Willow Joystick
SUMMARY

Overview

After developing the LipSync, an opportunity arose to take the magnetic gimbal system and develop it further to create a low force addition to the MMC joystick library. The Willow uses a reprogrammed LipSync hub, and a smaller version of the LipSync gimbal with the pressure sensors removed.

The Willow has files available for 7 different toppers, as well as the design file to create your own custom topper. It also has files for 4 different wrist ramps with an editable design file, and a hub stand to keep the hub screen visible. Finally, it also comes with files for two different mounting adaptors for the joystick, as well as a nonslip base attachment.

The Willow is compatible with a range of host devices that are able to support a USB Mouse, a USB Gamepad and/or a Bluetooth Mouse. Compatible devices include PC and Mac computers and laptops, Android, iOS, and Windows smartphone and tablets, and the Xbox Adaptive Controller.

The Willow is Open Assistive Technology (OpenAT) and is certified as Open Source Hardware by the Open Source Hardware Association under the OSHWA UID CA000062. Under the terms of the open source hardware licenses, the Willow may be built, used, and improved by anyone.

Product Information

Product Name

Willow Joystick

Device Category

Mark any relevant categories with an “X”:

	Adapted Toys
	Aids for Daily Living (ADL)
	Assistive Switches
	Communication Aids (AAC)
X	Computer Access
	Environmental Controls
X	Gaming

	Keyguard
	Kits
	LipSyncs
	Mounting
	Recreation and Leisure
	Seating and Positioning
	Switch Interfaces
	Writing Aids

User Value Statement

The Willow joystick allows users with low force/range of motion to access their digital devices for cheaper than a commercial option.

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Designer

Neil Squire Society

Device Information

Overview

The Willow is made up of the Willow Joystick and the Willow Hub. The Joystick is the primary user interface and contains a low-force Hall-Effect joystick. The Hub has a display that provides a graphical interface for independently adjusting settings, as well as it provides the connection to the host device and up to three external assistive switches with 3.5 mm jacks.

The Willow uses a modified version of the LipSync firmware and is compatible with a range of host devices that can support a USB Mouse, a USB Gamepad and/or a Bluetooth Mouse. Compatible devices include PC and Mac computers and laptops, Android, iOS, and Windows smartphone and tablets, and the Xbox Adaptive Controller.

The joystick requires 25 grams of force to operate and comes with 7 different swappable toppers. It has adaptors for both ¼-20 mounting arms and RAM B ball mount arms and has an optional nonslip base for use on a table. There is also a modifiable wrist ramp to help raise a user's wrist while using the joystick.

Disability Type

Select one or more disability types and mark with an "X":

	Agility / Dexterity
X	Arthritis
	Cognitive
	Hearing
	Mobility

	Pain
X	SCI
	Vision
	Other

Disability Type Description

The Willow is designed for users with low range of motion/low force, such as users with Spinal Muscular Atrophy.

How To Use

The joystick is plugged into the hub, and up to three assistive switches can also be connected. The hub can be connected to a device through either a direct USB connection, or through Bluetooth.

Moving the joystick moves the connected cursor in mouse mode or the gamepad joystick in gamepad mode. The connected assistive switches can be used to perform mouse clicks, scrolls, and drags in mouse mode, or act as gamepad buttons in gamepad mode.

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The hub menu allows the user to change settings such as light brightness, cursor speed, and scroll speed.

Full instructions can be found in the quickstart guide or the user guide.

Estimated Cost

The estimated material cost of the device for a single build:

	$0 - $10
	$11 - $25
	$26 - $50

	$51 - $100
X	$101 - $250
	$250+

Attribution

Designers:

- Brad Wellington, Neil Squire Society / Makers Making Change.
- Stephen Moyer, Neil Squire Society / Makers Making Change.
- Josie Versloot, Neil Squire Society / Makers Making Change.
- Tyler Fentie, Neil Squire Society / Makers Making Change.
- Jake McIvor, Neil Squire Society / Makers Making Change.

Maker Information

Project Skills

Mark the required project skills with an “X”:

X	3D Printing
X	Custom PCB
X	Electronics
	Laser Cutting
	Mechanics

	Software
X	Soldering
	Woodworking
	Other

Skills Description

Making the hub primarily involves soldering components to a custom PCB, and making the joystick involves assembling 3D printed components to make the gimbal.

Tools Needed

X	3D Printer
X	Common Hand Tools
	Common Power Tools

	Laser Cutter
X	Soldering Iron
	Specialized Tooling

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Print time (hrs)

9

Assembly time (hrs)

8

Build Instructions

The enclosure and most of the joystick parts are 3D printed, the electrical parts are ordered from Digikey or Mouser, and the PCB is custom ordered using the provided files.

The hub is mostly soldering, then assembling the enclosure around the finished circuit board. The joystick involves assembling a gimbal using magnets, 3D printed parts, and a sensor board. This requires some dexterity to attach bolts while holding everything together.

The firmware files are included, and just require the requisite libraries to be installed then the firmware can be compiled and installed.

Full instructions can be found in the maker guide.

Download Link

github.com/makersmakingchange/Willow-Joystick/archive/refs/heads/main.zip

Project Link

github.com/makersmakingchange/Willow-Joystick

License

License

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