FAIO MULTIPLEXER WIRELESS INSTRUCTIONS MANUAL

What if you could have a switch interface that would let you perform many actions using only 4 switches?

Version 1.0

https://github.com/milador/FAIO_Multiplexer_Wireless

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Components List

1. ADAFRUIT BLUEFRUIT FEATHER **x 1**
2. ADDRESS LED DISC SER RGB 5MM **x 1**
3. FEATHER HEADER KIT FML **x 1**
4. RES 470 OHM 1/4W 5% AXIAL **x 1**
5. CONN JACK STEREO 3.5MM R/A **x 4**
6. HEX NUT 0.197" NYLON M2.5 **x 4**
7. MACH SCREW PAN SLOTTED M2.5X0.45 **x 4**
8. CONN HEADER VERT 5POS 2.54MM **(Optional) x 1**
9. BATTERY LITHIUM 3.7V 350MAH **(Optional) x 1**

The FAIO_Multiplexer_Wireless_BOM or FAIO Multiplexer Wireless bill of materials can also be downloaded from GitHub repository under main directory.

https://github.com/milador/FAIO_Multiplexer_Wireless/blob/master/Components/FAIO_Multiplexer_Wireless_BOM.xlsx

Software

The FAIO Multiplexer Wireless software can be downloaded from the GitHub repository under software directory.

https://github.com/milador/FAIO_Multiplexer_Wireless/tree/master/Software/FAIO_Multiplexer_Wireless_Software

Installing Arduino Libraries

The following instructions on how to install additional Arduino libraries helps you to get started with setting up Arduino IDE with required libraries and dependencies.

https://www.arduino.cc/en/guide/libraries

Required Software and libraries

The wireless version of the software requires the following files and libraries:

- StopWatch.h
- EasyMorseBlue.h
- EasyMorseBlueHid.h
- Bluefruit Arduino Library
- Adafruit_NeoPixel.h
- FlashStorage.h (Optional: Only M0 processor)
- FAIO_Multiplexer_Wireless_Software.ino

StopWatch library helps to calculate the reaction time and timeout in the morse code interface.

EasyMorseBlue library is used to provide morse code input interface by translating morse code into characters.

EasyMorseBlueHid header file provides simple methods to send mouse and keyboard HID actions to the bluetooth module.

FAIO Multiplexer Wireless is using Adafruit_NeoPixel library to provide visual feedback using RGB LED.

The M0 processor does not come with EEPROM support and requires using FlashStorage library to handle saving variables and settings.

There is a great instructions manual on how to use Arduino IDE and Adafruit Feather 32u4 Bluefruit LE board which can help you get started using Arduino IDE and install necessary Adafruit drivers.

https://learn.adafruit.com/adafruit-feather-32u4-bluefruit-le/using-with-arduino-ide

The wireless version of the FAIO Multiplexer is using nRF51 Bluetooth chip to communicate with host devices. Bluetooth communication might seem complicated but Adafruit has made the bluetooth communication process less challenging by providing Adafruit nRF51 BLE Library which you can download from Adafruit and import it to your locally installed Arduino directory under libraries directory.

https://github.com/adafruit/Adafruit_BluefruitLE_nRF51

The instructions on how to install Adafruit nRF51 BLE Library can be found in following link:

https://learn.adafruit.com/adafruit-feather-32u4-bluefruit-le/installing-ble-library

Uploading Software

Note: Make sure all three files are included in your local copy of Software directory before uploading it to the Adafruit Feather board. The libraries can be installed in Arduino libraries.

The downloaded software and libraries can be uploaded to the Adafruit Feather board in FAIO Multiplexer using Arduino IDE which you can download from Arduino official website.

https://www.arduino.cc/en/Main/Software

You can go ahead and upload the downloaded. ino software to Adafruit Feather board using Arduino IDE once all the necessary libraries are installed.

