# Introduction

This device is a capacitive touchscreen joystick that allows users to connect to the XAC and operate a joystick with little to zero force. This device is well suited for users with limited dexterity and finger strength.

# Research

## Commercial Products

|  |  |  |  |
| --- | --- | --- | --- |
| **Title** | **Picture** | **Price** | **Notes** |
| [Steam Controller](https://store.steampowered.com/app/353370/Steam_Controller/) | A photo of the Steam controller. | N/A | This commercial gaming controller made by Steam uses a trackpad joystick instead of the standard analog joystick.  Considered a commercial flop and is no longer available. |
| [Vive Controller](https://www.vive.com/ca/accessory/controller/) | A photo of the Vive controller. | $179.99 | A controller used for VR gaming that uses a track pad joystick |
| [Dell Wireless Touchpad](https://www.amazon.com/dp/B00AM0SI16/?tag=tguru-20&th=1) | A photo of the Dell Wireless Touchpad. | $109.99 | A wireless trackpad that can connect to a computer through a USB dongle. |

## DIY Products

|  |  |  |  |
| --- | --- | --- | --- |
| **Title** | **Picture** | **Price** | **Notes** |
| [Joy-Con Touchpad Mod](https://medium.com/@matteo.pisani.91/how-i-hacked-nintendo-joy-con-controller-8ac22d75b0b8) | A photo of the Joy-Con touchpad mod. |  | “The initial inspiration for this project was to create a permanent solution to joystick fatigue and drifting issues”  Replaces the stock joystick with the [Cirque GlidePoint](https://www.cirque.com/glidepoint-circle-trackpads) capacitive joystick. |

# Requirements

## Goals

|  |  |
| --- | --- |
| G01 | Offer users an alternative to analog joysticks. |
| G02 | Allow users to control their joystick with little to no activation force. |
| G03 | Use capacitive touch to control joystick movements. |

## Functional Requirements

|  |  |
| --- | --- |
| F01 | Must be compatible with the XAC. |
| F02 | Must use common connection types to connect the device to the XAC. |

## Non-functional Requirement

|  |  |
| --- | --- |
| NF01 | 3D printed parts must be printable on common maker printers. |
| NF02 | 3D printed parts should be printable with no supports. |

## Constraints

|  |  |
| --- | --- |
| C01 | Must use readily available off the shelf parts. |
| C02 | Must be buildable using common maker tools. |

# Version 1.0

## GlidePoint Joystick MKII

**Designer**: Ron Nelson

**Cost:** ~$32

**Print Time**: ~1h

**GitHub Repository:** [nelsonii (Ron Nelson) (github.com)](https://github.com/nelsonii)

* Contains firmware and housing designs for various devices made by Ron Nelson, including the glide point joystick.

**YouTube:** [GlidePoint as Joystick for XBOX Adaptive Controller - YouTube](https://www.youtube.com/watch?v=LsAF-lyaMcg)

* Brief explanation of the prototyping process.

**Other Resources:**

[ATMakers - Makers & Users | Facebook](https://www.facebook.com/groups/ATMakers/) – Some discussion of device.

[Cirque Glidepoint Light Touch Switch - YouTube](https://www.youtube.com/watch?v=ezXU3xq22Q4) – Review of product.

[SevenMileMountain - Etsy Canada](https://www.etsy.com/shop/SevenMileMountain?) – Etsy shop where Ron Nelson currently sells mounts for this device.

### Cirque GlidePoint Sensor

The GlidePoint is a capacitive trackpad that is used as a joystick in this project. There are three sizes available: 23 mm, 35 mm, and 40 mm in diameter.

There are also 4 different top surfaces available:

1. Curved Overlay
2. Flat Overlay
3. Adhesive Overlay
4. No Overlay

### Device Configurations

|  |  |  |  |
| --- | --- | --- | --- |
| **Configuration** | **GlidePoint Variants** | **Microcontroller Options** | **Enclosure** |
| 1  (MKII) | * [35 mm - Curved Overlay](https://www.mouser.ca/ProductDetail/355-TM0350352024-003) | * [QT PY SAMD21](https://www.mouser.ca/ProductDetail/485-4600) * [QT PY RP2040](https://www.mouser.ca/ProductDetail/485-4900) | * [Top](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirqueGlidePointMKII_Enclosure_QTPy_Top_Disc_35mmWithOverlay_v1A.stl) * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirqueGlidePointMKII_Enclosure_QTPy_Bottom_35mmWithOverlay_v1A.stl) |
| 2 | * [23 mm - Flat Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM023023-2024-002?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mPlv2NExs3Z8%3D) * [23mm - No Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM023023-2024-000?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mqjFnvRi8yK8%3D) | * [QT PY SAMD21](https://www.mouser.ca/ProductDetail/485-4600) * [QT PY RP2040](https://www.mouser.ca/ProductDetail/485-4900) | * [Top](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_QTPy_Top_Disc_23mm_QTPy_v1H.stl) * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_QTPy_Bottom_23mm_v1H.stl) |
| 3 | * [35 mm - Flat Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-002?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mljGtaoJl40o%3D) * [35 mm - Adhesive Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-001?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mj5Wzi%252BnOGqM%3D) * [35 mm - No Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-000?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mfunfVZT7bg4%3D) | * [QT PY SAMD21](https://www.mouser.ca/ProductDetail/485-4600) * [QT PY RP2040](https://www.mouser.ca/ProductDetail/485-4900) | * [Top](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_QTPy_Top_Disc_35mm_QTPy_v1H.stl) * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_QTPy_Bottom_35mm_v1H.stl) |
| 4 | * [40 mm - Flat Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-302?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mSsZK%2FTUbSJY%3D) * [40 mm - Adhesive Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-300?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mo1FSrB0r8pw%3D) * [40 mm - No Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-301?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mSWgtNQf0SXM%3D) | * [QT PY SAMD21](https://www.mouser.ca/ProductDetail/485-4600) * [QT PY RP2040](https://www.mouser.ca/ProductDetail/485-4900) | * Top   NA or uses other top.   * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_QYPy_Bottom_40mm_v1C.stl) |
| 5 | * [35 mm - Flat Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-002?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mljGtaoJl40o%3D) * [35 mm - Adhesive Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-000?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mfunfVZT7bg4%3D) * [35 mm - No Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM035035-2024-000?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mfunfVZT7bg4%3D) | * [KB2040 – RP2040](https://www.mouser.ca/ProductDetail/Adafruit/5302?qs=Rp5uXu7WBW%252B5BBDEK5EDhw%3D%3D) | * [Top](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_KB2040_Top_Disc_35mm_v1C.stl) * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_KB2040_Bottom_35or40mm_v1C.stl) |
| 6 | * [40 mm - Flat Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-302?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mSsZK%2FTUbSJY%3D) * [40 mm - Adhesive Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-300?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mo1FSrB0r8pw%3D) * [40 mm - No Overlay](https://www.mouser.ca/ProductDetail/Cirque/TM040040-2024-301?qs=sGAEpiMZZMu3sxpa5v1qrmePy6bg6o9mSWgtNQf0SXM%3D) | * [KB2040 – RP2040](https://www.mouser.ca/ProductDetail/Adafruit/5302?qs=Rp5uXu7WBW%252B5BBDEK5EDhw%3D%3D) | * [Top](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_KB2040_Top_Disc_40mm_v1C.stl) * [Base](https://github.com/nelsonii/JoystickEnclosures/blob/main/CirquePoint/CirquePoint_Enclosure_KB2040_Bottom_35or40mm_v1C.stl) |

### License

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# Testing

## 3D Printing

Device printing successfully without the need of support. The top and bottom of the enclosure fit together nicely.

## Assembly

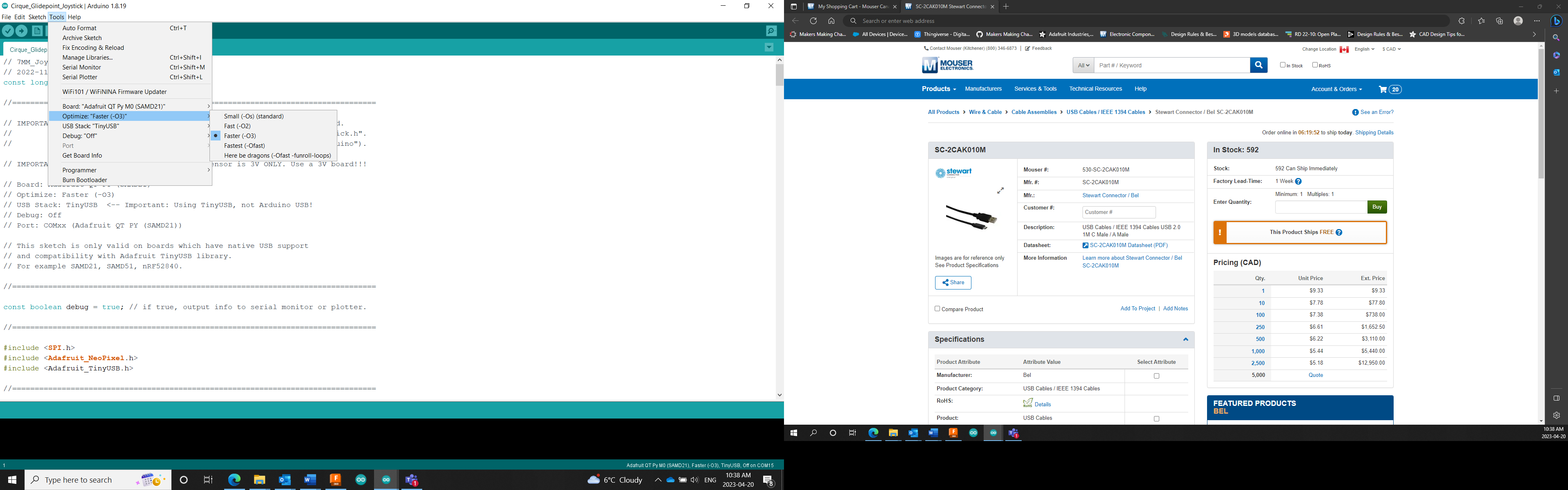
Wires could be shorter to fit better or note the gauge of wire to be smaller.

## Functional Test

### Connecting to XAC

Plugging in the joystick to the left or right USB input on the XAC and testing on Gamepad-Tester is successful.

Current testing

* Soldered components
  + Soldered easily.
  + Should have used less stiff wire as this made it more difficult to install components into the enclosure.
* Uploaded code
  + Had to download Adafruit board backage
  + Downloaded Neopixel and TinyUSB libraries
  + Forgot to change “Optimize:” to “Faster” as defined in the code.
  + 

# Opportunities for Improvement

* Create a 3D printed handheld mount.
* Have markers to establish joystick orientation.
* Have the enclosure halves click-lock together.