

# Arduino based Pulse Oximeter

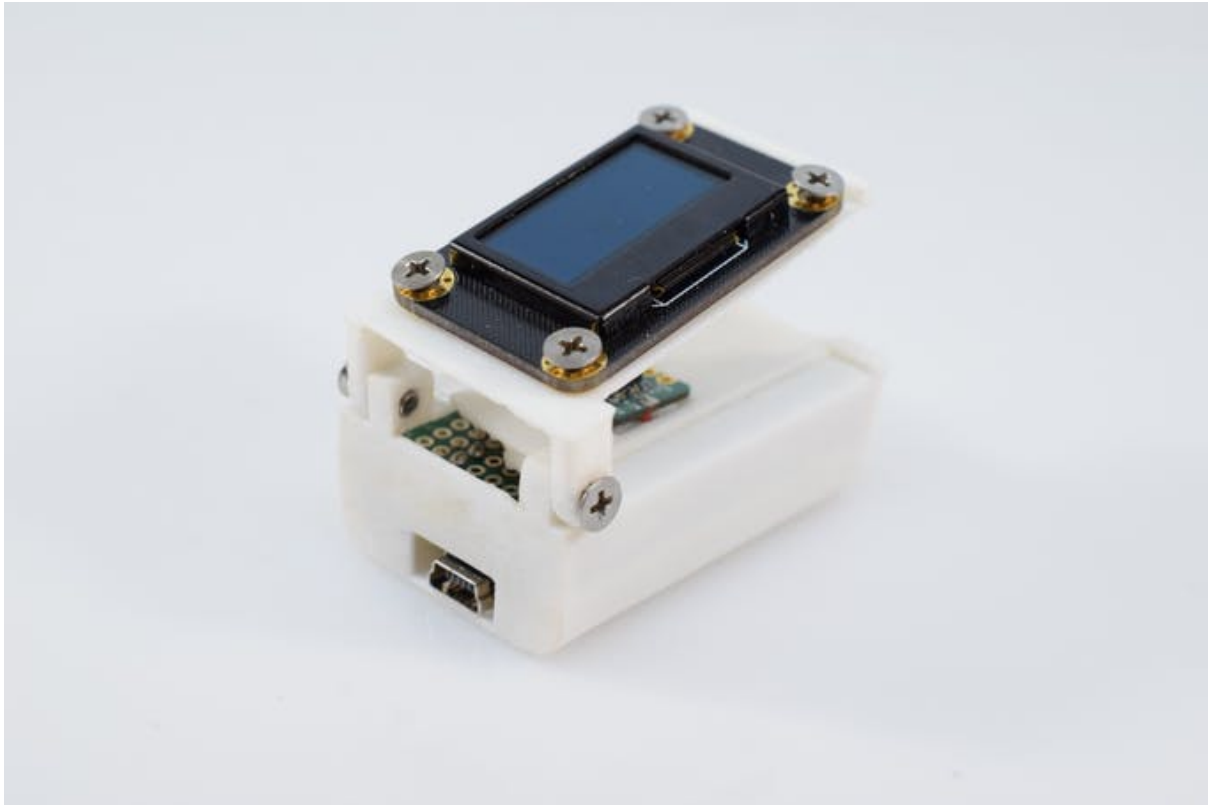
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## 1 Project description

### 1.1 The Challenges of COVID-19

COVID-19 is a disease caused by the SARS-CoV-2 virus that primarily attacks a person's respiratory system. Some milder symptoms can include fever, aches, and chills, but it can also lead to more serious conditions such as pneumonia. A person who has pneumonia or even slight shortness of breath might not know when to go to a hospital, especially as they start to get even more overwhelmed. This is why I created this open source pulse oximeter, which can assist in getting people the help they need and get accurate information about their current condition.



