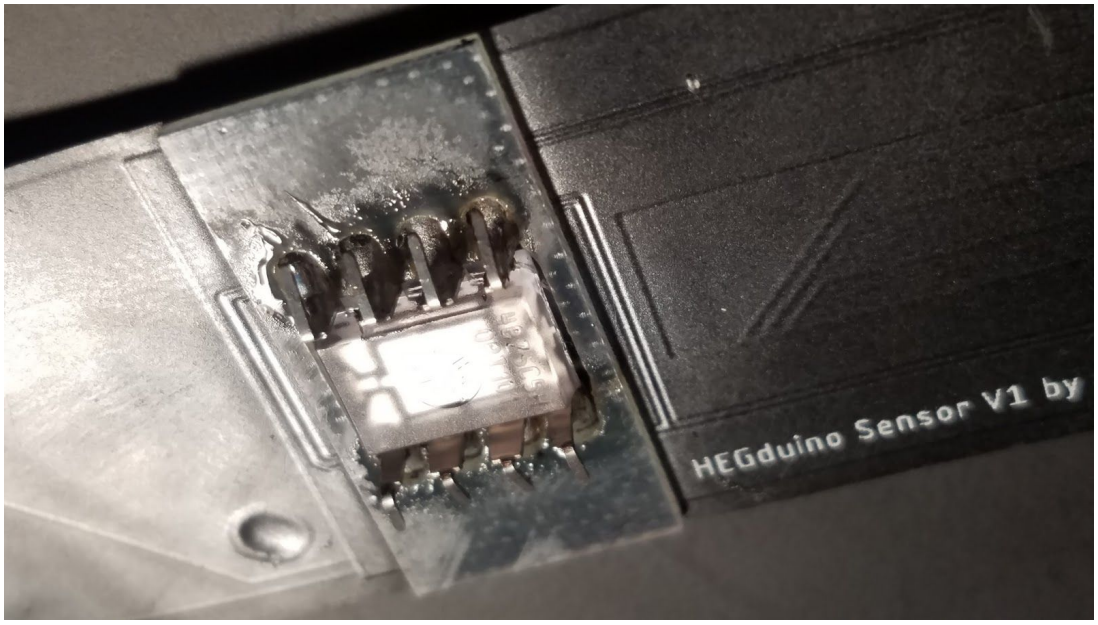
Sensor: OPT101

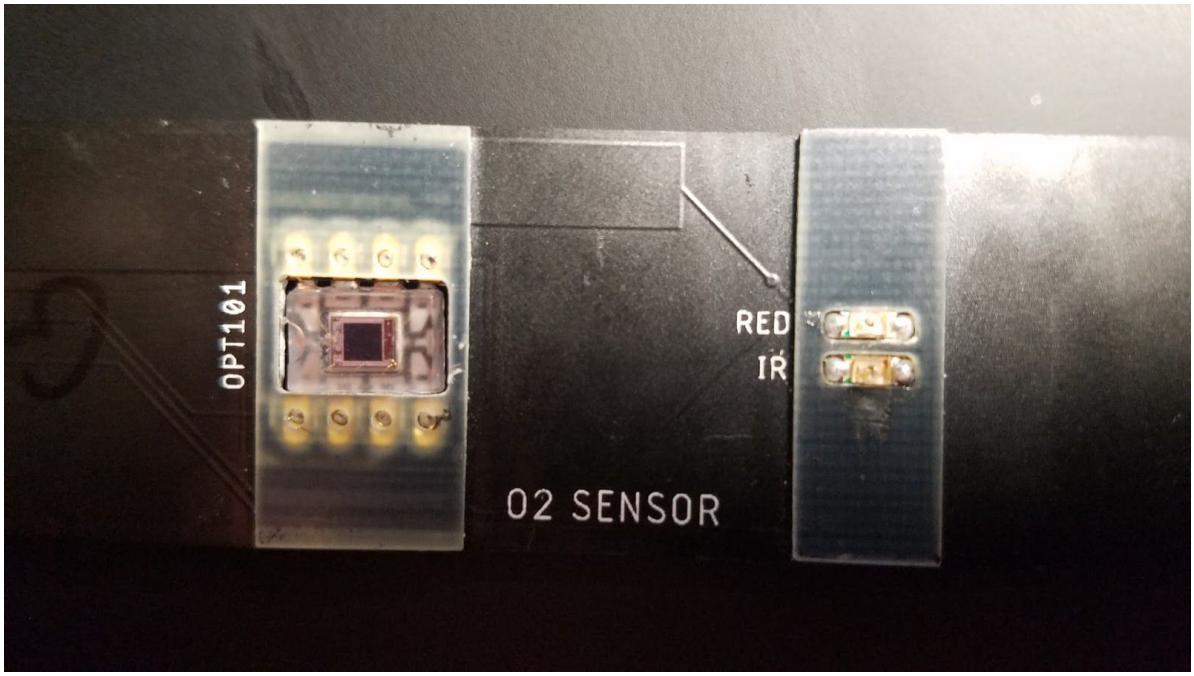
Place the OPT101 through the hole from the backside where the solder pads are exposed. Make sure the notch on the OPT101 is facing the 6p6c connector direction. Solder it down so it is about flush with the stiffener on the face.