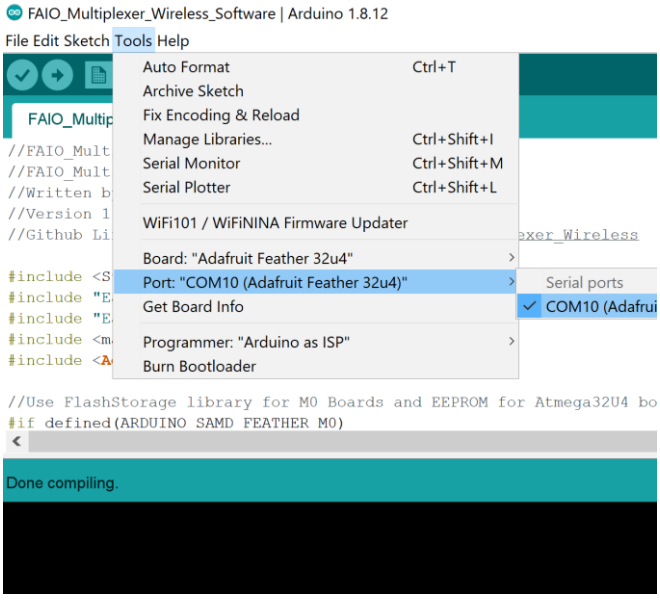
1. Select the Board under **Tools > Board** as **Adafruit Feather 32u4** or **Adafruit Feather M0** based on your board
2. Select the correct port number under **Tools > Port** which should say **COM XX (Adafruit Feather 32u4)** or **COM XX (Adafruit Feather M0)** based on your board

Note: It's very important to make sure the correct Board and port number are selected as selecting the wrong board may result problems with bootloader of Adafruit Feather board.

3. Press the Verify button to make sure there is no problem with the software and libraries
4. Press Upload button

Here you can see an example of my selected Board and port number.

Note: Your port number won't be the same



You can now go ahead and upload the software. Arduino IDE will show you a "Done uploading" message indicating the software is uploaded to your FAIO Multiplexer Wireless.

The LED on the FAIO Multiplexer Wireless main board blinks two times in green to indicate the start of initialization process has been started and it will blink again two times in green to indicate end of the initialization process.

You can also open the Serial Monitor in Arduino IDE on 115200 baud rate to read initialization information about the version of software.

Hardware Assembly

Printed circuit Board design

The printed circuit boards (PCB) can be downloaded from GitHub repository under Hardware directory.

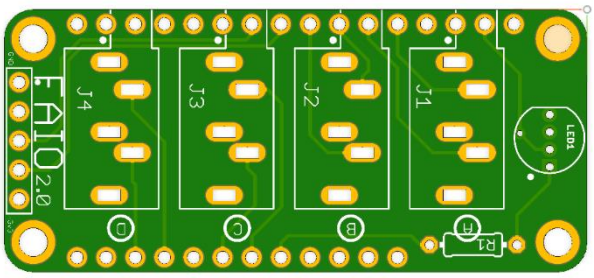
https://github.com/milador/FAIO_Multiplexer_Wireless/tree/master/Hardware/PCB_design

Enclosure design

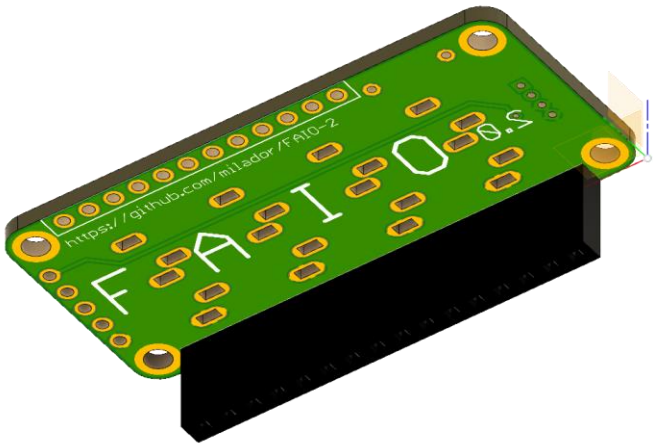
The enclosure/housing files in STL format can be downloaded from GitHub repository under Hardware directory.

https://github.com/milador/FAIO_Multiplexer_Wireless/tree/master/Hardware/Housing_design

