

# Icthyystick Upgrade Kit

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## Supplies and kit contents

You will need:

- Wire strippers
- Microclasp and microfit crimpers [*adapter cables available for extra cost if you do not want to crimp, but these will be less reliable than cutting and crimping as the original cabling does not have locking in-line connector options available*]
- Phillips head screw driver
- Existing Icthyystick electronics box
- USB-C cable (to connect to Arduino, if you did not receive it pre-programmed from Acbotics Research)

Base Kit contents:

- Arduino Uno R4 Wifi
- Icthyystick Arduino Shield
- Microclasp crimp parts (pins, shells)
  - Shells: 1x2, 1x8 microclasps
  - Pins: 12 x (2 extra)
- Microfit crimp parts
  - 2x2 Male shell, 2x3 male shell, 1 x 3 male shell
  - 12 female pins (2 extra)
- Mounting plate
- 5 x M2 5mm screws (phillips head) (one spare)

Option 1: USB connector add-on

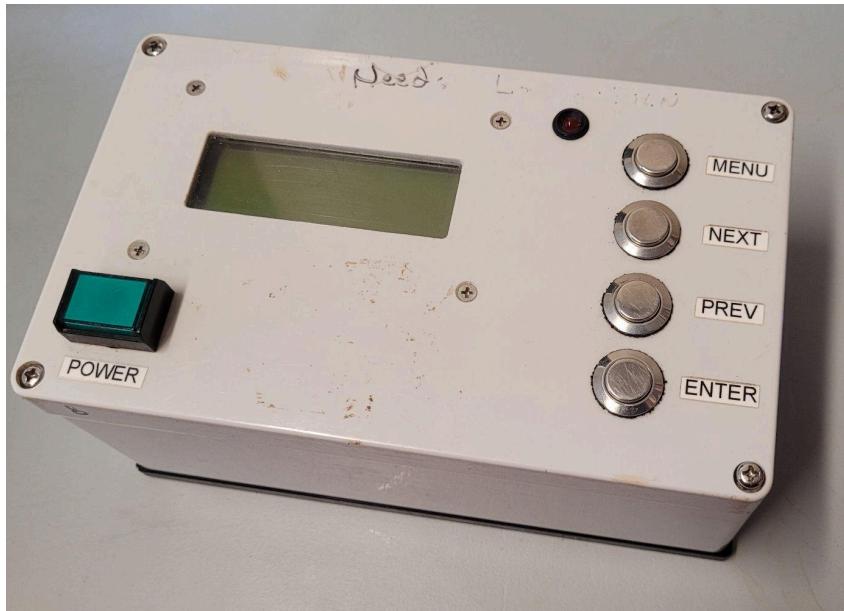
- Drill an extra hole in the box
- Add Bulgin USB connector (replaces serial in old module)

Option 2: Camera triggered by mag touch

- SPI camera
- External connector

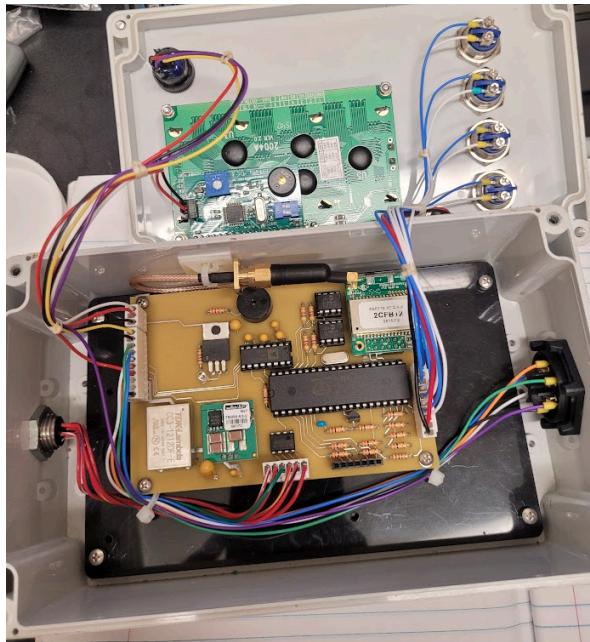
- Internal cable
- You will need to drill an extra hole in the box

