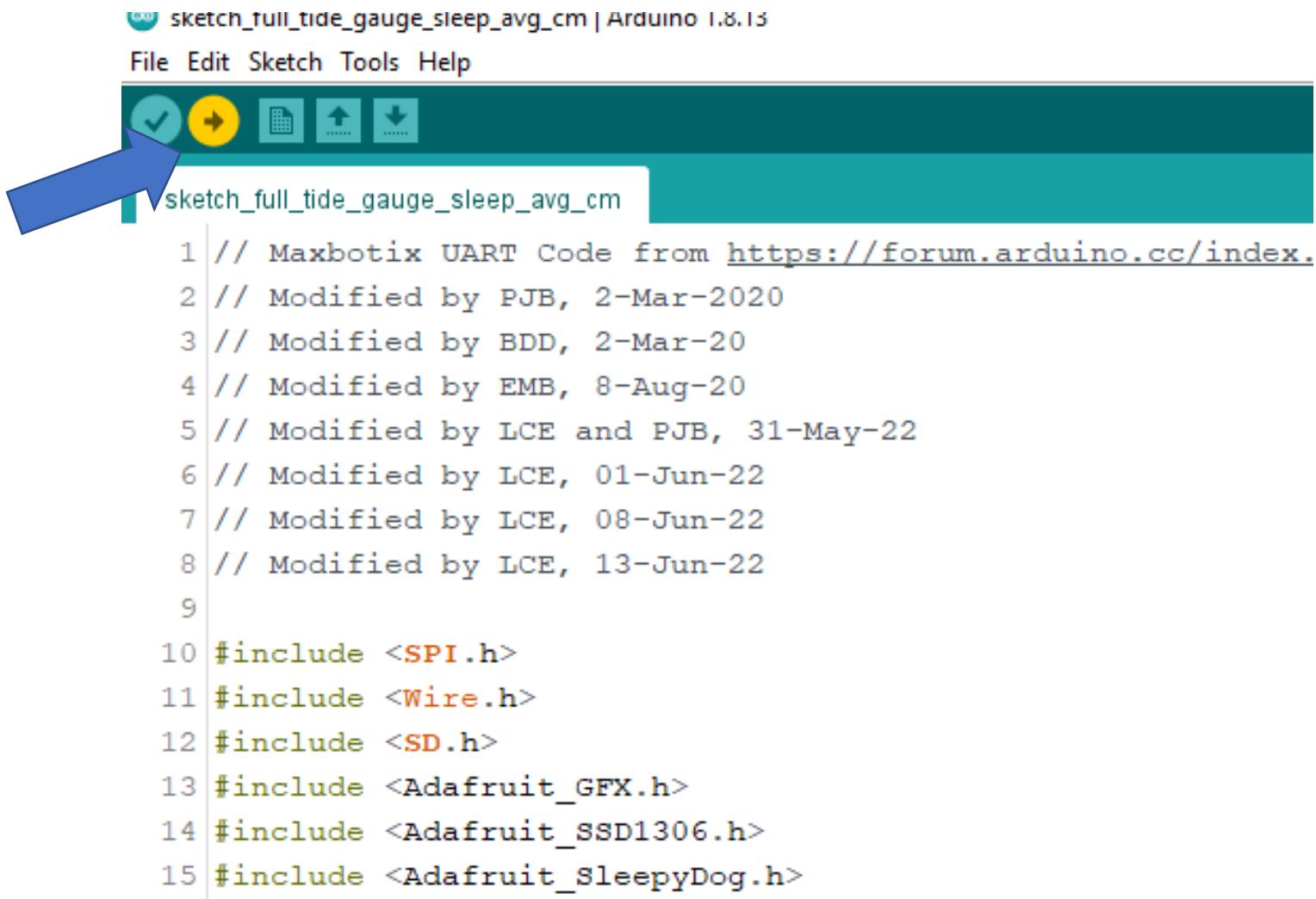


Upload sensor code

Select port



Click upload



sketch_full_tide_gauge_sleep_avg_cm | Arduino 1.8.13

File Edit Sketch Tools Help

```
1 // Maxbotix UART Code from https://forum.arduino.cc/index.
2 // Modified by PJB, 2-Mar-2020
3 // Modified by BDD, 2-Mar-20
4 // Modified by EMB, 8-Aug-20
5 // Modified by LCE and PJB, 31-May-22
6 // Modified by LCE, 01-Jun-22
7 // Modified by LCE, 08-Jun-22
8 // Modified by LCE, 13-Jun-22
9
10 #include <SPI.h>
11 #include <Wire.h>
12 #include <SD.h>
13 #include <Adafruit_GFX.h>
14 #include <Adafruit_SSD1306.h>
15 #include <Adafruit_SleepyDog.h>
```

