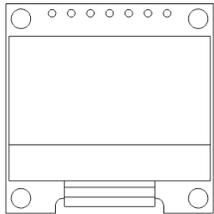
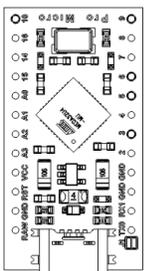


INTRODUCTION TO
SURFACE MOUNT
SOLDERING

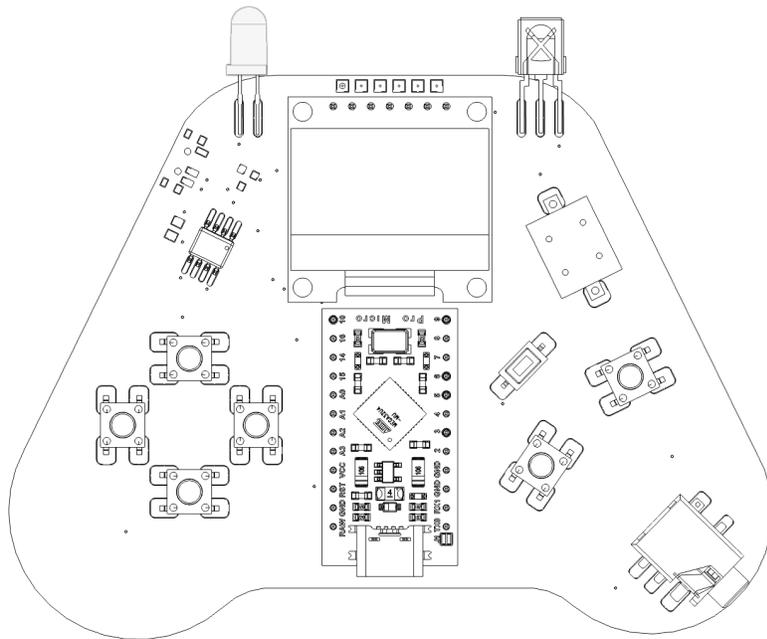
ARDUBOY KIT



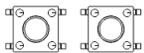
OLED DISPLAY



PRO-MICRO



RESET BUTTON



BUTTONS (x6)



SPEAKER

ADVANCED FEATURES



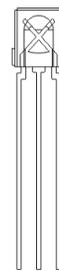
HEADPHONE JACK



FLASH CHIP



IR LED



IR RECEIVER

OPEN-SOURCE GAME SYSTEM COMPATIBLE WITH
OVER 300 FREE GAMES AVAILABLE AT ARDUBOY.COM

CREATE YOUR
OWN GAMES

ORIGINAL DESIGN BY KEVIN BATES

FOR
HOPE CONERENCE JULY 12-14 NEW YORK 2024



SOLDER AND SOLDERING IRON REQUIRED

AGES 12+

ARDUBOY.COM / KIT

Arduboy Kit

The Arduboy Kit is a video game system on a circuit board. Based on the popular Arduboy open-source game platform, it is designed to be assembled by hand.

Goals

The Goal of the Arduboy Kit is to be a casual and friendly introduction to surface mount soldering. Most introduction soldering kits feature only through-hole components. Surface mount kits can often be daunting. This kit aims to be somewhere in the middle. While many of the components are surface mount, they are large and easy to manipulate by hand.

Intermediate Difficulty

This kit will be best enjoyed by those with some soldering experience but is accessible to beginners with no experience at all. The most difficult component is the flash chip (SOP-8), but with a little bit of flux and determination anyone can successfully complete this kit. Ages 12 and up.

Materials

Required: Soldering Iron, Solder, Snips

Recommended: Flux, Solder Braid

Included: PCB, Pro-Micro, OLED Display, Short Pin-Headers, Reset Button, Buttons (x6), Speaker, Headphone Jack, Flash Chip, Tweezers, Practice PCB, USB-C 2.0 Cable

Learn to Solder

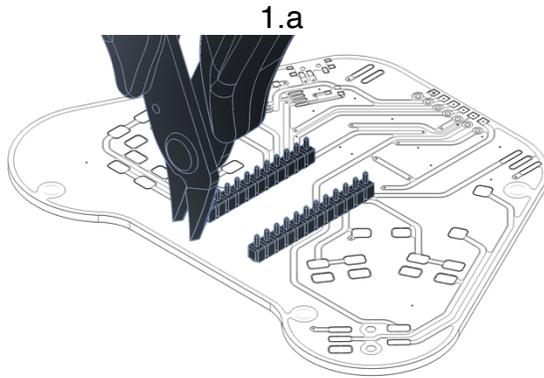
Soldering involves melting a metal alloy to create a bond between components. Temperature control is important but almost just as important is our friend flux. Flux, or sometimes called rosin, is often integrated into the solder, cleans the surfaces, prevents oxidation, and enhances the soldering process by aiding the flow and bonding of the solder.

