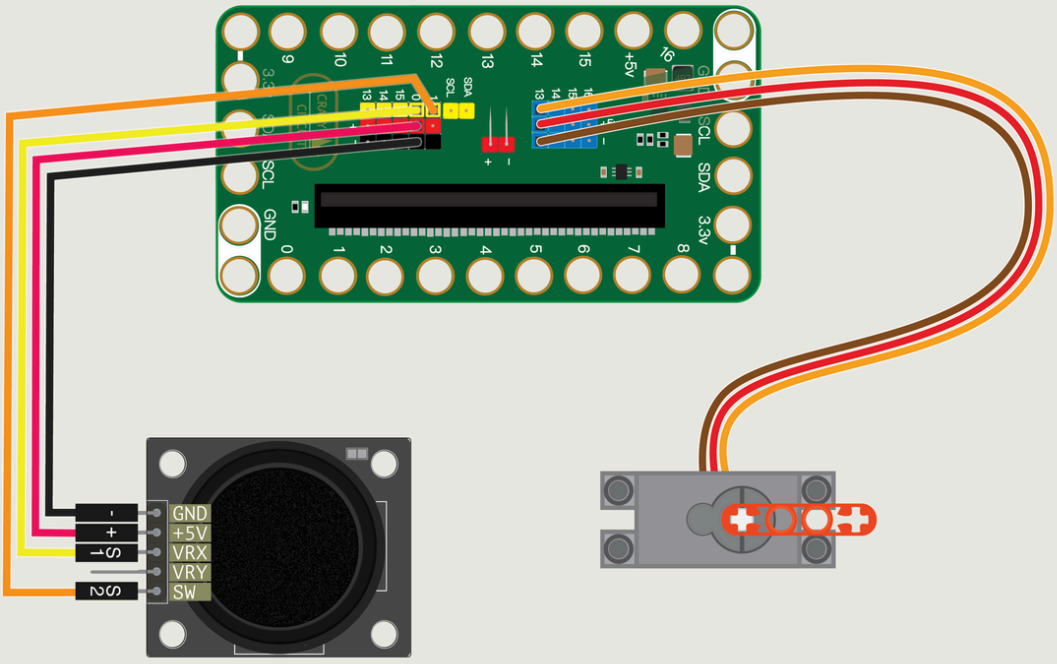
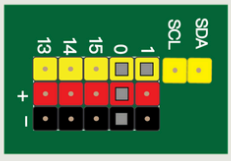
CH44-D - Thumbstick 270 Servo Step

Connect a Thumbstick to a Bit Board and use it to control a 270˚ Servo.

Written By: Pete Prodoehl



TSTK	Bit Board
GND	-> - (Negative) Pin
+5V	-> + (Positive) Pin
VRX	-> PIN 0 (S1)
VRY	-> (not used)
SW	-> PIN 1 (S2)



INTRODUCTION

Connect a Thumbstick to a Bit Board and use it to control a 270˚ Servo.

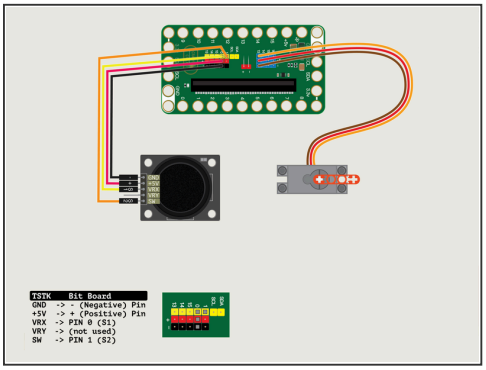
TOOLS:

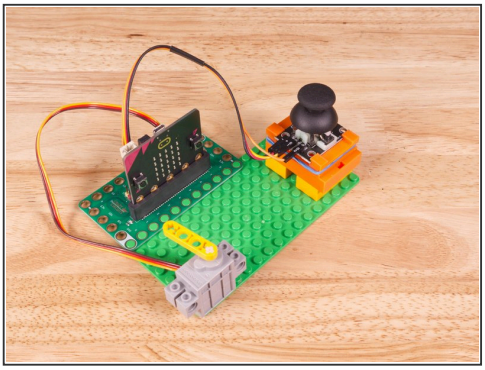
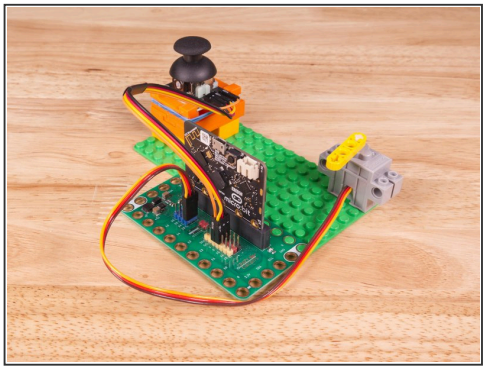
- Computer (1)