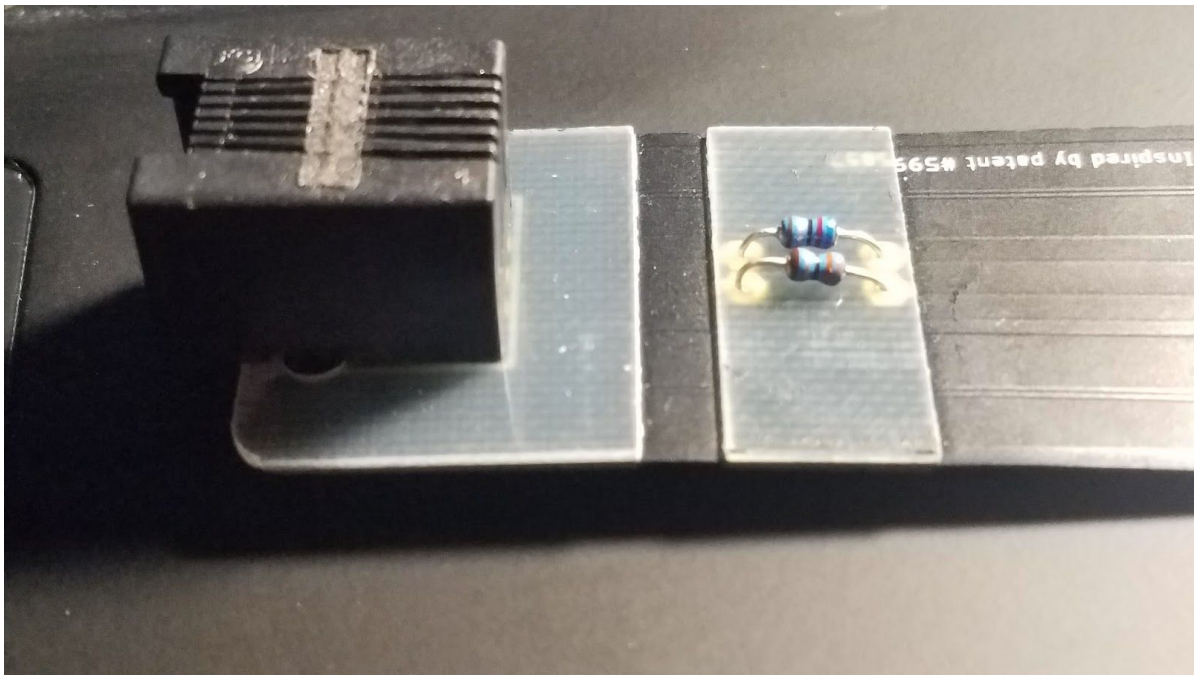


Sensor: LEDs

The LEDs have tiny green notches on them. Put the Red and Infrared LED in each of their respectively labeled positions with the green notches facing toward the 6p6c connector (direction also marked by little white notches on the PCB). If you forget which LED is which you can always get the Red one to visibly light up with a multimeter set to Diode mode.