Begin by pre-heating the components and PCB. Apply solder where the components meet, heating the joint sufficiently to allow the solder to flow into place. Use as little solder as possible to avoid bridging nearby connections. Timing is key—hold the iron just long enough for proper wicking without burning the flux. Always ensure you are working in a well-ventilated area, clean the iron's tip frequently, and wear safety glasses to protect against splashes of hot solder.

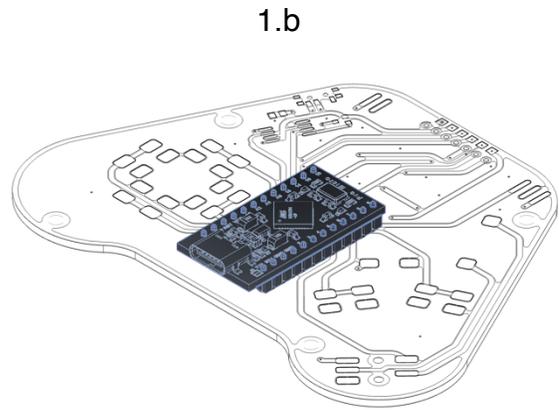
Solder Practice

Contained within the Arduboy Kit is a green circuit board. Use this board to tune the settings of your iron and practice your soldering before getting started. Practice making solder connections and get a feeling for how quickly the solder melts and how it flows to the PCB. Try to use as little solder as possible. Experiment with and without pre-heating the pad, intentionally use too much solder, make a mess and of course – have fun!

Step 1: Header Pins to Modules

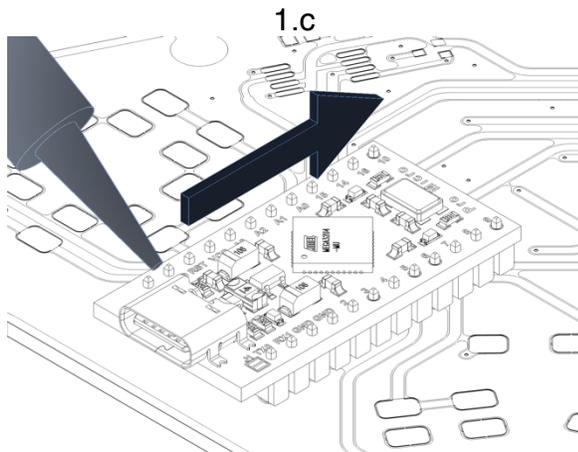


1.a
Cut and place short pin headers
WARNING: Do not solder yet!

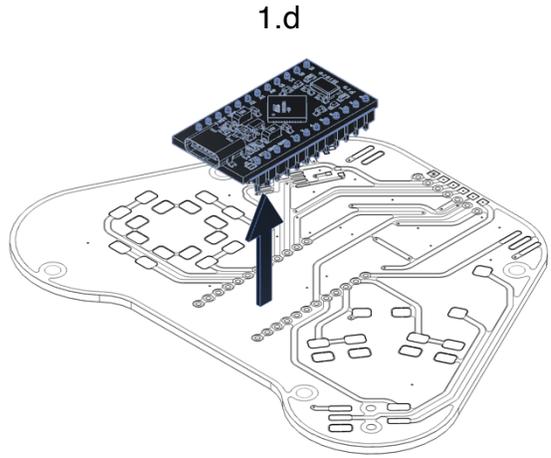


1.b
Place Pro-Micro

It's recommended to use the PCB for reference instead of counting the number of required pins. The PCB is used as a jig to align the pins to the module
CAUTION: When cutting pin headers, they can go flying

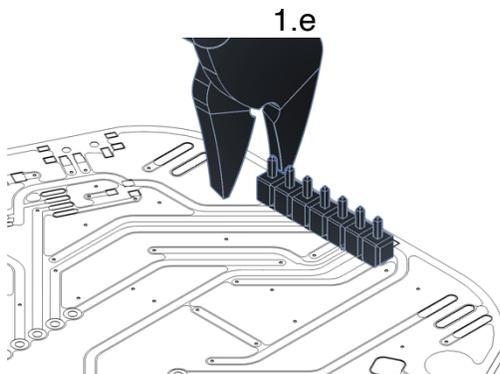


1.c
Solder pins to Pro-Micro

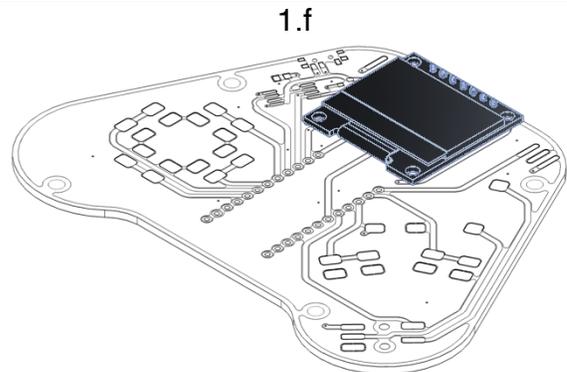


1.d
Remove Pro-Micro with pins

CAUTION: Do not disturb components already mounted to the Pro-Micro. Hold the soldering iron in a way that safely clears other components