PARTS:

- Crazy Circuits Bit Board (1)
- micro:bit (1)
- Crazy Circuits Ribbon Cable (2)
- Thumbstick (1)
- Brick Compatible 270 Degree Servo (1)

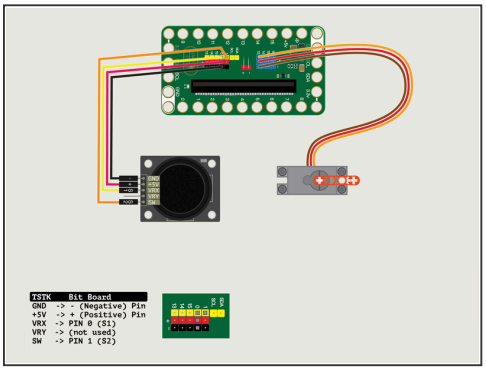
Step 1 — Connect the Thumbstick

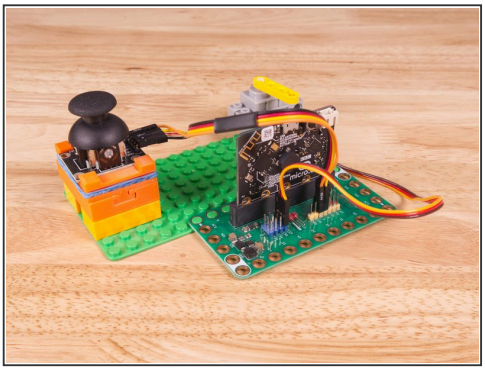
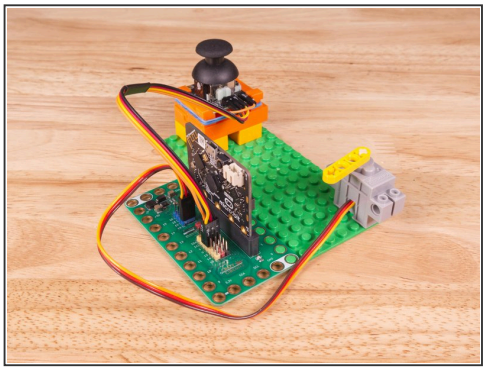


- We'll connect the **Thumbstick** with a **Crazy Circuits Ribbon Cable** using all four wires.
- Plug the three-wire connector of the **Crazy Circuits Ribbon Cable** into the row with **Pin 0** on the Bit Board. The wire colors should match the pin header colors, with **S1** (yellow) going to the yellow pin.
- Next, plug **S2** (orange) into **Pin 1**. *(S2 is separated from the three-wire connector to allow you to plug it into another row.)*
- To the Thumbstick plug **-** (black) into **GND**, **+** (red) into **+5V**; **S1** (yellow) into **VRx**; **S2** (orange) into **SW**.
- We won't plug anything into **VRy** pin for this example.

