# Overview

This document contains the necessary information to build the device. This version is still under development.

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# Maker Checklist

This list provides an overview of the steps required to build and deliver the device.

## Maker To Do List

* Read through the Assembly Guide to become familiar with required components, tools, supplies, and safety gear and overall assembly steps.
* Talk to User about customization options (e.g., color, any special requests, etc.)
* Order hardware components
* Print or obtain the 3D Printed Components
* Gather tools, supplies, and safety equipment.
* Assemble the device
* Test device
* Print “User Guide”

## Items to Give to User

* Assembled, tested device
* “User Guide”

# Tool List

A Computer with Arduino IDE for programming microcontroller

# Customization Guide

The enclosure can be printed in the user’s desired colour.

# 3D Printing Guide

## 3D Printing Summary

|  |  |
| --- | --- |
| **Metrics** | **Single Unit** |
| Total Print Time (min) | 1h58m |
| Total Number of Components | 3 |
| Typical Total Mass (g) | 13 |
| Typical Number of Print Setups | 1 |

## 3D Printing Settings

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Print File Name** | **Qty** | **Total Print Time (hr:min)** | **Mass (g)** | **Infill (%)** | **Support(Y/N)** | **Layer Height/ Nozzle Diameter(mm)** | **Notes** |
| Enclosure Top | 1 | 1:12 | 13 | 15 | N | 0.2/0.4 |  |
| Enclosure Bottom | 1 | 0:36 | 6 | 15 | N | 0.2/0.4 |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## Post-Processing

* Remove any stringing or blobs

# Assembly Guide

## Required Components

|  |  |
| --- | --- |
| *A visual bill of materials with numbered components.* | **BOM**   1. [Adafruit QT PY - SAMD21](https://www.digikey.ca/en/products/detail/adafruit-industries-llc/4600/13543375) 2. [Adafruit Wii Nunchuck Breakout](https://www.digikey.ca/en/products/detail/adafruit-industries-llc/4836/13577615) 3. [Qwiic Cable - 50 mm](https://www.digikey.ca/en/products/detail/sparkfun-electronics/PRT-14426/7652739) 4. [6 ft USB C – USB A Cable](https://www.digikey.ca/en/products/detail/cvilux-usa/DH-20M50053/13177348) 5. Light Pipe 6. Enclosure Top 7. Enclosure Bottom 8. [Nunchuck Controller](https://www.amazon.ca/dp/B00FJ2LMGK) |

## Required Tools

* Computer with Arduino IDE to program microcontroller.

## Required Personal Protective Equipment (PPE)

* None required.

## Part A: Enclosure Assembly

### Step 1: Attach STEMMA QT Cable to Microcontroller

Attach one end of the STEMMA QT cable to the STEMMA QT connector on the Adafruit QT Py microcontroller.

|  |
| --- |
| An Adafruit QT PY development board with a STEMMA QT cable attached. |

### Step 2: Attach STEMMA QT Cable to Nunchuck Breakout Board

Attach the other end of the **STEMMA QT Cable** to one of the STEMMA QT connectors on the Nunchuck Breakout board.

|  |
| --- |
| The Adafruit QT PY Development board and the Adafruit Nunchuck Breakout board attached by a STEMMA QT cable. |

### Step 3: Insert QT Py into Bottom Enclosure

Align the QT Py USB connector into the corresponding opening in the **Enclosure Bottom**. Gently press on the board to lock it into place.

|  |
| --- |
| The Enclosure Bottom with the QT PY board inserted. |

### Step 4: Insert Nunchuck Breakout Board into Bottom Enclosure

Position the Nunchuck Breakout Board so the mounting holes align with the posts. Tuck the STEMMA QT Cable down into the Enclosure Bottom.

|  |
| --- |
| The Enclosure Bottom with both the QT Py and Nunchuck Breakout board inserted. |

### Step 5: Connect Top Enclosure to Bottom Enclosure

Position the **Top Enclosure** over top of the Bottom Enclosure and press down to engage the snap fit.

|  |
| --- |
| The enclosure with the Top Enclosure attached. |

### Step 6: Insert the Light Pipe

Insert the **Light Pipe** into the hole in the Enclosure Top.