## Upgrading electronics in an existing box [base kit]

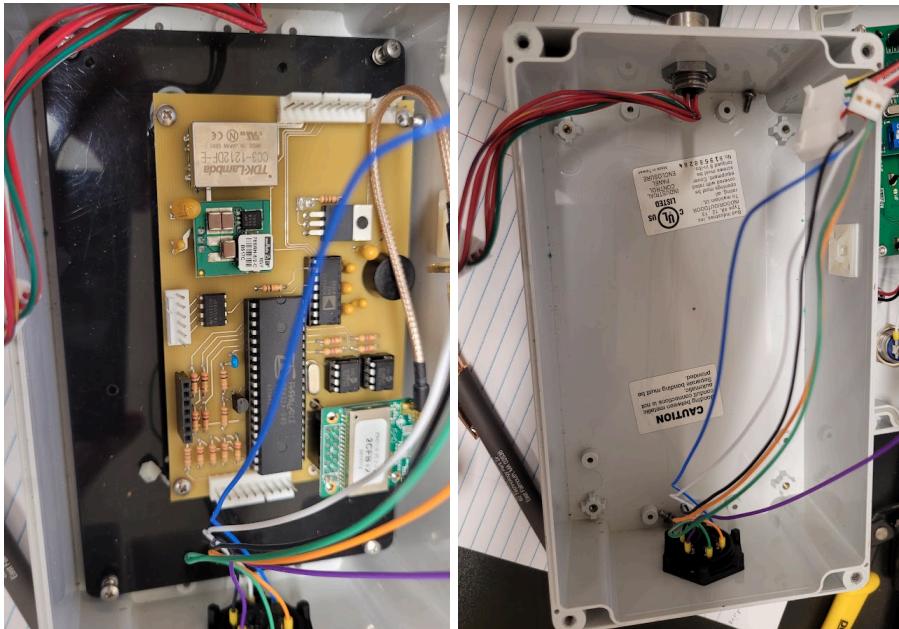


*Current icthystick dry box with buttons, LCD, and power button. The upgrade kit will replaces the internal electronics with an arduino and custom shield so that almost any random engineer can add software/hardware features if needed.*

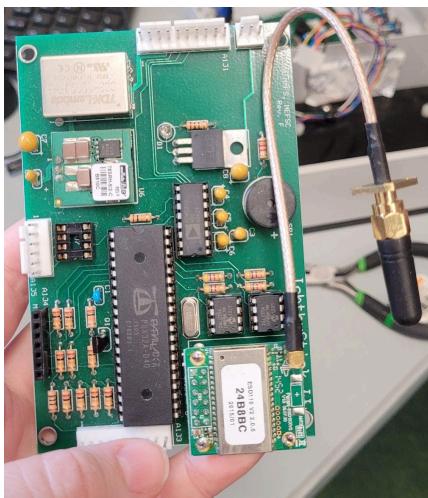
1. Remove corner screws and open the box



2. Disconnect all cables from the PCB in the lower part of the box and cut zip tie holding antenna, unscrew black plate in bottom to make it possible to remove old PC board and plate together.