Step 2 — Connect the 270˚ Servo

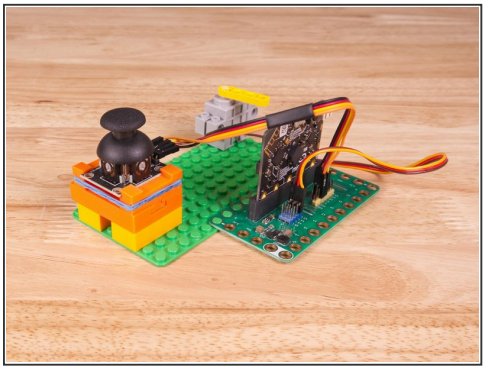
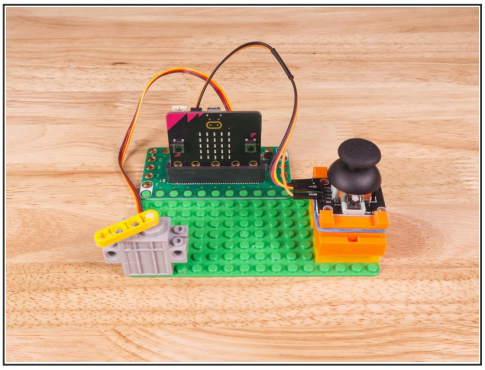
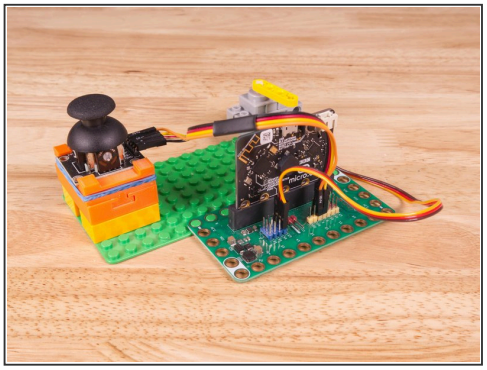


- The **270 Degree Servo Motor** has a 3-wire connector on the end that can plug directly into the pins on the back of the Bit Board.
- Make sure the **Orange Wire** from the servo is closest to the number **13** for the **Pin 13** column.
- Then the **Brown Wire** should be closest to the micro:bit (in the **-** row) and the **Red Wire** will be in the middle (the **+5v** row).

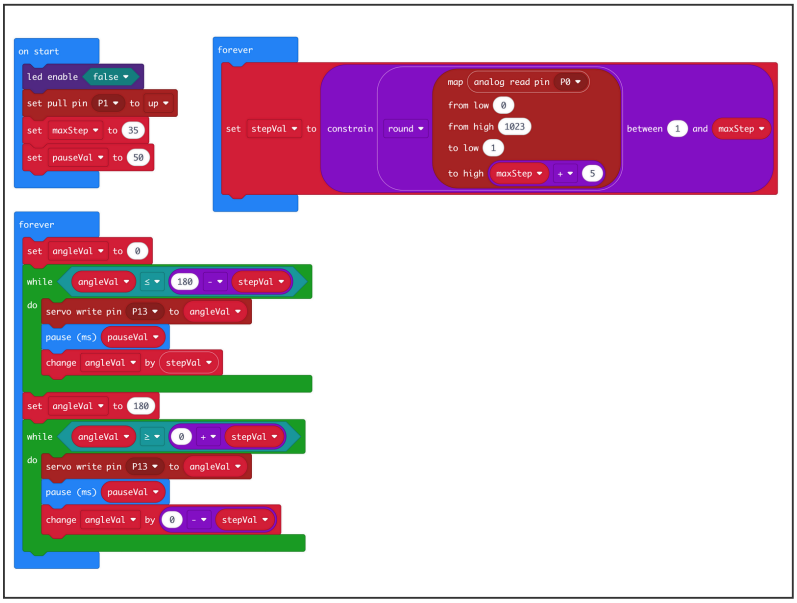
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Step 3 — Mounting the Thumbstick

- We used a 3D printed part we designed to hold the Thumbstick in place on a LEGO baseplate.
- We attached two 2x4 LEGO Bricks to the bottom of the 3D printed holder to allow it to snap onto the LEGO Baseplate a bit easier.
- Alternately you can try to use some LEGO bricks and some rubber bands to hold the sensor in place, or just hold it in your hand.
- 3D print your own Thumbstick Sensor Holder.