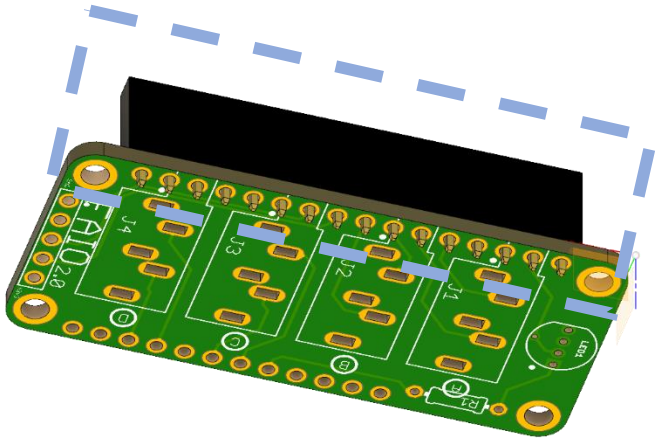
Assembly Instructions



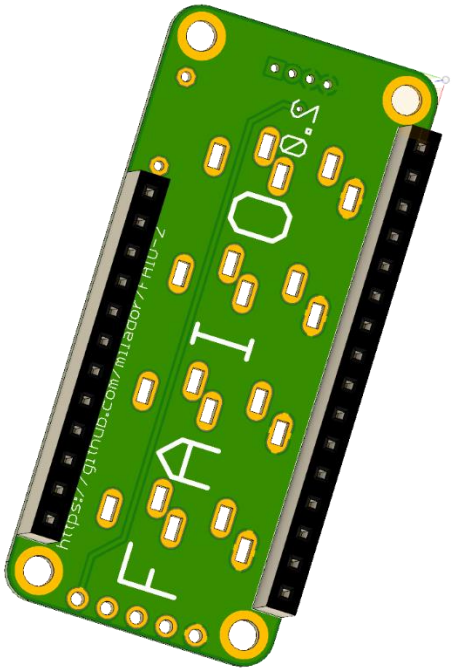
Step 1 – FAIO Switch main board x 1



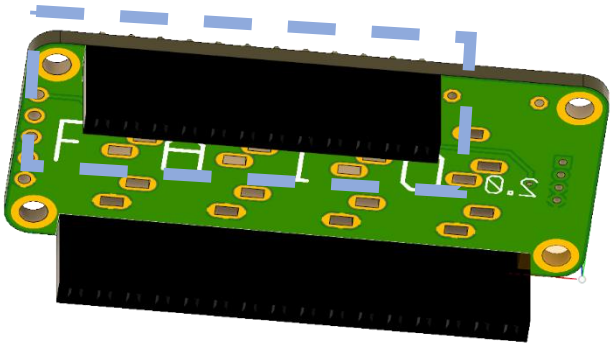
Step 2 – 16 position female header connector x 1



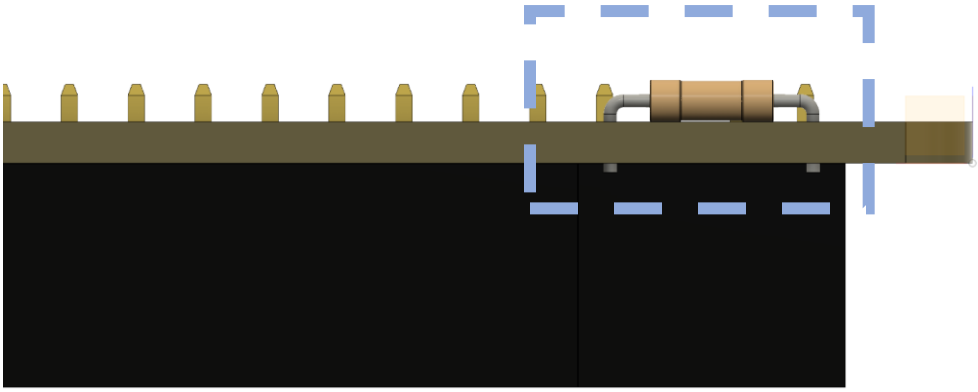
Step 3 – Solder 16 position female header connector