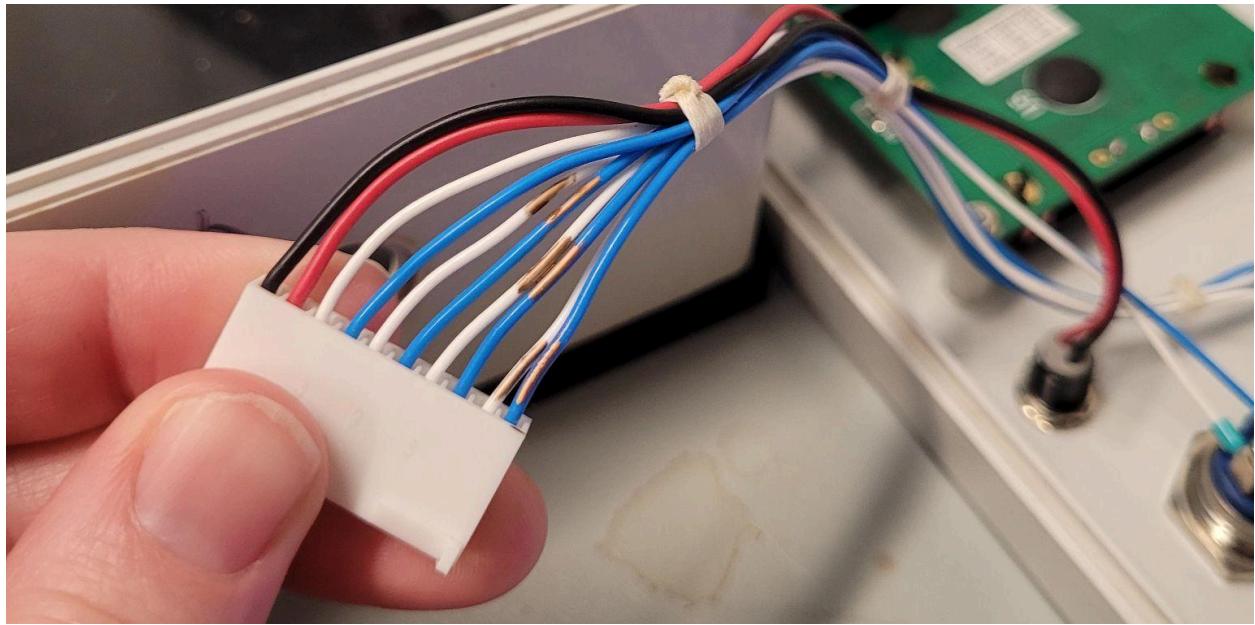


3. Remove old PC board

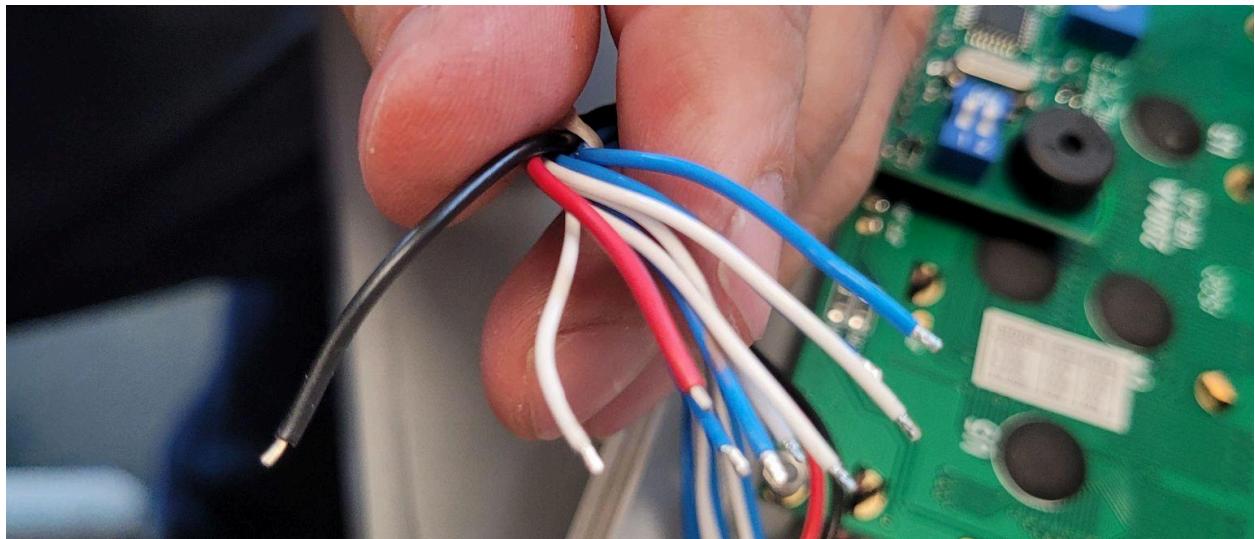


4. Recrimp button connector with microclasp 1x8 and 1x2:

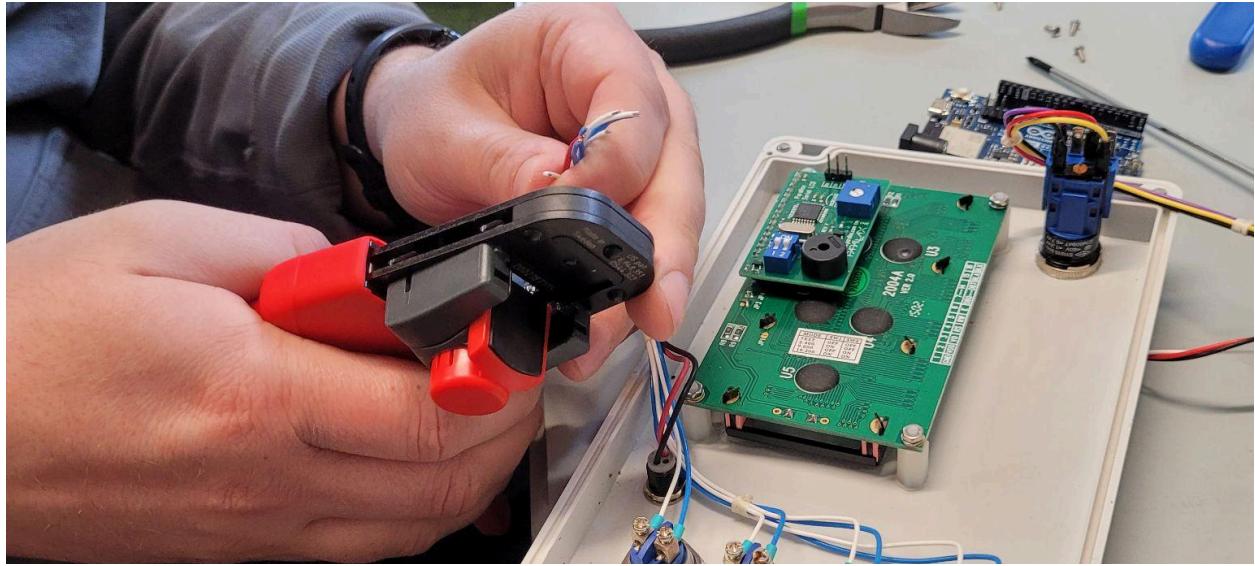
- a. Mark pairs of button cables so you can