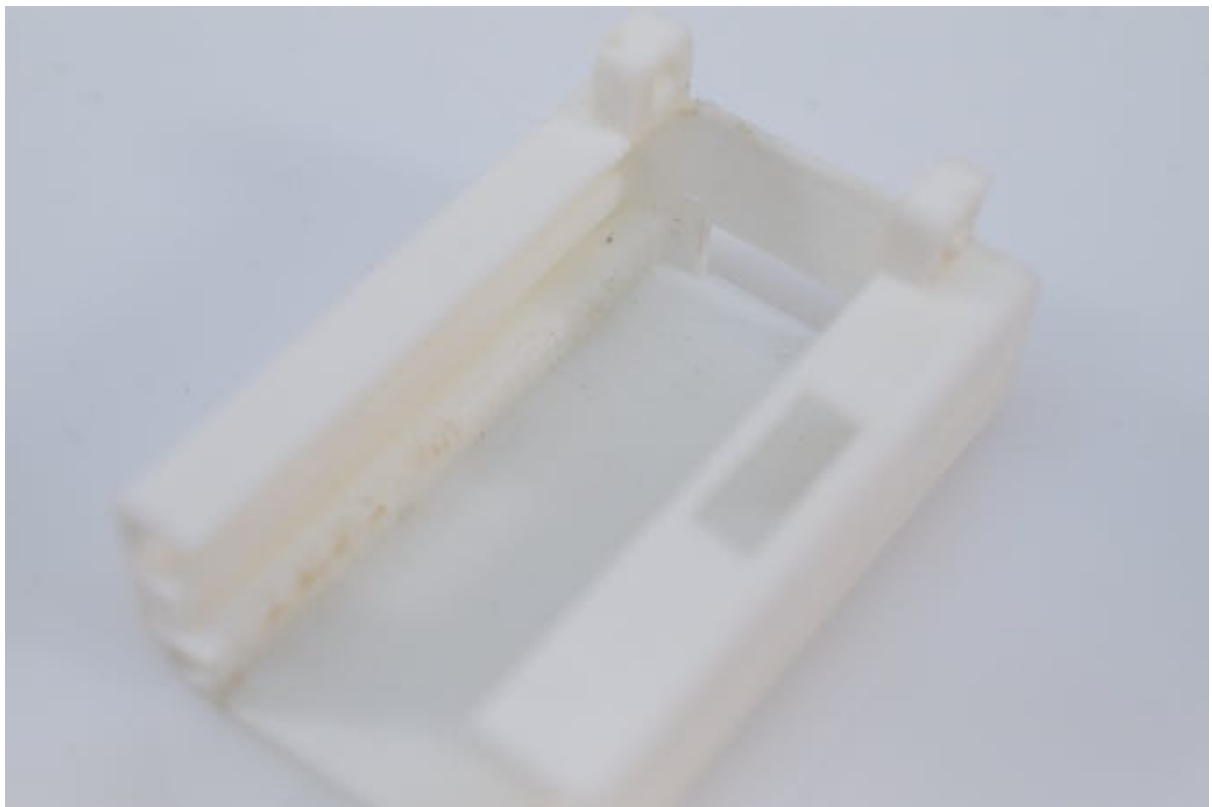
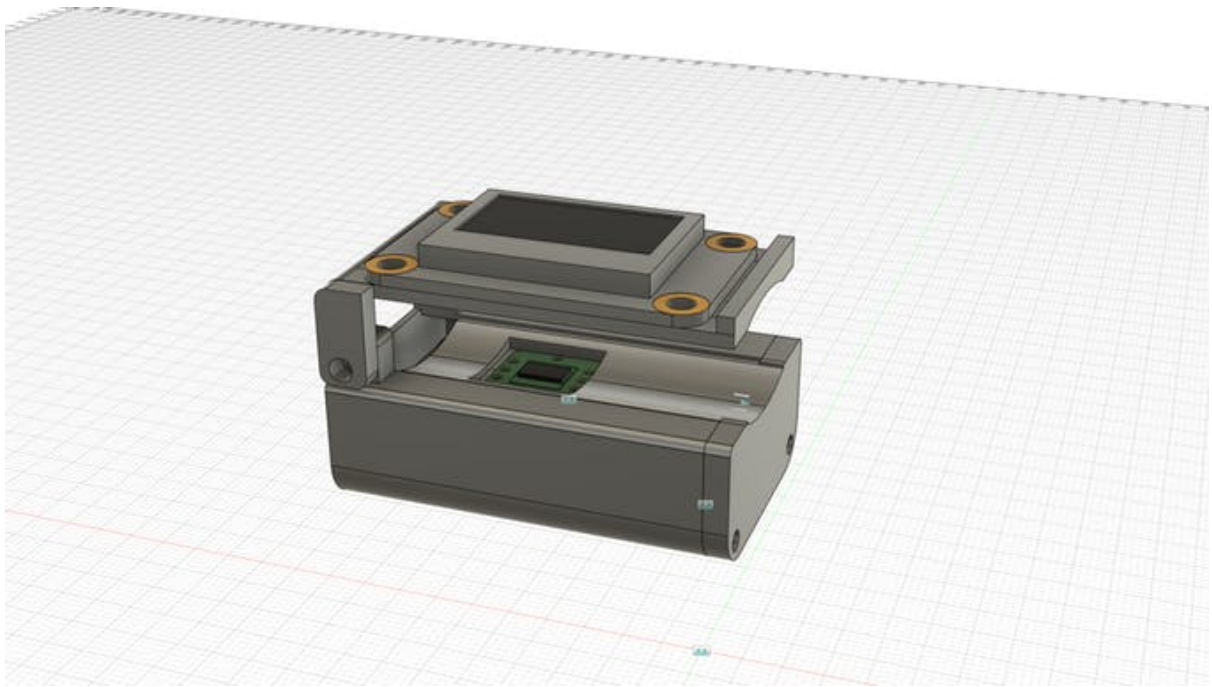
## 1.2 A Bit of a Disclaimer

This device/project is not to be used as an accurate medical diagnostic tool!