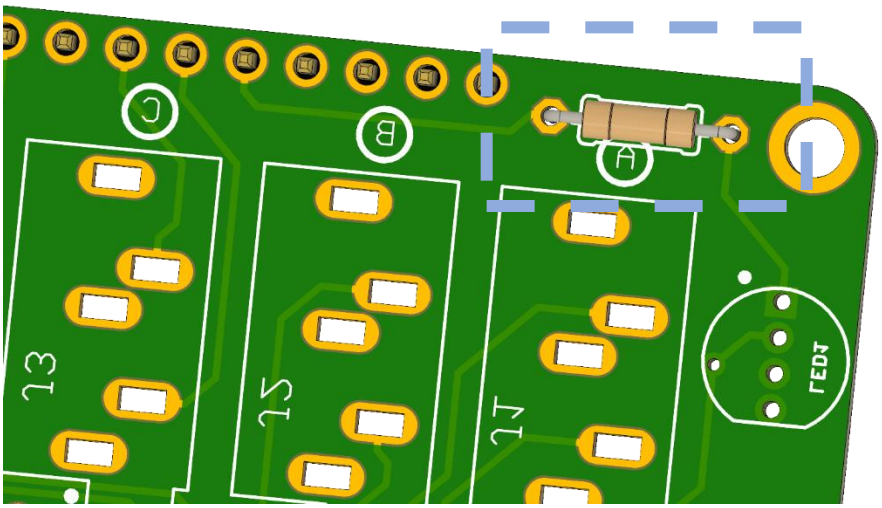
Step 4 – 12 position female header connector x 1



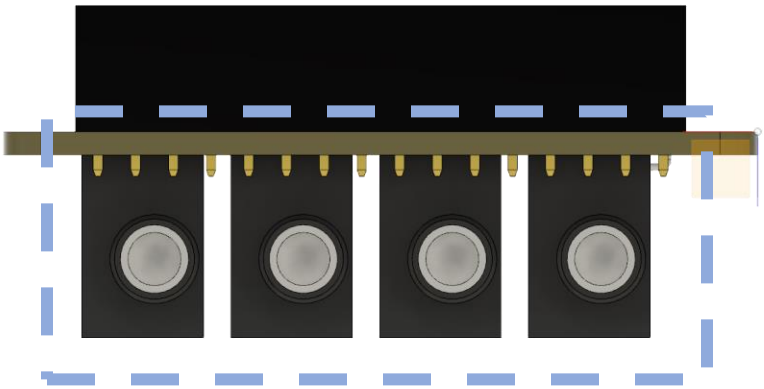
Step 5 – Solder 14 position female header connector