identify the pinout [we used a colored marker and colored each pair at different heights]



b. Cut off connector, Strip  $\frac{1}{8}$ " of jacket off of all 10 wires

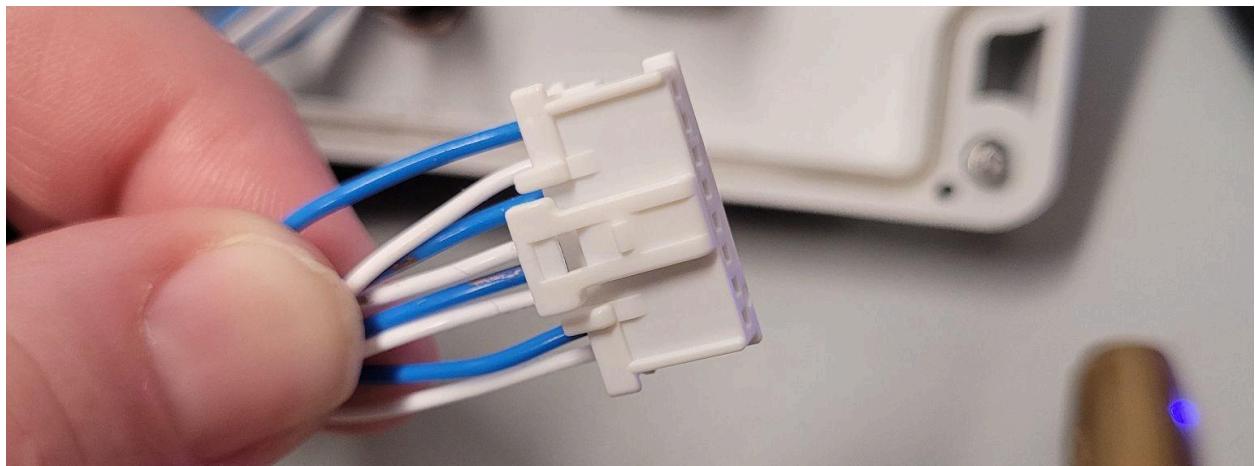
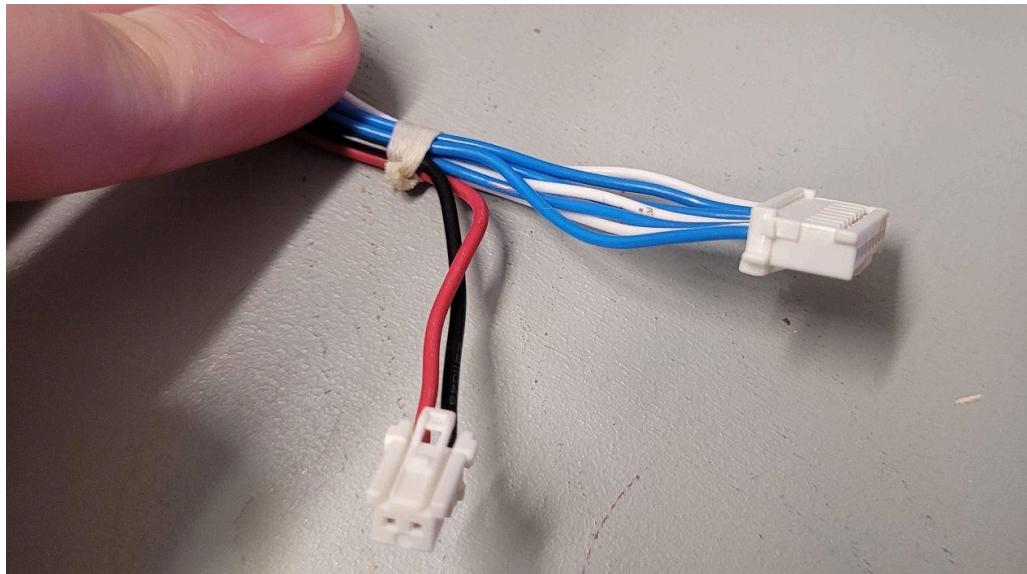