## 2 Steps to build the device

### 2.1 Print Out and Clean Parts

- Begin by downloading each piece from the attachment section on this project and loading it into your slicer of choice.
- I used an infill of around 70-80% and medium supports, all with PLA.
- After they were done printing, I removed the supports and did some light sanding to ensure they all fit together nicely.

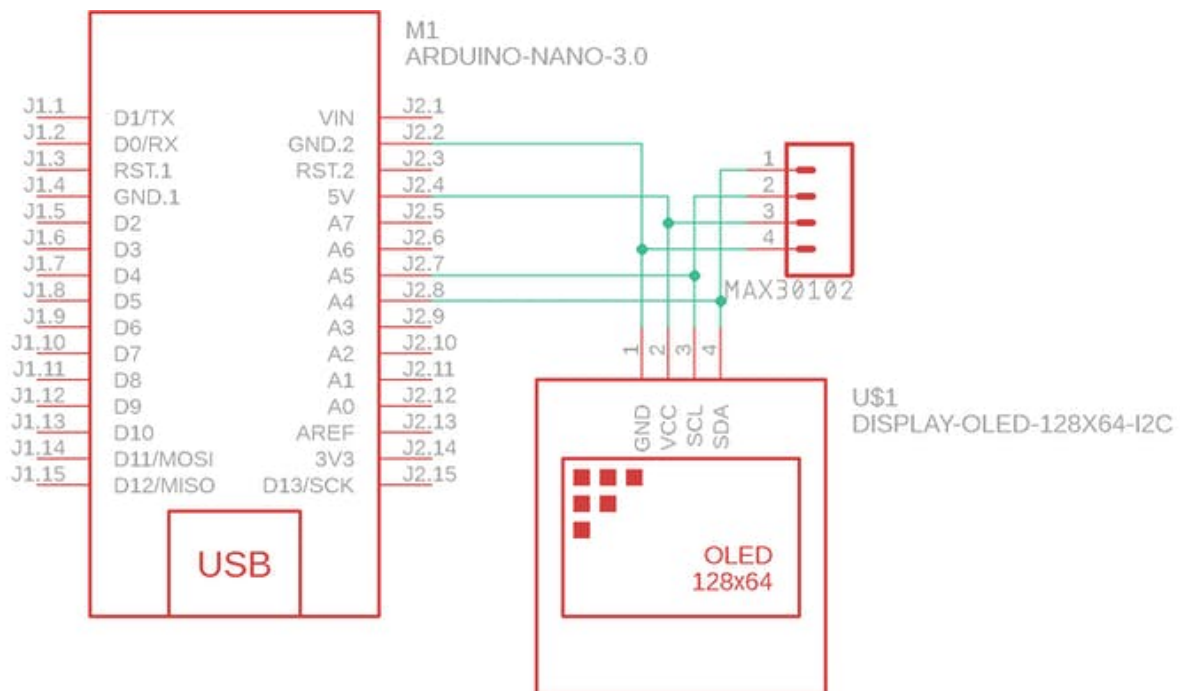




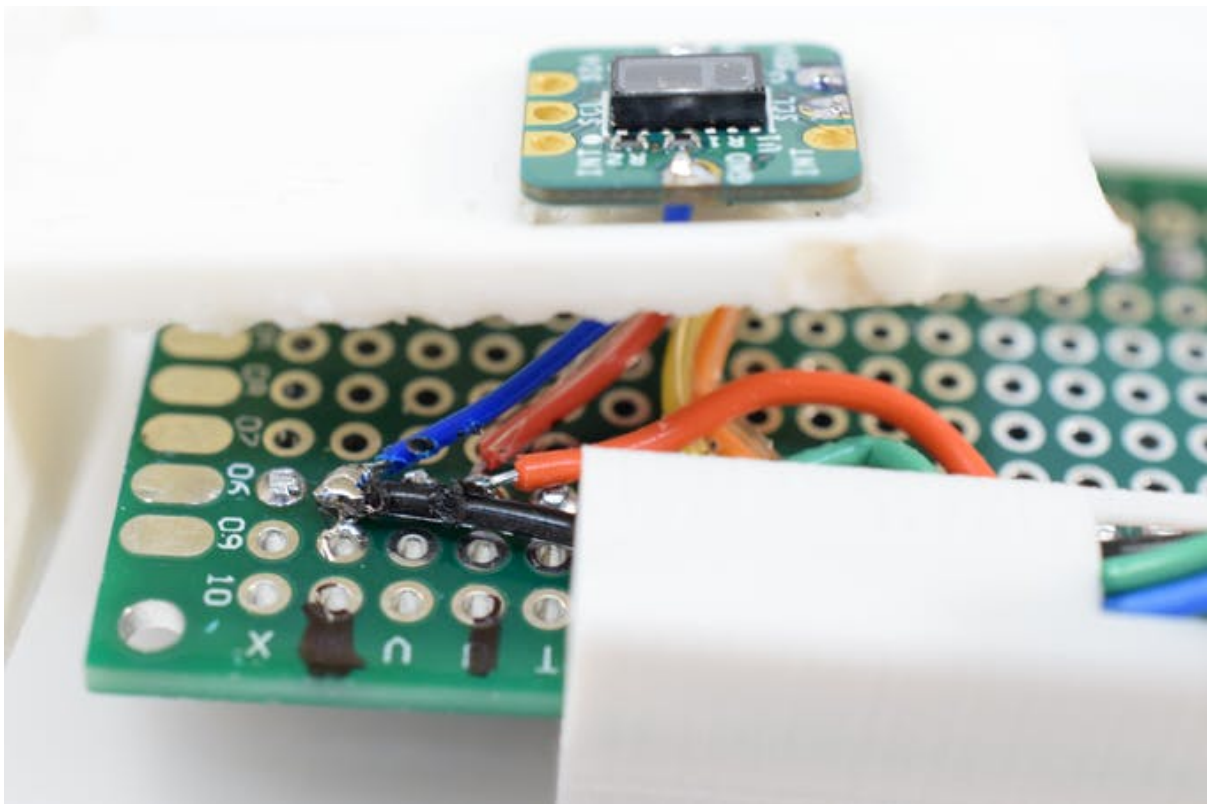
## 2.2 Solder the Electronics

- The entire device is designed around an Arduino Nano that is mounted on a piece of 44mm by 30mm perfboard.

- First, wires get soldered to the VIN, GND, SDA, and SCL pins of the sensor and then run underneath the bed piece to the Arduino Nano.