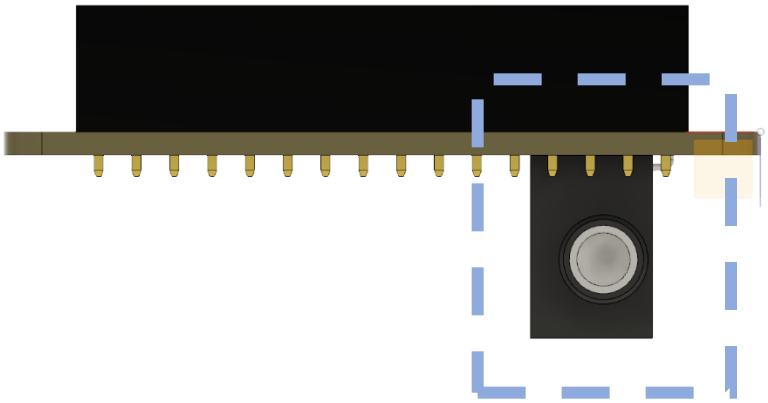
Step 6 – 470 OHM Resistor



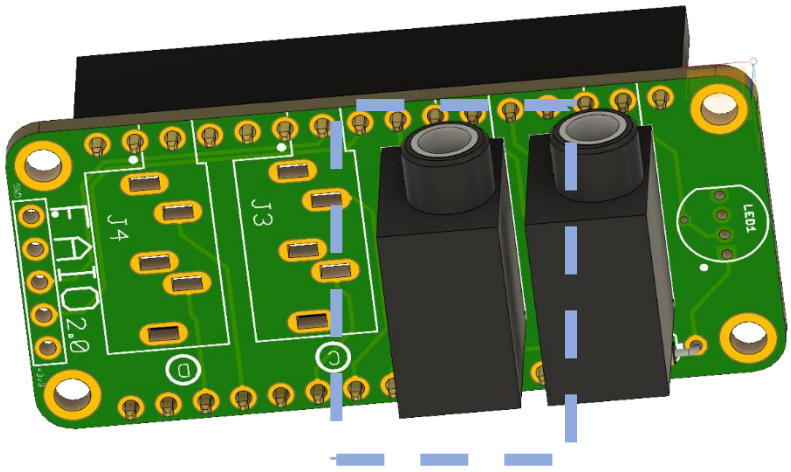
Step 7 – Solder 470 OHM Resistor



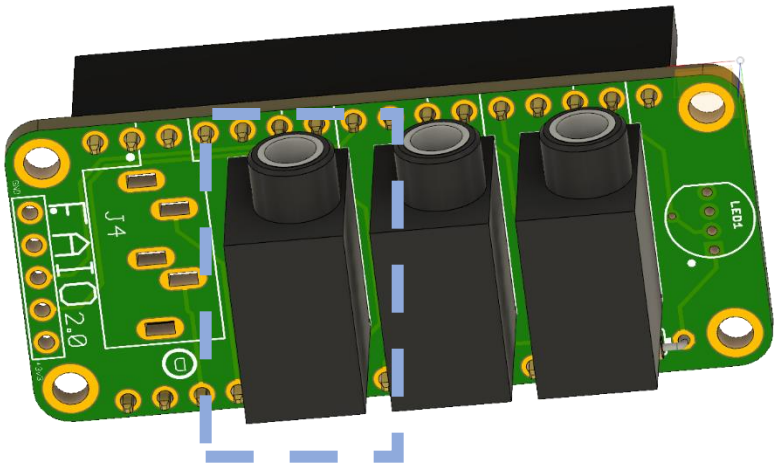
Step 8 – 3.5 mm stereo audio plugs x 4



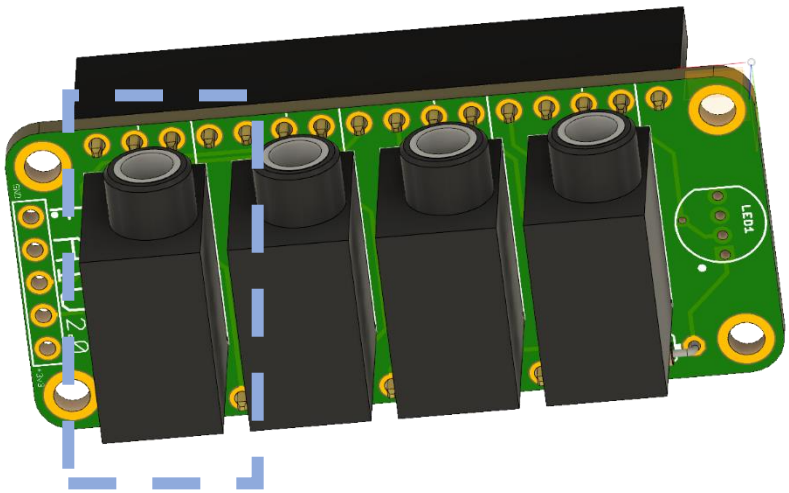
Step 9 – Solder 3.5MM plug A



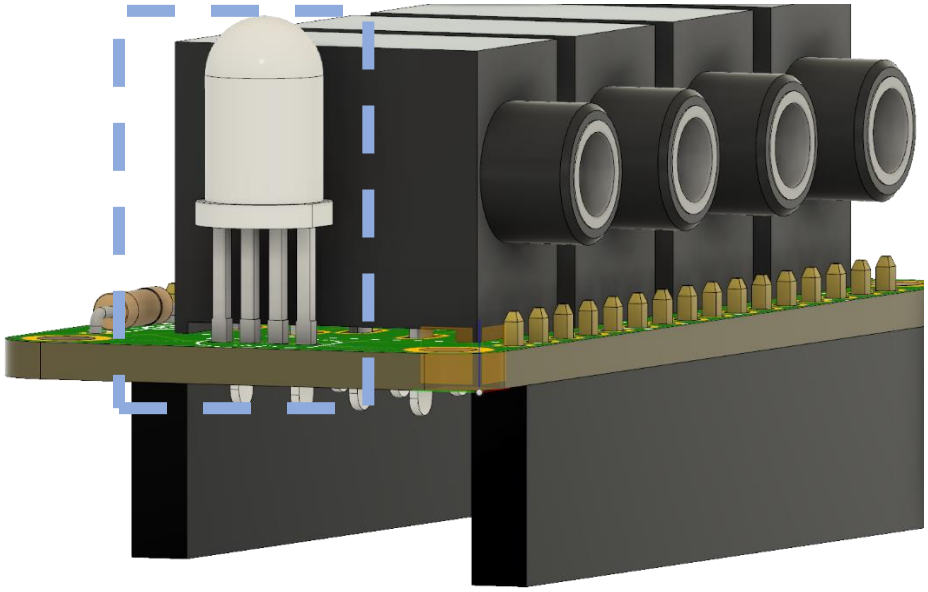
Step 10 – Solder 3.5MM plug B



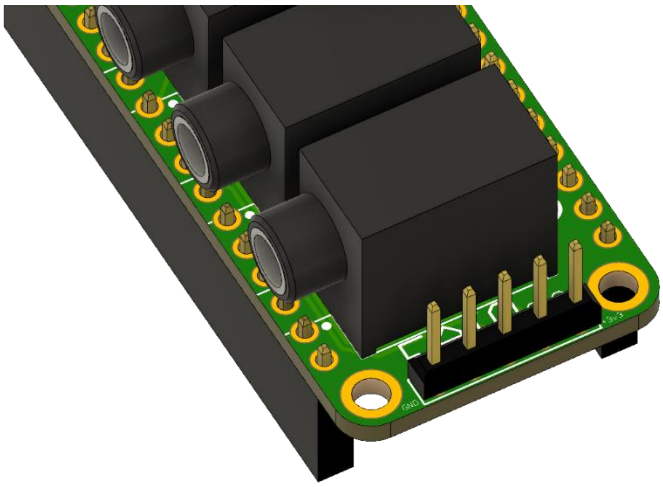
Step 11 – Solder 3.5MM plug C



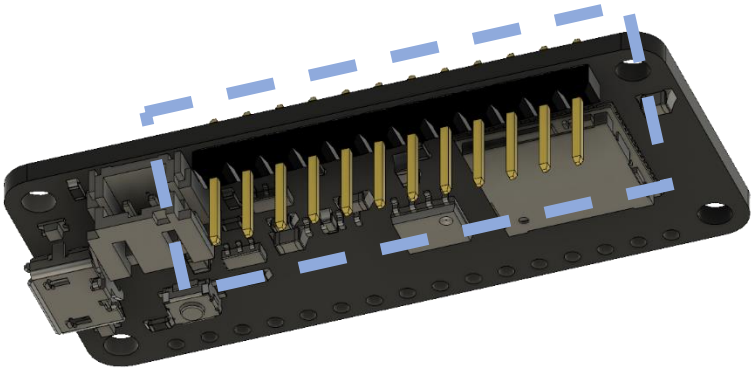