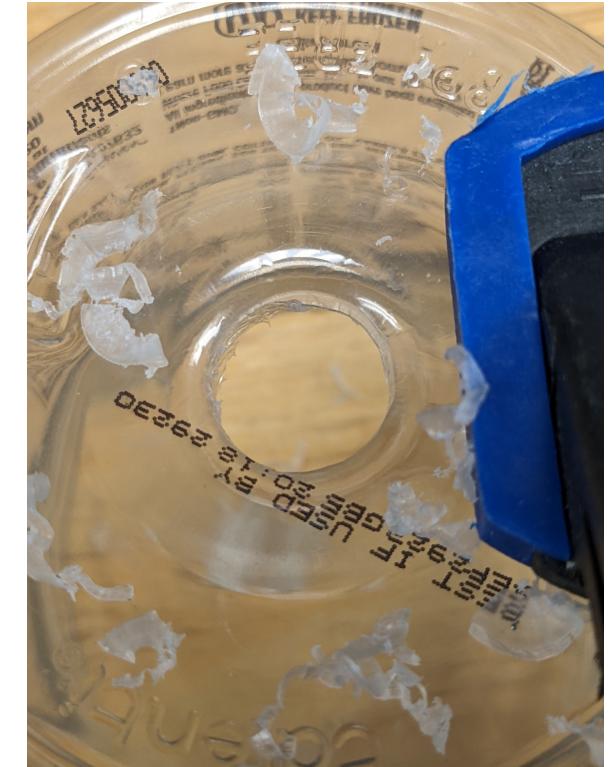
Upload complete

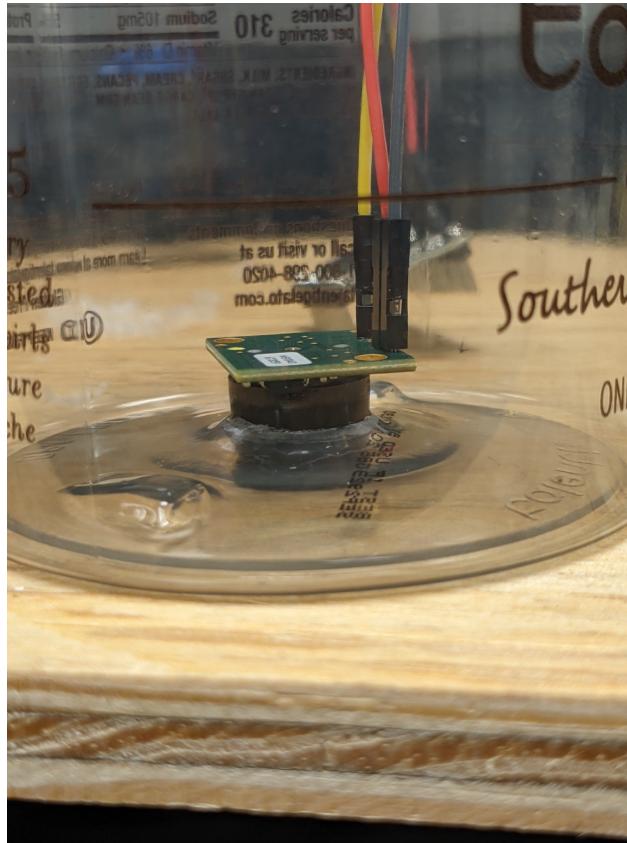
```
168     display.setTextColor(SSD1306_WHITE);
169     display.setCursor(0, 0);
170     display.println("card error");
171     display.display();
172     delay(1000);
173     display.clearDisplay();
174     display.display();
175 }
176
177 // Determine time elapsed for more accurate sleep time
178 int end_time_ms = millis();
179 int elapsed_time = end_time_ms - start_time_ms;
180 int sleep_time = desired_sleep_time_ms - elapsed_time;
181 int sleep_loops = sleep_time / 8000;
182 float sleep_remainder = sleep_time % 8000;
183