c. Crimp Microclasp crimp pins to all 10 wires

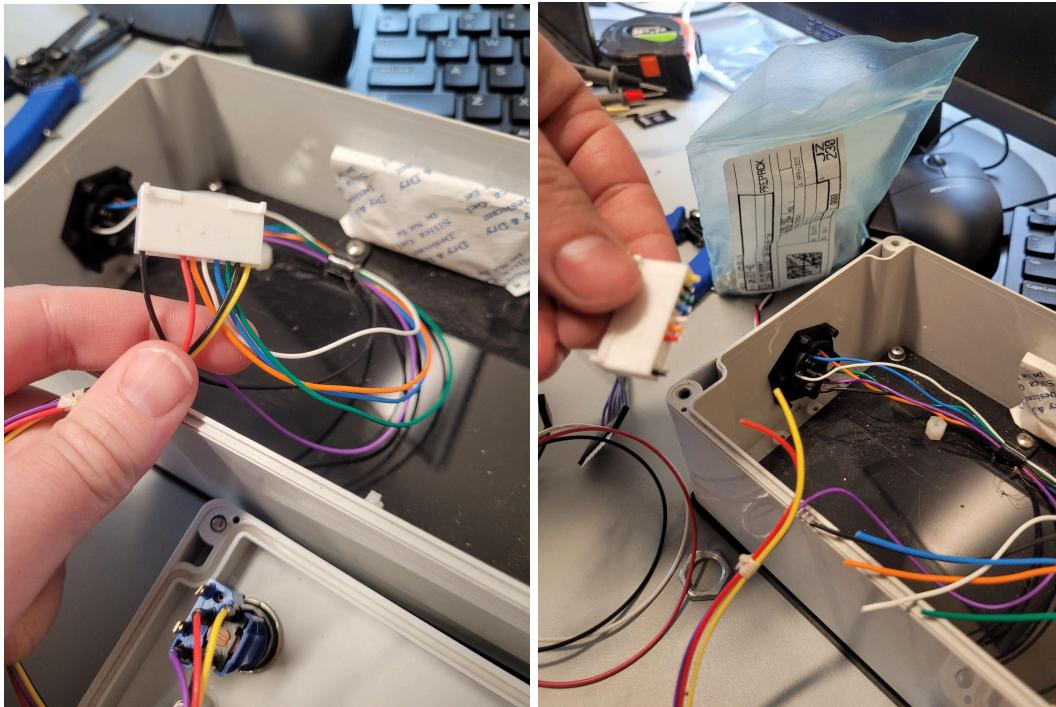


d. Insert LED pins (Red/Black) into 2-pin microclasp, black=pin 1, red=pin 2; Insert button wires into 1x 8:

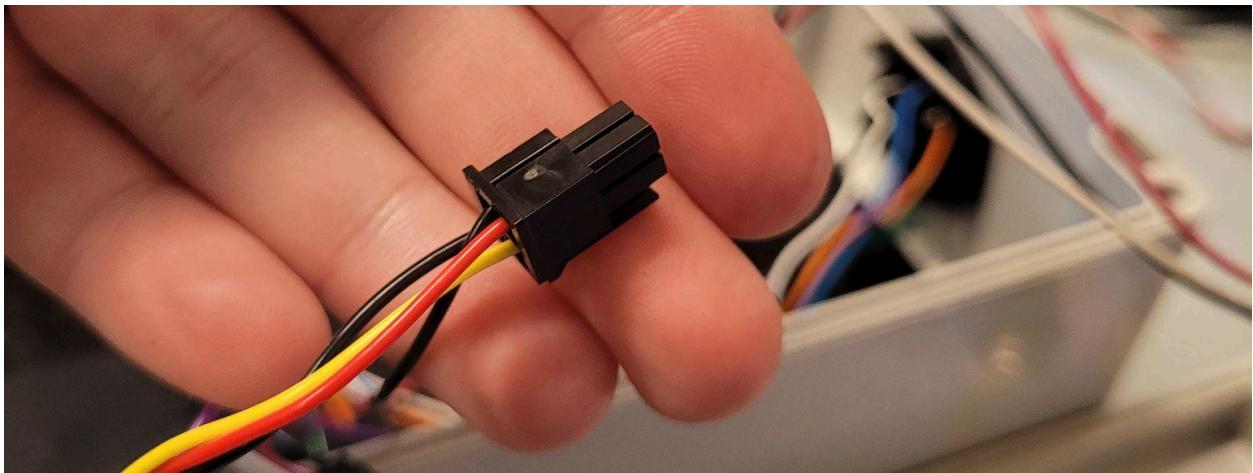
Old connector pin (10 pin)	Wire color	New connector	New connector pin
1	Black	J5	J5-1
2	Red	J5	J5-2
3	White	J3	J3-2
4	Blue	J3	J3-1
5	White	J3	J3-4
6	Blue	J3	J3-3
7	White	J3	J3-6
8	Blue	J3	J3-5
9	White	J3	J3-8
10	Blue	J3	J3-7



5. Power connector: [Note: the current version does NOT provide UART, will provide USB if desired [see addendum: adding USB]]



- Cut off connector, noting wiring colors/numbers if not as indicated below!!
- Crimp microfit female pins to wires
- Insert as indicated into microfit 2x2 M connector shell



Current Pin no.	Current color	New connector/pin no	Description
1	Black	J4-1	GND
4	Red	J4-2	Power in [after switch]
5	Orange	NC	Serial [NC]
6	White	NC	

7	Blue	NC	
8	Green	NC	
9	Black	J4-3	GND
10	Yellow	J4-4	Power switch LED

6. Magnet sensor cable:

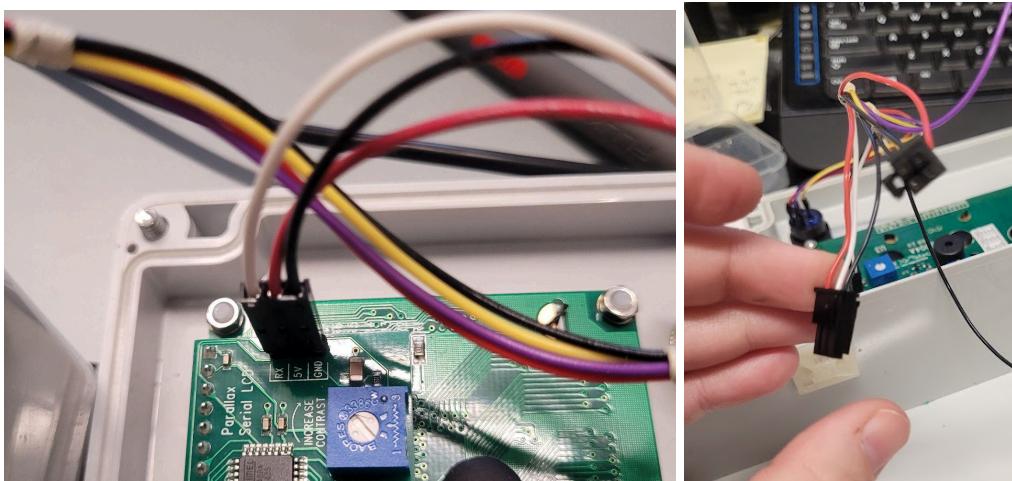


- Cut cable [Note pinout if colors differ from below]
- Strip each wire
- Crimp microfit F pins onto each wire
- Put through hole in box, tighten nut. **If you put the microfit on first before installing the connector in the box, the nut will not fit over the connector**
- Insert pins into microfit 2x3 as indicated below