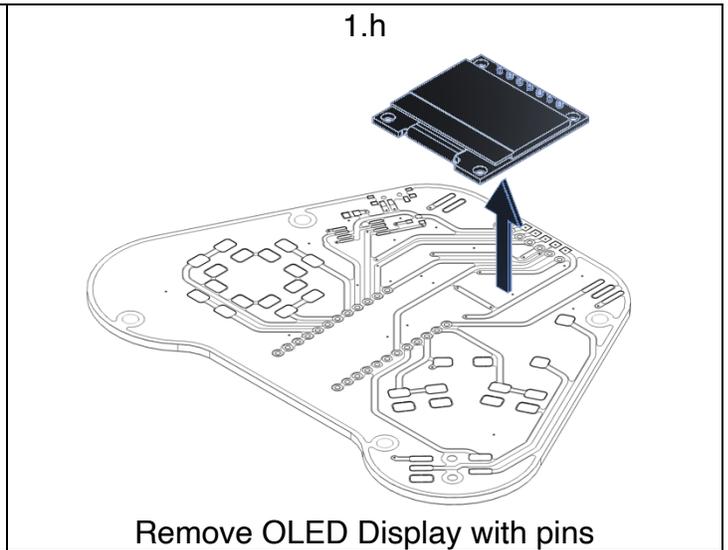
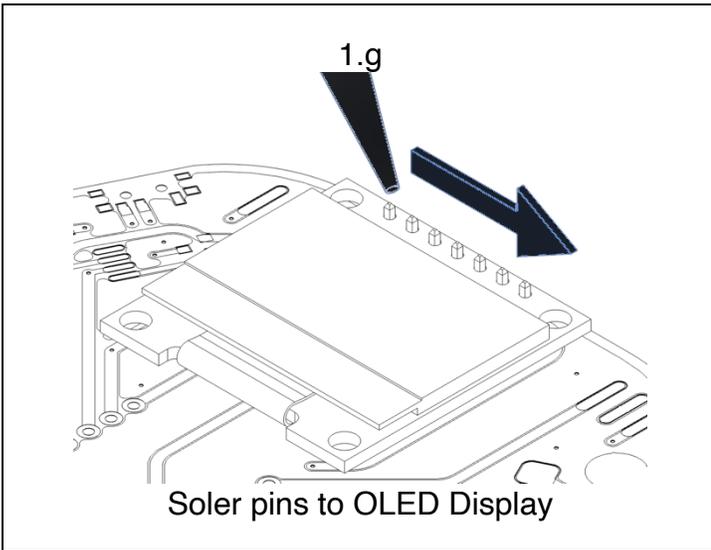


1.e
Cut and place pin headers
WARNING: Do not solder yet!

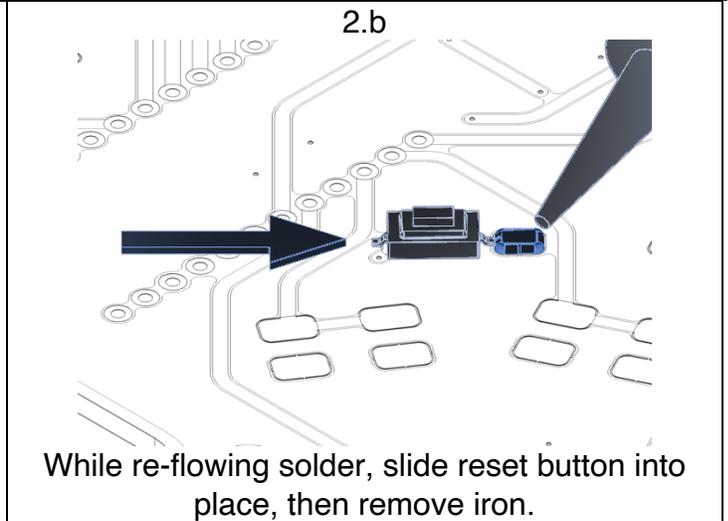
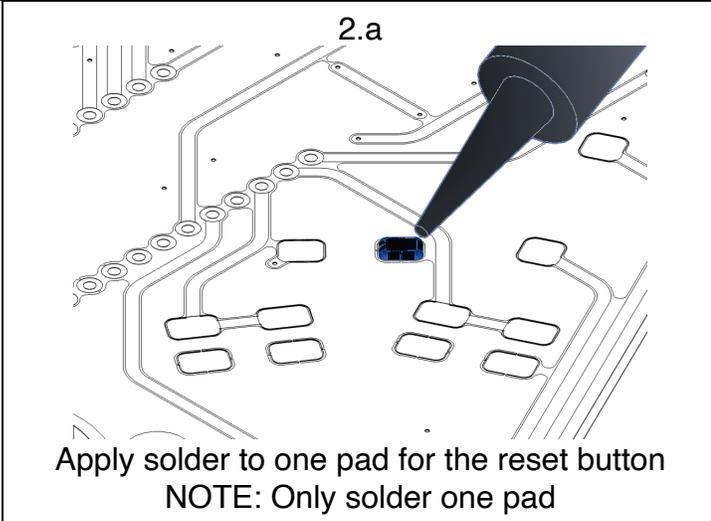