Add a 33 to 62 ohm resistor to the 62 ohm spot (we provided a 33 ohm res. in the kit for this), and a 62 ohm resistor to the 470 ohm spot. We had to lower the resistance on the IR LED due to sensitivity issues that cropped up on lower power settings. Make sure the resistors are on the back side facing away from your head so it doesn't feel awkward. Clip the leads. Finally, add the 6p6c connector to the correct side.



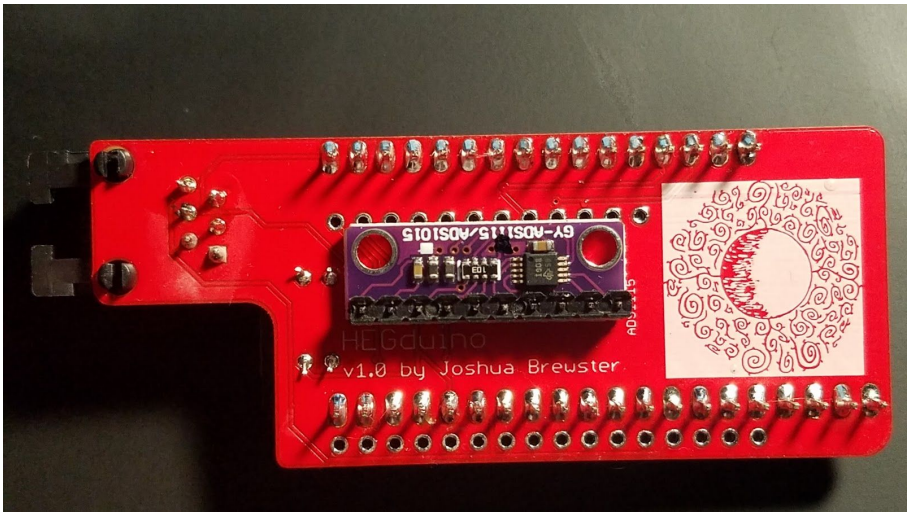


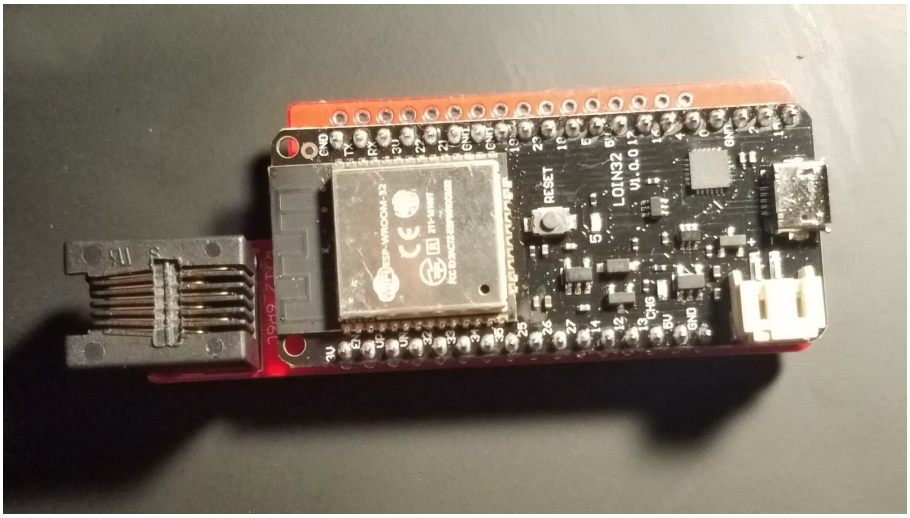
Finally use vinyl or rubber tape to cover all of the exposed connections as well as the edges of the OPT101 Sensor so it isolates the aperture to be only toward your forehead.