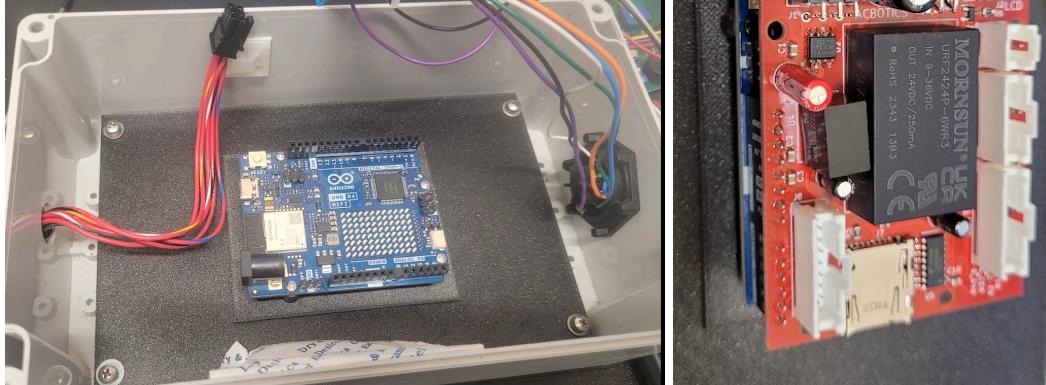
Current Pin no.	Current color	New connector/pin no	Description
1	Red/white stripe	Pin 6 J1	Power
2	Red/Red	Pin 1 J1	GND
3	Green/yellow	Pin 2 J1	Pin5- transceiver
4	Red/orange	Pin 3 J1	Pin6 transceiver
5	Red/black	Pin 4 J1	Pin7 transceiver
6	Red/blue	Pin 5 J1	Pin 8 transceiver

7. Crimp 1x3: cut off old connector
  - a. Cut cable [Note pinout if colors differ from below]
  - b. Strip each wire
  - c. Crimp microfit F pins onto each wire
  - d. Insert into 1x3 M shell as follows:

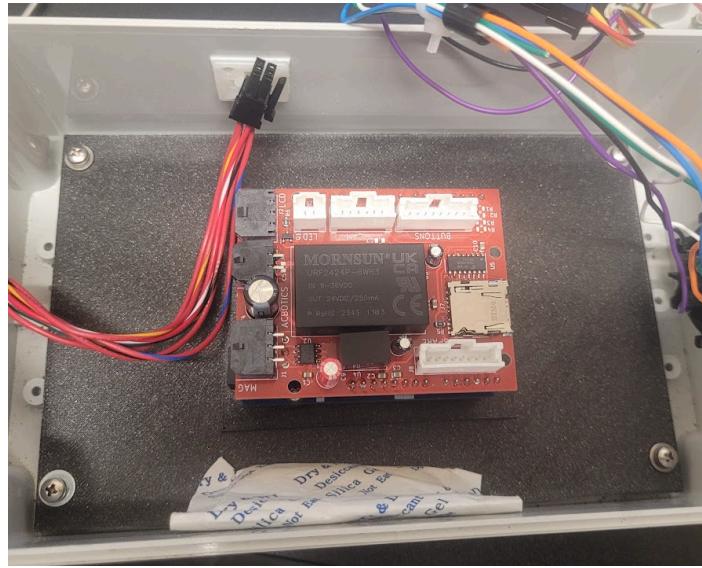
Current Pin no.	Current color	New connector/pin no	Description
1	Black	Pin 1 J2	GND
2	Red	Pin 3 J2	POW
3	White	Pin 2 J2	SIG



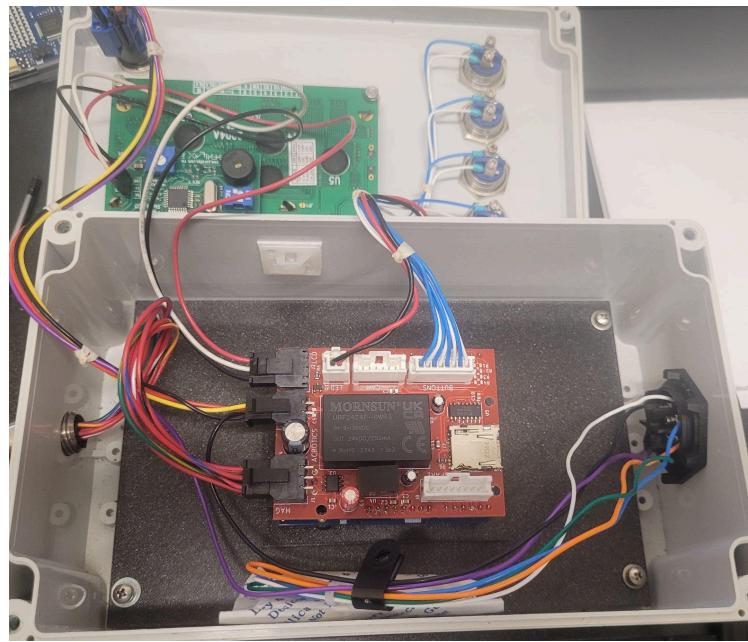
8. Screw in new base plate. Attached Arduino Uno R4 wifi to the new base plate using M2 x 5.5 mm phillips head screws. Note: barrel connector on Arduino Uno R4 should face the magnetic sensor connector as shown; this means the new plate should be installed with the wider-space holes facing the mag connector.