Step 12 – Solder 3.5mm plug D



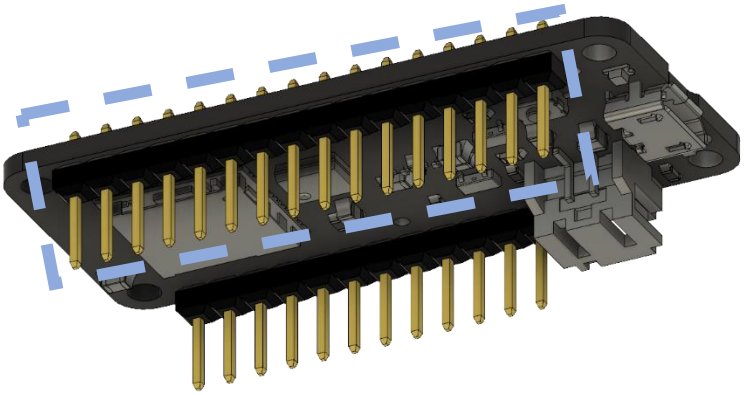
Step 13 – Solder RGB LED x 1



Step 14 – Solder 5 position male header connector on feather board



Step 15 – Solder 16 position male header connector on feather board

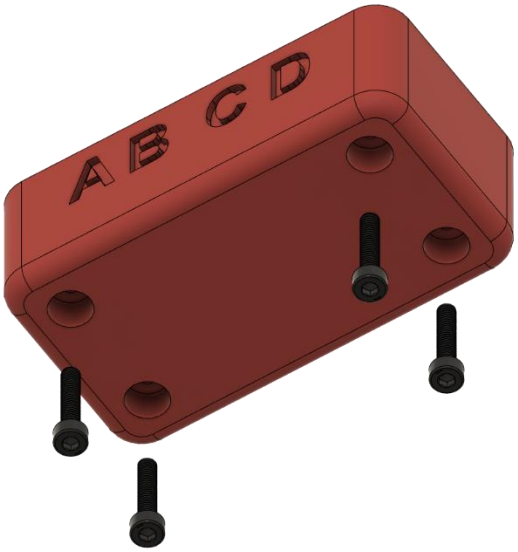


Step 16 – Solder 12 position male header connector on feather board

Step 17 – 3D Print FAIO Multiplexer enclosure bottom part

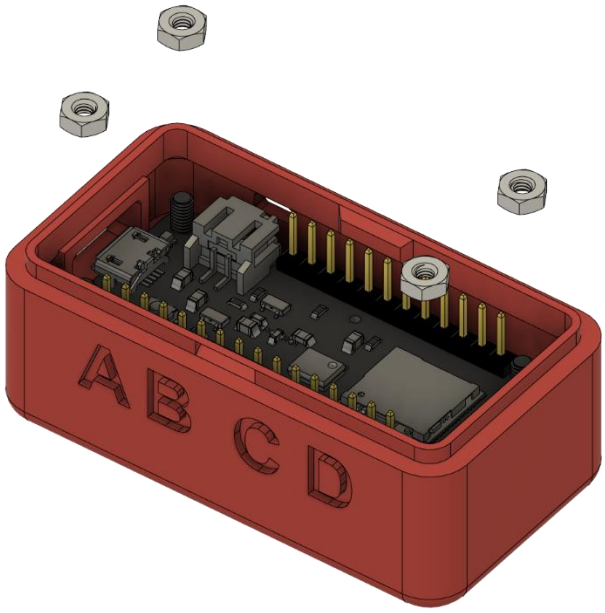