|  |
| --- |
| The finalized enclosure with the Light Pipe inserted in the top. |

### Step 7: Plug in USB Cable and Nunchuck

Plug in the **USB C Cable** on the left hand side of the Enclosure and the **Nunchuck** on the right hand side of the Enclosure.

|  |
| --- |
| The Ivy Nunchuck Joystick Adapter with the USB cable and Nunchuck attached. |

## Part B: Software Installation

1. Setup Arduino IDE
   1. Download Arduino IDE for your operating system at <https://www.arduino.cc/en/software>
   2. Install the Arduino IDE.
2. Setup Arduino IDE for QT Py Board
   1. Open Arduino IDE.
   2. Click on **File -> Preferences**.
   3. Locate the text field that says **Additional Boards Manager URLs** beside it.
   4. Copy and paste the following link into the field as a new line:  
      [**https://adafruit.github.io/arduino-board-index/package\_adafruit\_index.json**](https://adafruit.github.io/arduino-board-index/package_adafruit_index.json)
   5. Click on **OK.**
   6. Restart the Arduino IDE.
   7. Open the **Boards Manager** option from the **Tools-> Board-> Boards Manager...,**
   8. **Search for “Adafruit SAMD” and select “Adafruit SAMD Boards” by Adafruit.**
   9. **Click Install to install the board.**
3. **Install Libraries**
   1. In a web browser, go to <https://github.com/cyborg5/TinyUSB_Mouse_and_Keyboard> and go to Code -> Download ZIP.
   2. In Arduino IDE, click **Sketch -> Include Library -> Add .ZIP Library.**
   3. Navigate to the ZIP file downloaded in Step (a). Click **OK**.
   4. Go to **Tools -> Manage Libraries…,** search for “Flash Storage” and install the library “FlashStorage” by Arduino.
   5. Go to **Tools -> Manage Libraries…,** search for “Adafruit\_Neopixel” and install the library “Adafruit\_Neopixel”.
   6. Go to **Tools -> Manage Libraries…,** search for “WiiChuck” and install the library “WiiChuck”.
4. Upload the Code to the microcontroller.
   1. Open OpenAT\_Joystick\_M0\_Software\_Ivy.ino with Arduino IDE.
   2. **Select Adafruit QT Py M0 (SAMD21) from Tools -> Board -> Adafruit SAMD Boards**
   3. Click on **Tools -> USB Stack** and select **Adafruit TinyUSB**
   4. Connect the adapter using the USB cable to the computer.
   5. Select the correct port from **Tools -> Port** menu.
   6. Verify and upload the code.

# Testing

## Mouse

1. Plug the USB cable into a USB port on the Host Device.
2. Confirm that the Adapter is in Mouse Mode (Yellow Status Light). If not switch modes (see below).
3. Confirm that the mouse cursor moves when the thumbstick is moved.
4. Confirm that the buttons produce a left and right click when pressed.

## Gamepad

1. Plug the USB cable into a USB port on the Host Device.
2. Confirm that the Adapter is in Gamepad Mode (Blue Status Light). If not switch modes (see below).
3. If using Windows, open “Set up USB Game Controllers” from the Control Panel. You can find this by searching your computer in the search bar next to the Windows icon.
4. Ensure that the joystick is registered as a game controller and select your joystick from the list and go to “Properties”.
5. Move your joystick and observe the movement of the cross hatch in the “Axes” window. Ensure it moves in the proper directions when you move the joystick (the arrow points in the up direction). If not, open the joystick and check your connections.
6. Activate each switch, and ensure that buttons 1 and 2 light up when you press the button, and stops when you release the button.

## Switching Modes

1. Reset the Adapter by pressing the Reset Button or removing and replacing the USB Cable.
2. When the Status Light turns red, press and hold both the C Button and the Z Button on the Nunchuk.
3. When the Status Light turns green, release the buttons.
4. Press the C button to toggle between modes. The light on the Adapter will indicate the current mode: USB HID Mouse - Yellow, USB HID Gamepad - Blue.
5. Press and release the Z button to set the mode. The light will blink.
6. Reset the Adapter by pressing the Reset Button or removing and replacing the USB Cable.