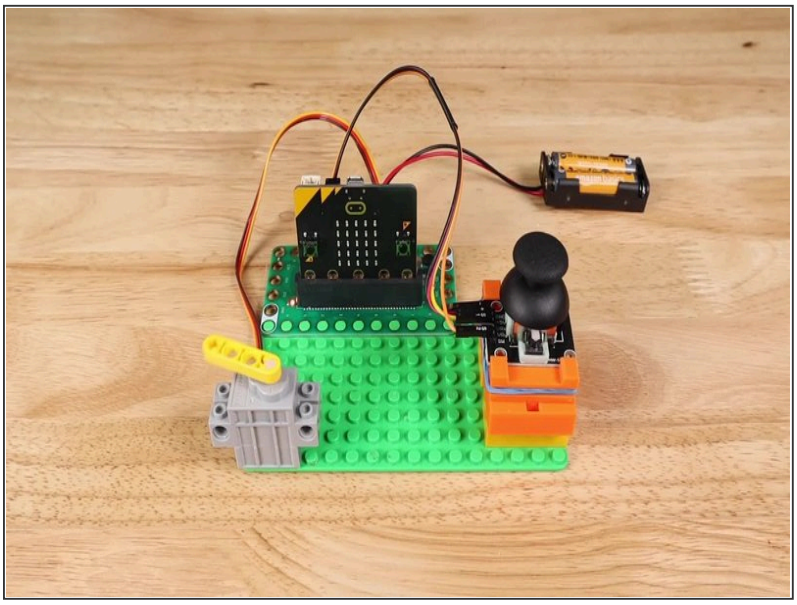
Step 4 — Load the Code



- If you've never used a micro:bit before you'll want to check out this guide: Bit Board V2 Setup and Use
- We're going to load the following code for our **Thumbstick 270 Servo Step** program: https://makecode.microbit.org/_e73XMPREw...
- In the on start block we'll disable the LED matrix and set **Pin 1** to **pull up**, as we'll attach this to the button on the Thumbstick. We'll also set two variables, **maxStep** and **pauseVal**.
- In the first forever loop we'll read analog **Pin 0** and map the value from **0** to **1023** to a scale going from **1** to **maxStep + 5**. We'll also use constrain to limit the values to be between 1 and **maxStep** (which is 35).
  - Why do we use **maxStep + 5** in the map function? We've seen before that sometimes the Thumbstick sometimes doesn't reach **1023**. This allows the value to *overshoot* to ensure we get to **1023**, and then the constrain makes sure we don't go over **maxStep**.

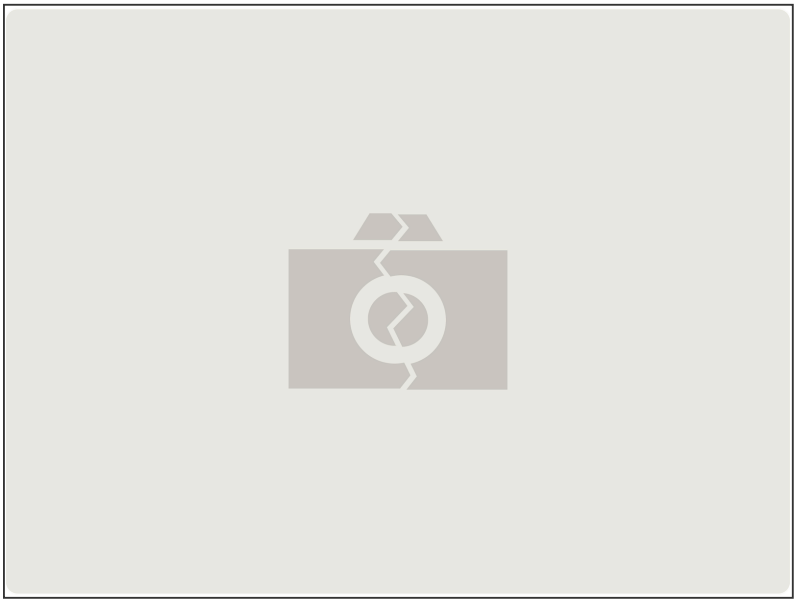
- In the second forever loop we will again use two for loops to sweep the servo back and forth, but this time **stepVal** is used to change *how much* the servo moves each time while the pause uses a constant value.

Step 5 — Test it Out!



- Once the code is loaded it should start running immediately.
- You can power the micro:bit via the USB cable you used to load the code or you can use a battery pack plugged into the Bit Board.
- The servo will start moving as soon as the code starts running, sweeping back and forth.
- Move the Thumbstick left and right and you'll see the speed of the servo change due to changing how much the servo moves per step.
- Chapter 24 has a few notes on using 270 Servos with the Bit Board and some MakeCode limitations: CH24-A - Servo Sweep

Step 6 — Follow Along



- Follow along with our recorded Live Stream!

(We'll add the video to this step after we do the stream!)