Step 18 – 3D Print FAIO Multiplexer enclosure battery holder part and insert it into the enclosure

Step 19 – Insert the Feather board into the main enclosure.

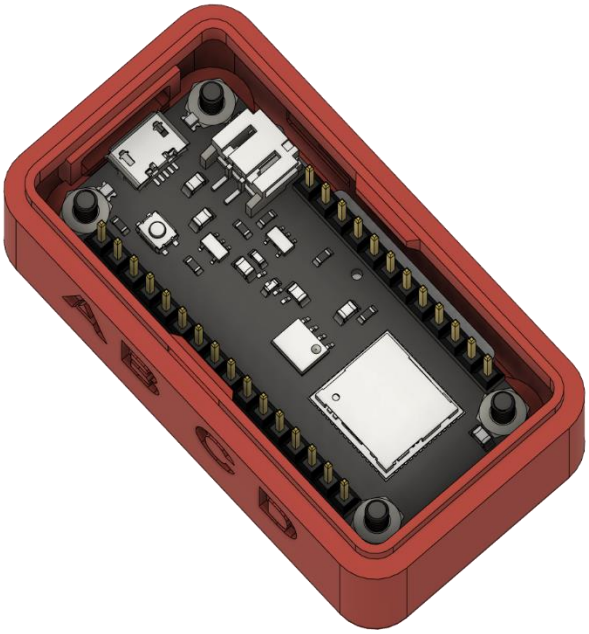


Step 20 – Insert the four M2.5 machine screws in Feather board drill holes

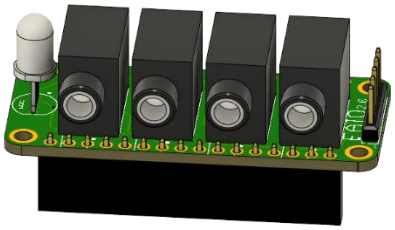
Step 21 – Make sure the Feather board is seating flat inside the enclosure.

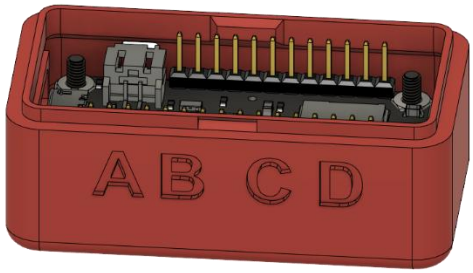


Step 22 – Insert the four M2.5 Machine screw nuts at the top of the enclosure into Machine screws.