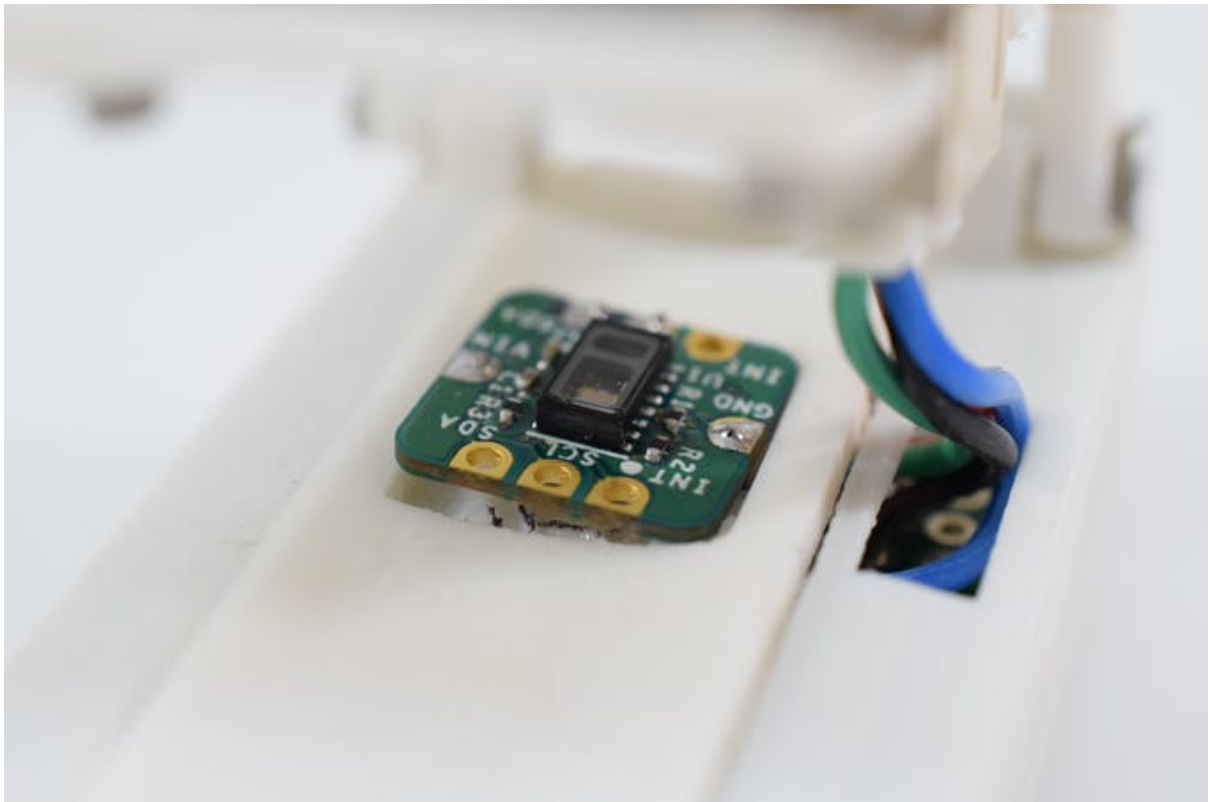
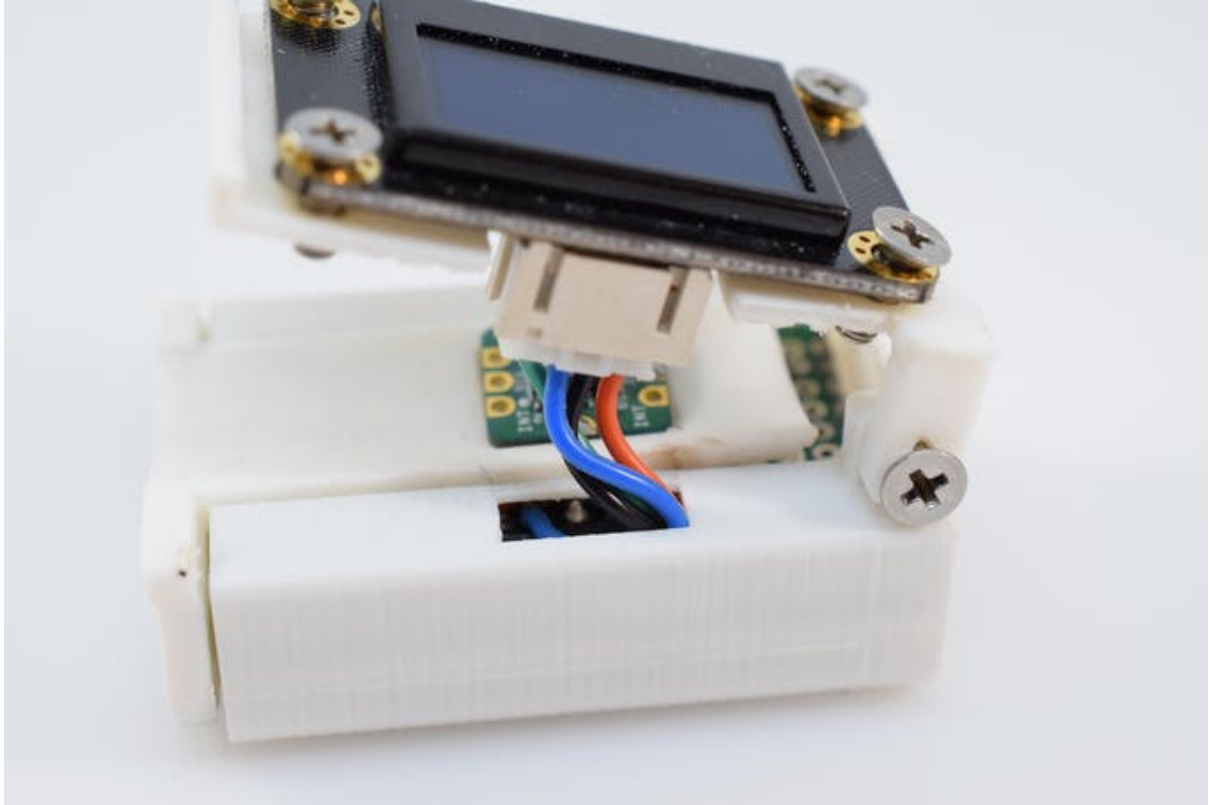
- Next, the connector for the OLED is attached to the Nano and then run up to the display itself.



- And finally, the entire electronics assembly is slid into the housing and secured with a couple of 3mm screws.