1.f
Place OLED Display
Screen facing up

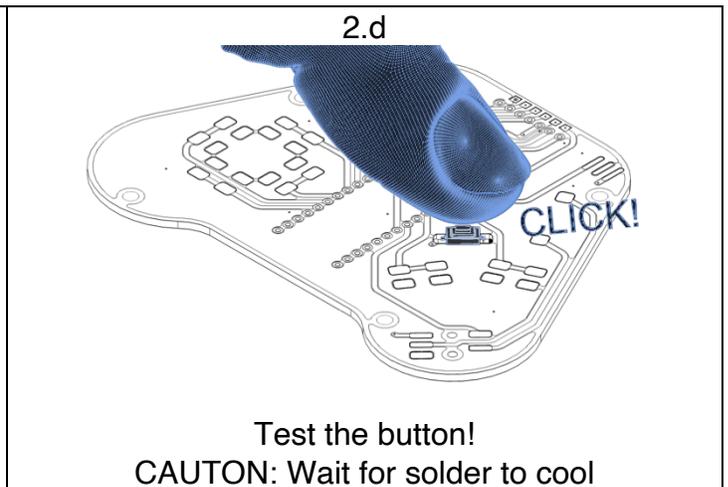
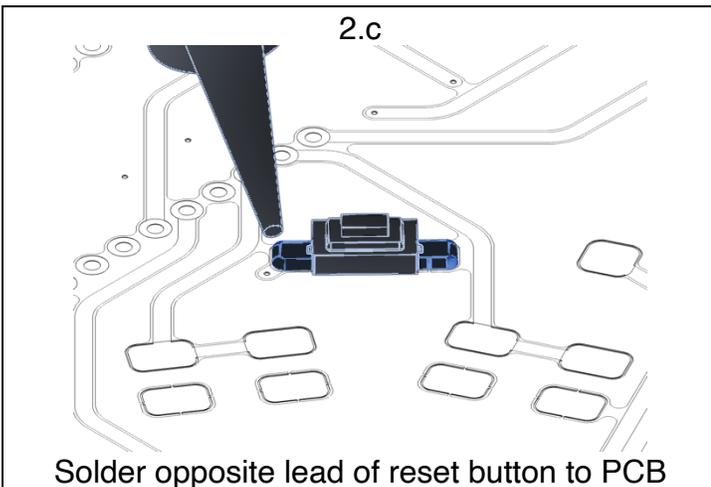
REMINDER: Do not solder to PCB yet, only solder pins to module



Step 2: Reset Button



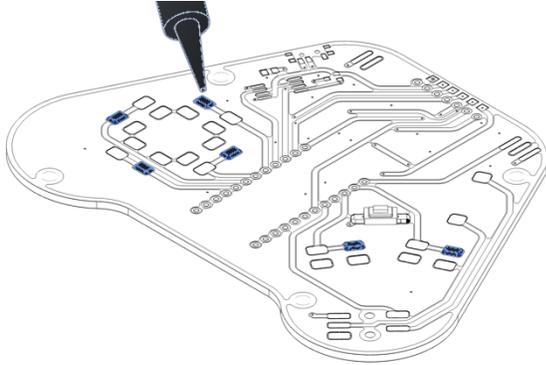
This method of applying solder to the pad is known as "tinning"



If you end up with solder tails, peaks generated when removing the soldering iron, try to complete the joint quicker as this is a sign of inadequate flux. This can be fixed by applying additional flux and re-flowing the solder joint.