9. Push the custom icthystick shield onto the arduino



10. Connect all cables to appropriate connectors on the icthystick shield.



11. Close box



## Programming Arduino Uno R4

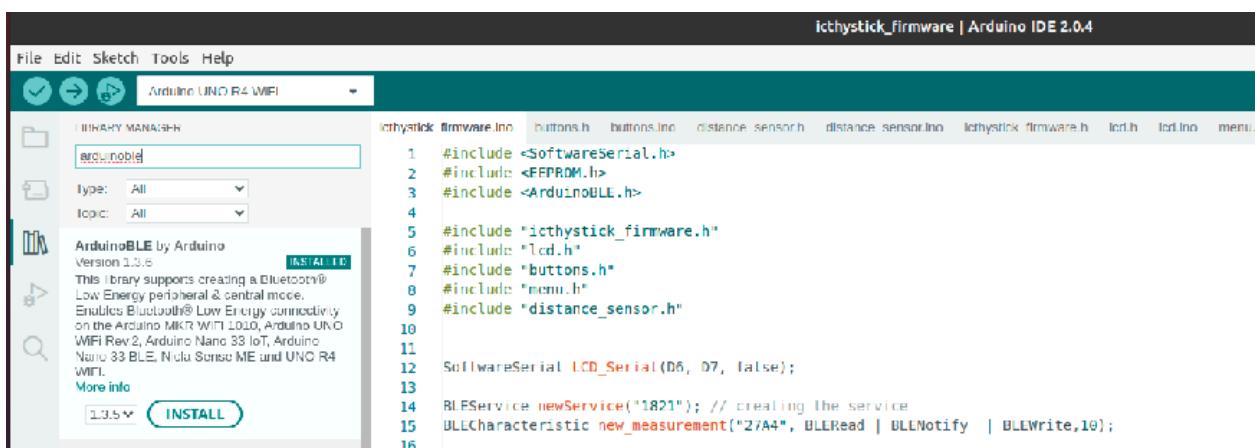
1. Get the icthystick\_firmware from github:  
[https://github.com/Acbotics-Public/Icthyostick2.0/tree/main/icthystick\\_firmware](https://github.com/Acbotics-Public/Icthyostick2.0/tree/main/icthystick_firmware)
2. Open up icthystick\_firmware.ino in Arduino IDE (it will open a bunch of .ino files automatically)

```

File Edit Sketch Tools Help
Arduino Uno R4 WiFi
icthystick_firmware.ino distance.h distance_menu.h distance_sensor.h distance_sensor.ino icthystick_firmware.h lcd.h lcd.ino menu.h menu.ino ...
1 #include <SoftwareSerial.h>
2 #include <EEPROM.h>
3 #include <ArduinoBLE.h>
4
5 #include "icthystick_firmware.h"
6 #include "lcd.h"
7 #include "menu.h"
8 #include "menu.h"
9 #include "distance_sensor.h"
10
11
12 SoftwareSerial LCD_Serial(D6, D7, false);
13
14 BLEService newService("1821"); // creating the service
15 BLECharacteristic newMeasurement("2744", BLERead | BLENotify | BLEWrite, 10);
16
17 BLEByteCharacteristic switchChar("2A57", BLERead | BLEWrite); // creating the LED characteristic
18
19

```

3. Follow instructions here to set up the R4 to work with arduino IDE (if you have not done this already): <https://docs.arduino.cc/tutorials/uno-r4-wifi/r4-wifi-getting-started/>
4. Install dependencies: Add Library -> search for ArduinoBLE



5. Connect your arduino via USB cable
6. Hit the program button (Arrow)