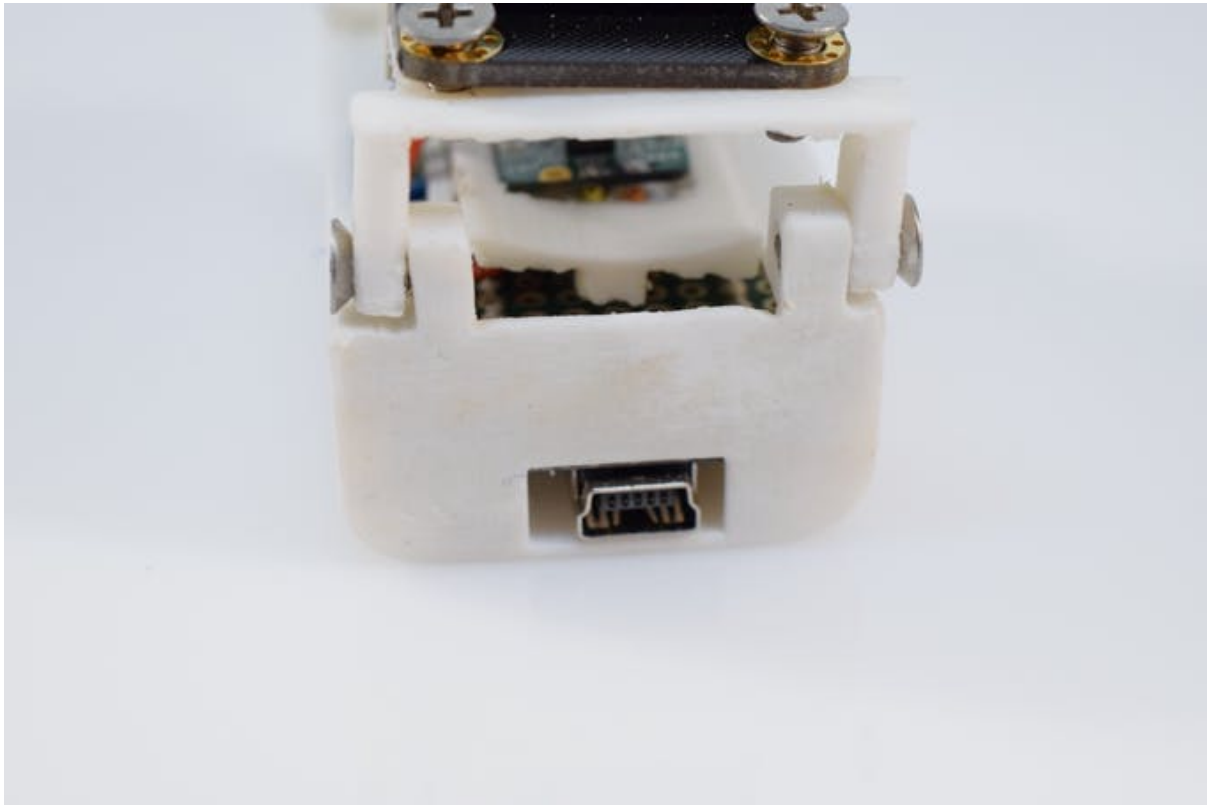
## 2.3 Assemble the Device

- After the electronics have been inserted, simply attach the OLED screen to the top piece and secure it to the rest of the chassis with a couple of 3mm screws.
- You can test its motion by gently articulating the lid up and down.



## 2.4 Uploading the Sketch

- The included sketch performs a couple of actions to display the user's current heartrate and oxygen saturation.
- To upload it, simply install the required libraries and select Arduino Nano from the board list in the Tools menu and click Upload.