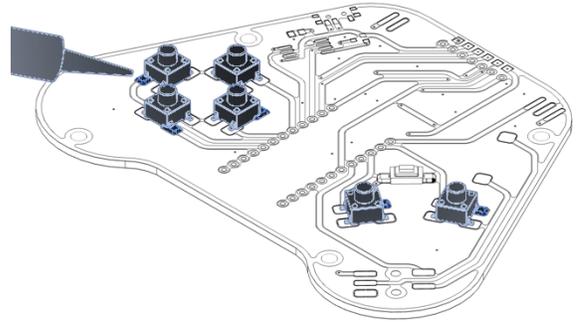
Step 3: Buttons (x6)

3.a



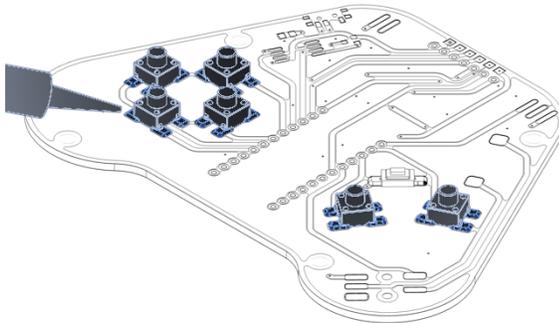
Apply solder to one pad for each of the 6 buttons
NOTE: Only solder one pad each

3.b



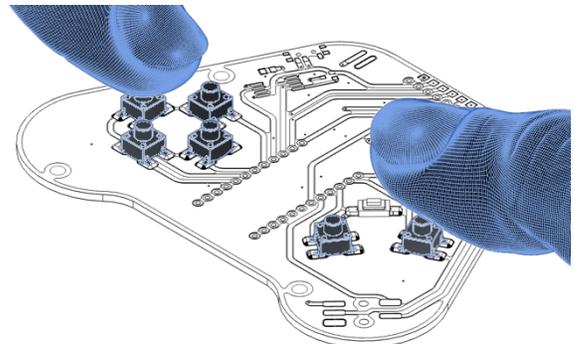
Place each of the 6 buttons, using the same re-flow sliding method as the reset button

3.c



Solder remaining 3 leads of each of the 6 buttons

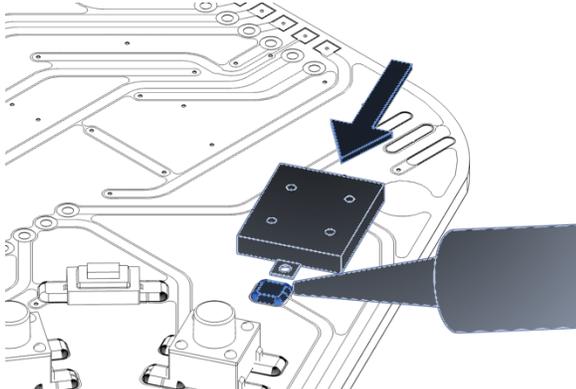
3.d



Test all the buttons!
CAUTION: Wait for solder to cool

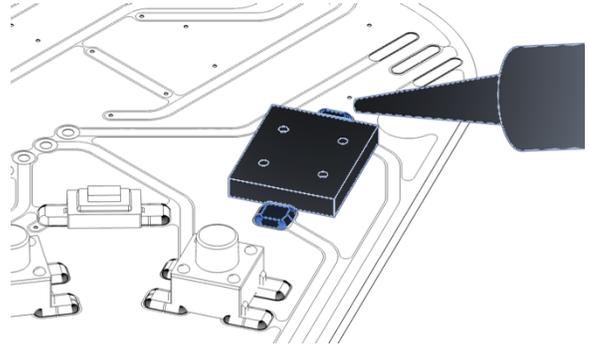
Step 4: Speaker

4.a



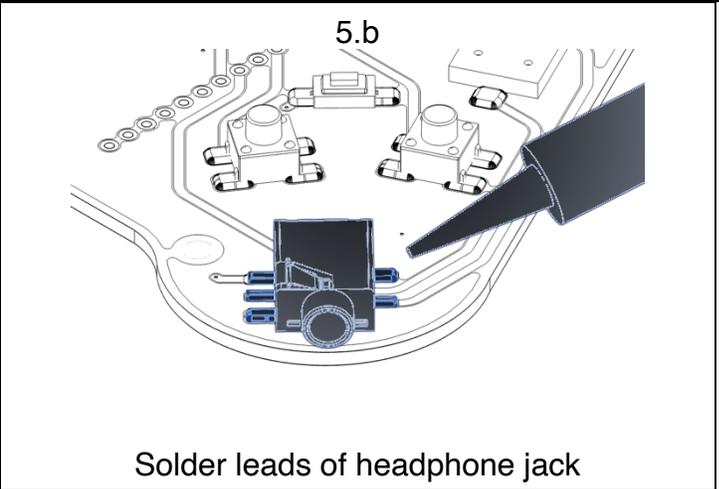
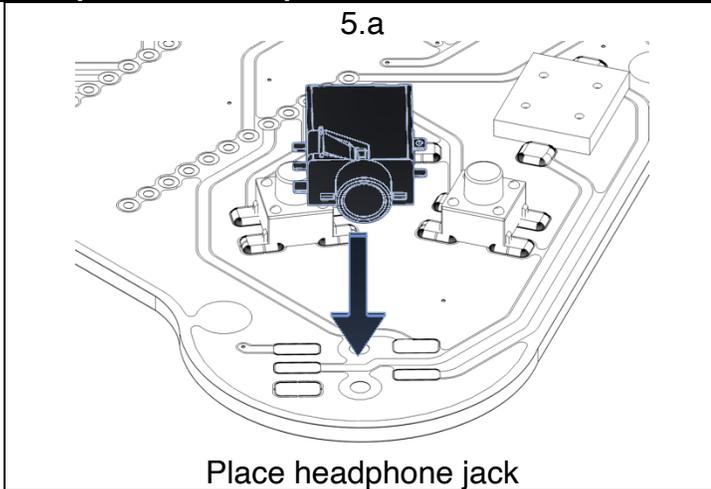
Solder one pad for the speaker and slide it into position while re-flowing