Microcontroller hub assembly

This part is fairly self explanatory as everything is clearly labeled. First add the 2.7kOhm resistor and the ADS1115. The ADS1115 has clearly marked VDD and A0 pins to indicate the direction it should be placed on the hub board. Do this first because it won't easy to add these after the ESP32 is soldered. If you are using a Huzzah32, the ADS1115 comes pretty close to the pin holes (sorry!) but just make sure you're not completely covering them. I recommend putting the pin header for the ADS1115 through the top of the ADS1115 to minimize the form factor. After soldering these parts, clip the leads as short as possible.

There are 2 compatible ESP32 boards (LOLIN32 and Huzzah32 Feather) that only fit in their respective slots on the correct side of the PCB, go ahead and add it, then finally add the connectors.

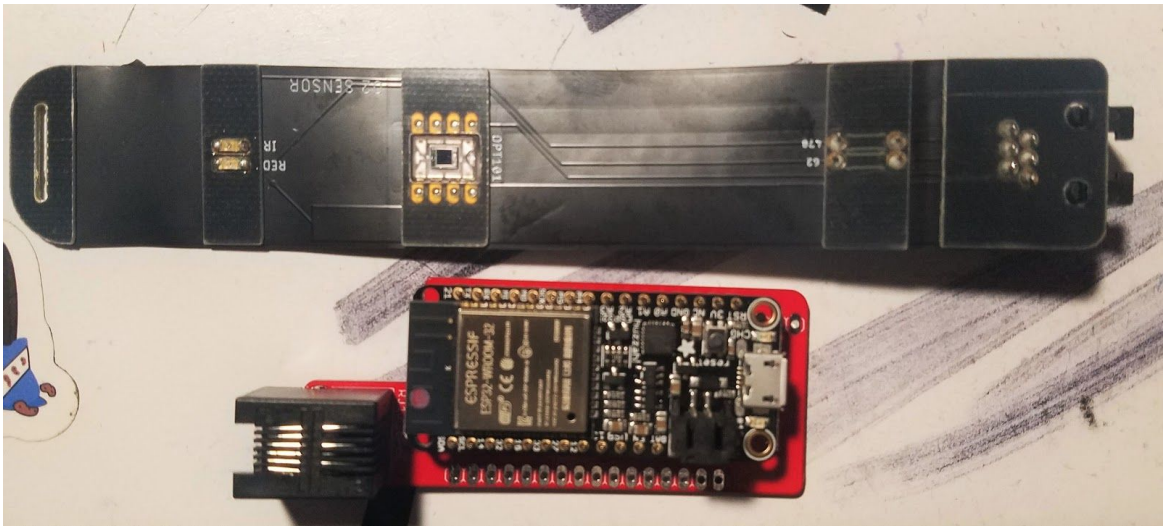




Connectors (Optional)

There are 2 6p6c connectors that can be used to give your sensor a cord and make the microcontroller placement more flexible. The pinholes are clearly marked and only fit in one direction.

You can also connect the connector pin holes on each PCB together directly on the correct-facing side for a shorter but more reliable HEG setup since the cord can be finicky. For this you just align the pins so the sensor is facing your face and the microcontroller is facing away and use standard pin headers to solder them together.



Plug it together then plug it in to your computer
With your HEG pieces assembled and connected, voila - an experimental biofeedback device! Go ahead and plug it into your computer and see that a light flashes on the board. You can get the firmware from https://github.com/moothyknight/HEG_ESP32

Setting up Arduino
You need the Arduino IDE, the ESP32 libraries (use the developer libraries rather than the boards manager version so these are modifiable), as well as all of the additional libraries and steps listed in our readme.

When that's all set up, if you followed our readme correctly, you should be able to simply open the sketch we provided and hit upload (ensure your Board is selected as well as the partition scheme “Minimal SPIFFS (Large Apps with OTA)”). Check the serial monitor output and try the command "D" to test the sensor and "f" to deactivate it - or just hit the reset button on your board.

After that, you should find "My_HEG" in your WiFi connections list, connect with password 12345678, go to 192.168.4.1 (or http://esp32.local on Apple or Bonjour-enabled devices) via your browser, and check out our on-board demo thanks to the ESP32's awesome web capabilities! Works best on Chrome and Firefox.