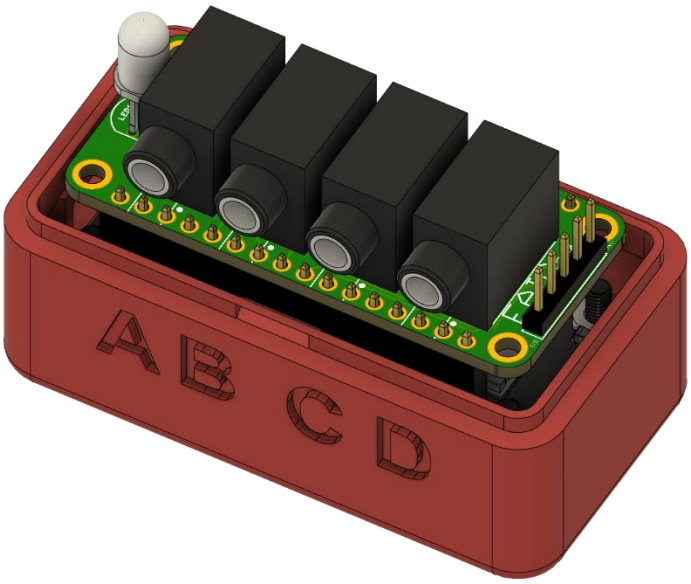


Step 23 – Hold the screws still while you spin the nuts.

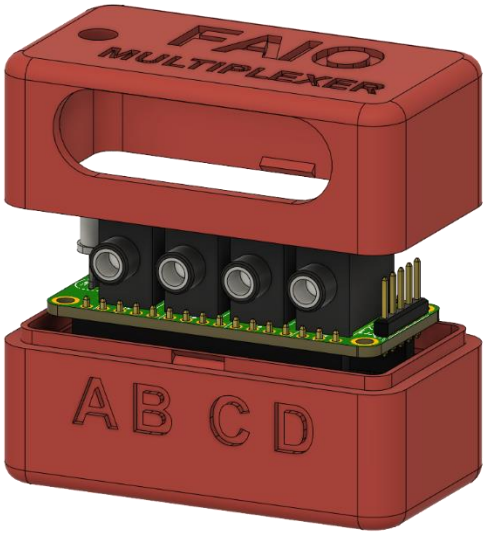




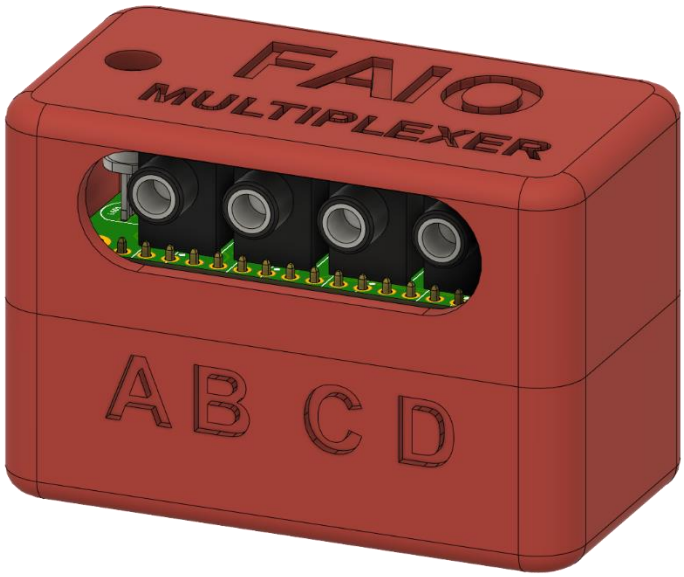
Step 24 – Stack the FAIO Multiplexer PCB Board into the Feather board inside the enclosure.



Step 25 – Make sure the FAIO board has been stacked correctly and the 3.5mm Audio plugs are accessible.



Step 26 – 3D Print FAIO Multiplexer enclosure top part and insert it into the enclosure



Step 27 – That's it! Your FAIO Multiplexer is fully assembled and ready to use.