4.b



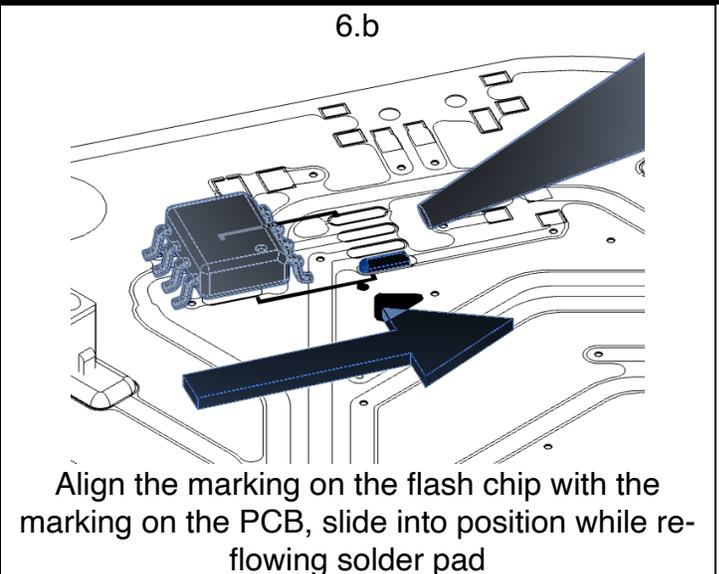
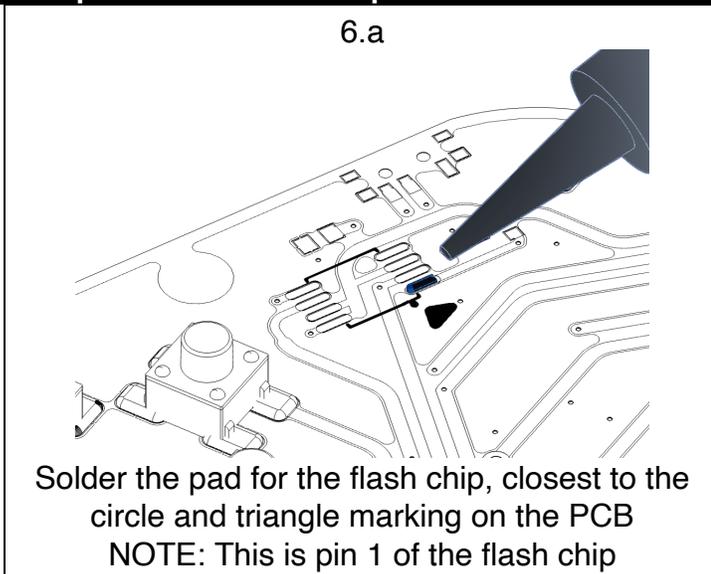
Solder the opposite lead of the speaker

Step 5: Headphone Jack

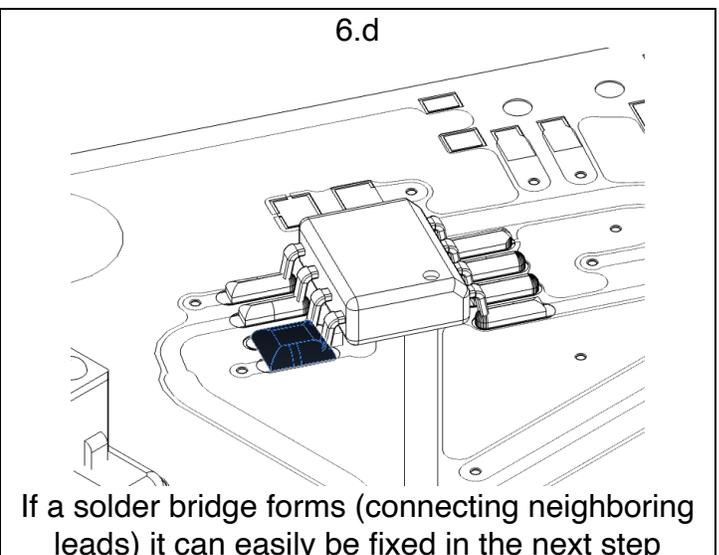
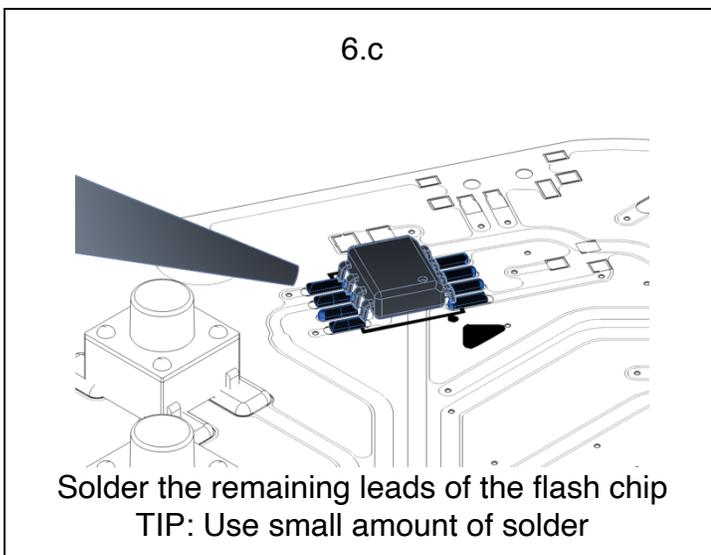