184 // This loop puts board into sleep state for number of milliseconds input into desired_sleep_time_ms
185 for (int i = 0; i < sleep_loops; i++) {
186     int sleepMS = Watchdog.sleep(8000); // puts device in low power state for ms, caps at 16 seconds, repeat code
187 }

Done uploading.
[=====] 99% (835/836 pages) checksumBuffer(start_addr=0xf0c0, size=0x30) = 5d0d
read(addr=0xf0c0, size=0x40)
[=====] 100% (836/836 pages)
Verify successful
Done in 1.907 seconds
writeWord(addr=0xe000ed0c, value=0x5fa0004)
```



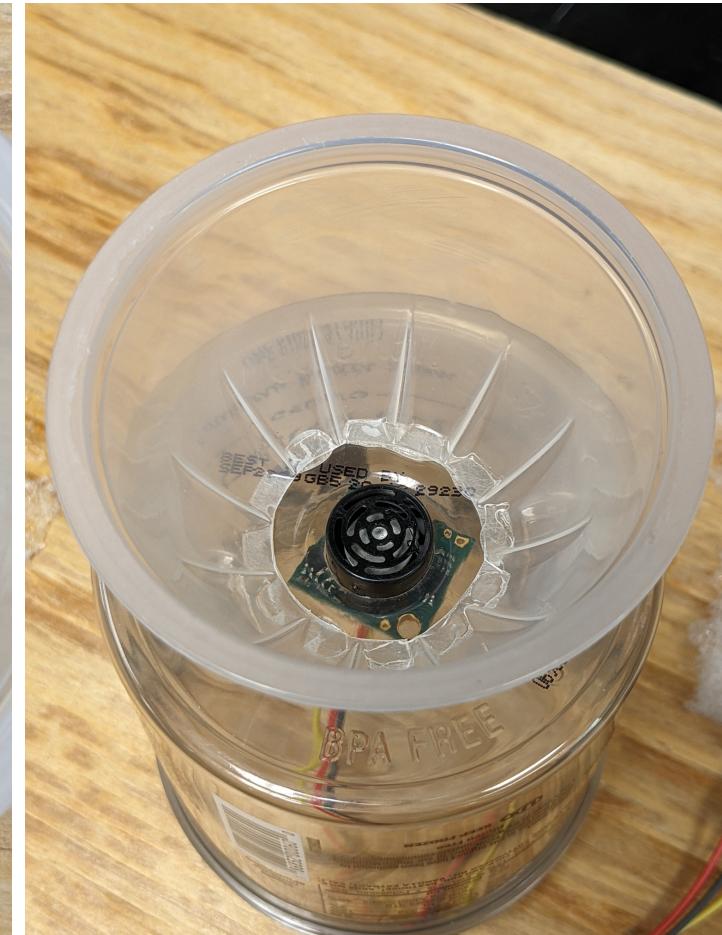
Housing construction





Insert sensor

Make rain hood



Deployment



Collect Data

- Convert from inches
- Determine distance: $H = a - x$