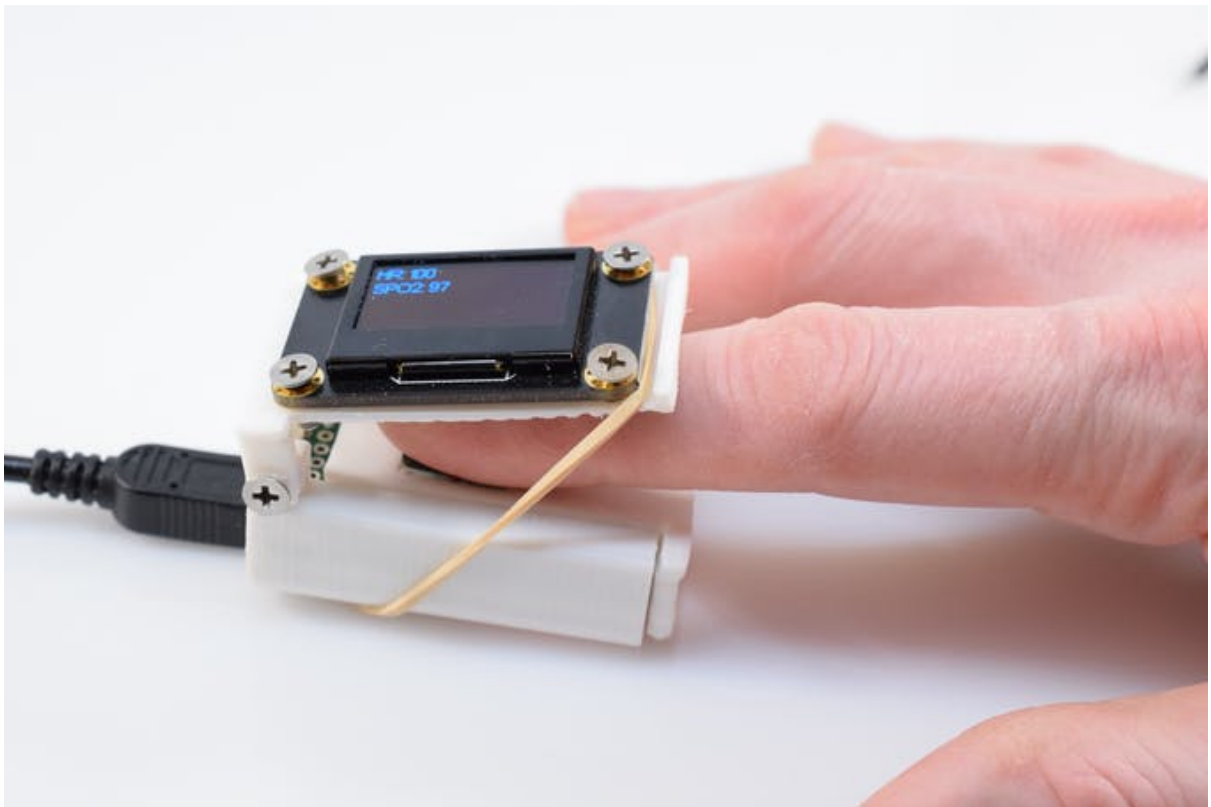
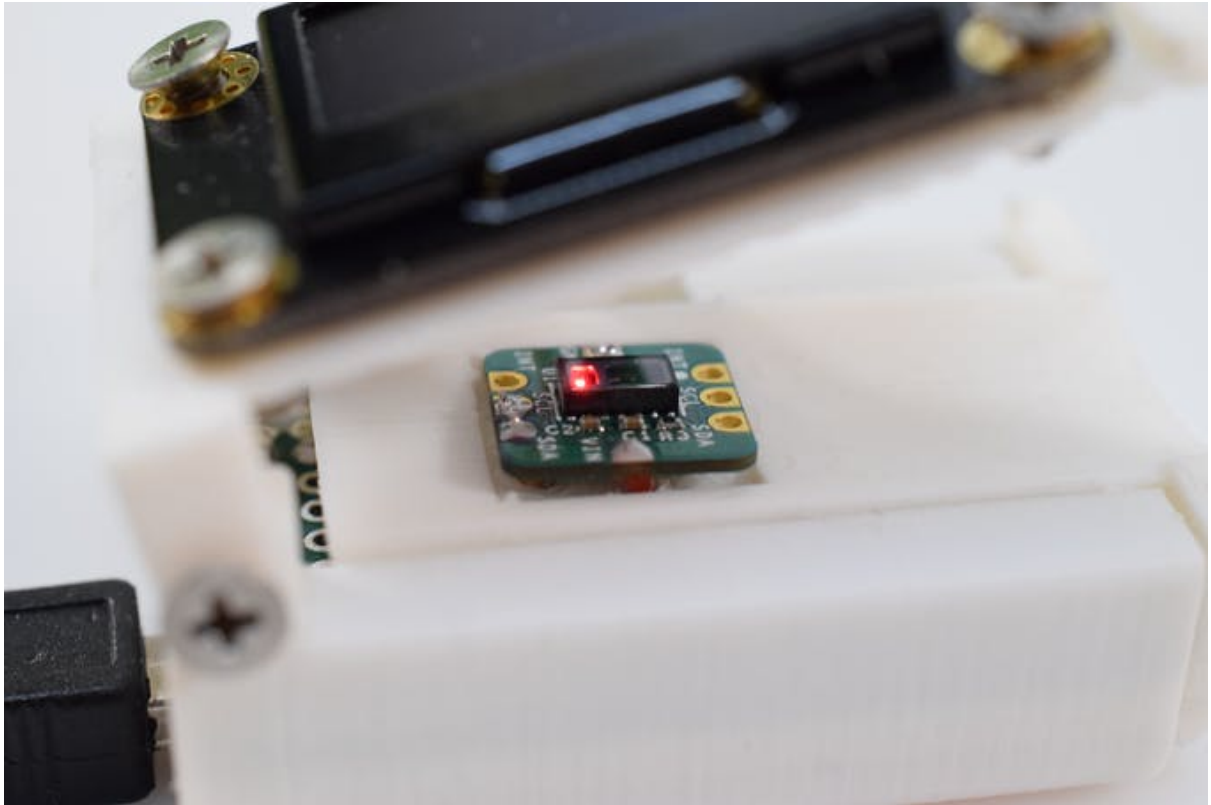