Tinning the pads are not necessary for the headphone jack as it has pins that locate it to the PCB

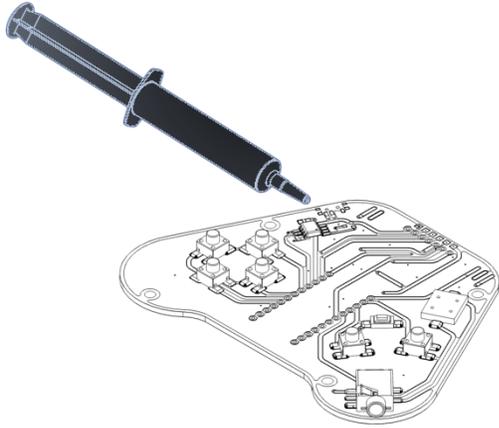
Step 6: Flash Chip



CRITICAL: Ensure the alignment of pin 1

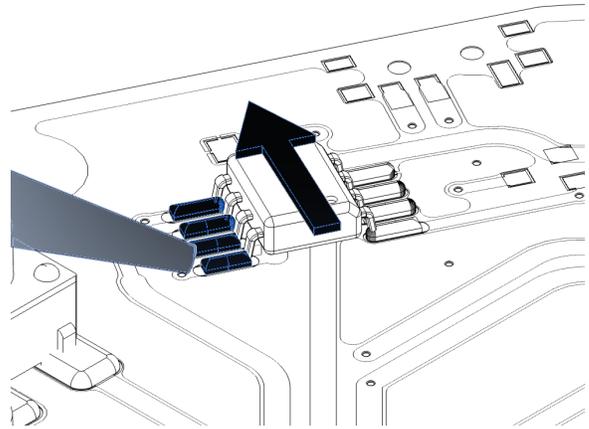


6.e



Apply small amount of flux to flash chip leads

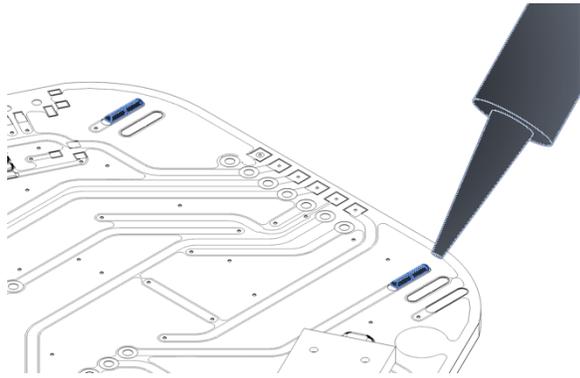
6.f



Use a dragging motion to swipe the soldering iron along the flash chip leads

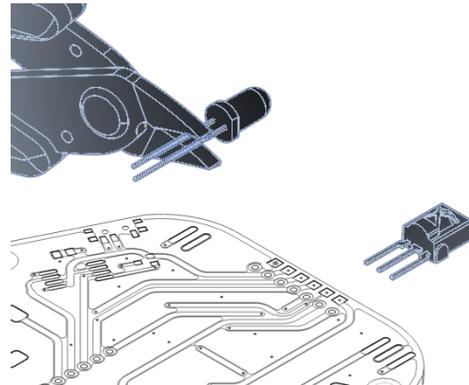
Step 7: IR LED and Receiver

7.a



Solder one pad of each of the IR components

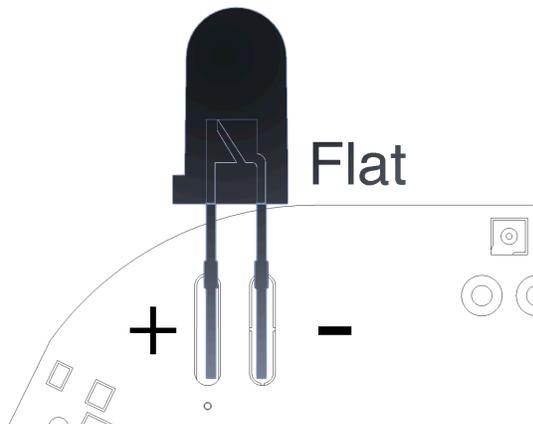
7.b



Cut IR LED and Receiver leads to length

CAUTION: Cutting the leads often causes them to go flying

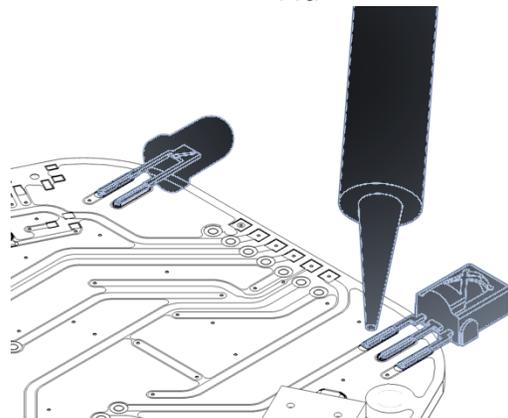
7.c



Orient the IR LED Polarity

NOTE: Cathode (-) is the flat side of the lens

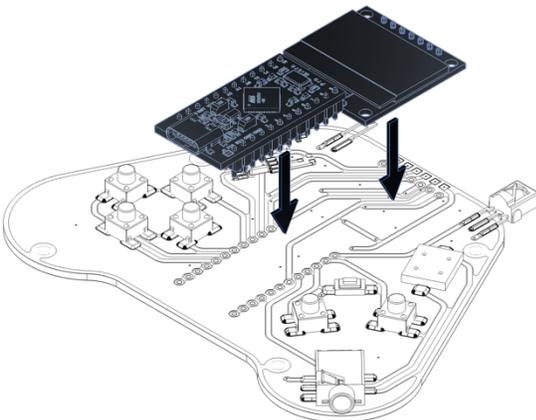
7.d



Solder IR components to PCB using previous methods

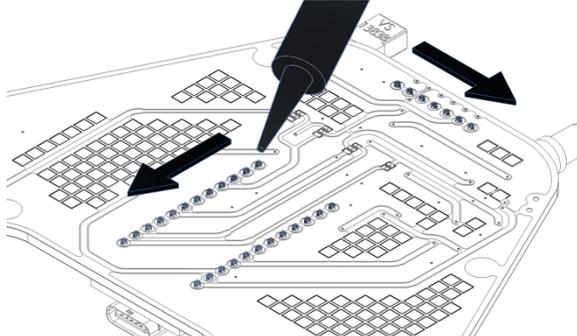
Step 8: Modules to PCB

8.a



Place Pro-Micro and OLED Display with pins on PCB

8.b



Flip PCB and solder pins to PCB
NOTE: Ensure modules are flush with PCB

Step 9: Loading Games

| | | |
|----------------------|--|---|
| Plug into PC via USB | Visit using chrome browser: https://arduboy.github.io/Kit | Use the one-click interface to upload all the games |
|----------------------|--|---|

Step 10: Making Games

Install Arduino software: <https://www.arduino.cc/en/software>

Add custom board files: <https://boards.arduboy.com/homemade.json>

Preferences

Settings Network

Sketchbook location:
/Users/kevin/Documents/Arduino BROWSE

Show files inside Sketches

Editor font size: 12

Interface scale: Automatic 100 %

Theme: Light

Language: English (Reload required)

Show verbose output during compile upload

Compiler warnings: None

Verify code after upload

Auto save

Editor Quick Suggestions

Additional boards manager URLs: <https://boards.arduboy.com/homemade.json> OK

CANCEL OK

BOARDS MANAGER

Arduboy

Type: All

Arduboy homemade package by Mr.Blinky

Boards included in this package:
Arduboy production, Arduboy DevKit, Arduino Leonardo,...

More info

1.4.0 INSTALL

Configure board: Select from the tool's menu the following configuration

- Board: "Homemade Arduboy" >
- Port >
- Get Board Info
- Based on: "Pro Micro 5V - Alternate wiring" >
- Bootloader: "Cathy3K (starts with menu)" >
- Display contrast: "Normal" >
- Core: "Arduboy optimized core" >
- Display: "SSD1306" >
- Flash select: "Pin0/D2/Rx (original)" >

Upload Hello Word

Select from the menu:

File > Examples > Arduboy2 > HelloWorld

Select the Arduboy Kit on the active port:

Tools > Port

Upload the sketch using the Upload Button or:

Sketch > Upload