- As for the sketch itself, it first initializes the OLED and MAX30102, whilst reporting any errors that might arise. See the code [here](#)
- Next, it reads in 100 values to calibrate the sensor and begins displaying them. The device then enters a loop where it reads in 25 new values and computes a moving average with them.
- Finally, it checks if the values are valid and prints them to the screen if they are.

## 2.5 Using It

- To use the pulse oximeter, place your fingertip over the sensor and gently close the top lid.
- Then plug in a power source and simply wait until you see data being displayed.









### 3 Items

- Development Board, Arduino Nano, ATmega328 MCU, 14 3.3V I/O, 6 PWM Outputs, USB Mini B

– Image:

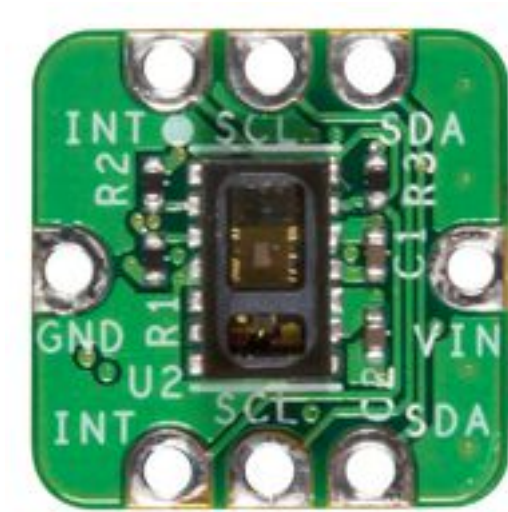


– Amount: 1

– Reference to buy it : [https://www.newark.com/arduino/a000005/dev-board-atmega328-arduino-nano/dp/13T9275?COM=ref\\_hackster](https://www.newark.com/arduino/a000005/dev-board-atmega328-arduino-nano/dp/13T9275?COM=ref_hackster)

- Reference Design Board, Pulse Oximeter & Heart Rate Monitor, MAX30102, MAX14595, MAX1921

– Image:

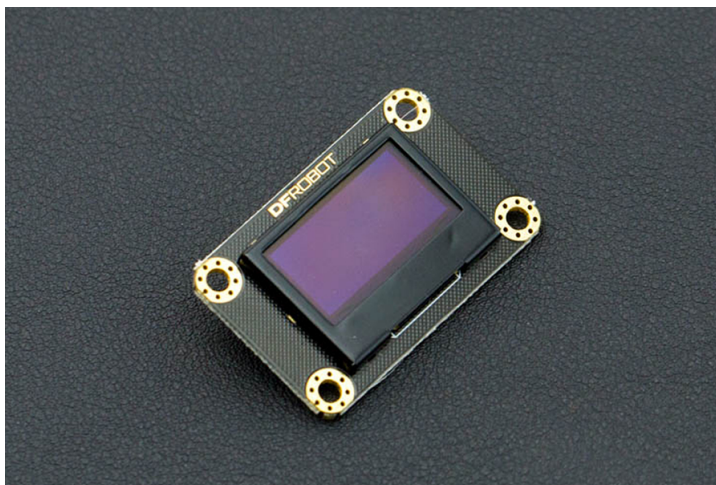


– Amount : 1

– Reference to buy it : <https://www.newark.com/maxim-integrated-products/maxrefdes117/ref-des-brd-heart-rate-pulse-oximeter/dp/96Y9339>

- Gravity I2C OLED-128x64 Display

– Image :



– Amount : 1

– Reference to buy it : <https://www.dfrobot.com/product-1576.html>

### 3.1 Necessary tools and machines

- A generic 3D printer
- A generic soldering iron

## **3.2 Apps and Online Services**

- Arduino Software
- Autodesk Fusion 360