Makers Making Change
A Neil Squire Program

LipSync
Startup Guide

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www.MakersMakingChange.com

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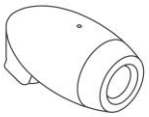
About the LipSync Gaming

The LipSync Gaming emulates a gaming controller for PC gaming and the Xbox console. Users can move the mouthpiece up, down, left, and right; and use the sip-and-puff for other controller functions. This adaptive gaming device is suitable for users with limited or no hand and finger dexterity. It can be paired with auxiliary controllers, like the XBOX Adaptive Controller, to suit a gamer's needs.

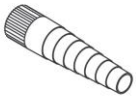
It is an open source assistive technology design by Makers Making Change, a program of the Neil Squire Society that connects volunteer makers with people with disabilities to create more affordable assistive technology. Join the Makers Makers Making Change to help people in your community: http://www.makersmakingchange.com

What Do You Get?



LipSync

Filter x 3



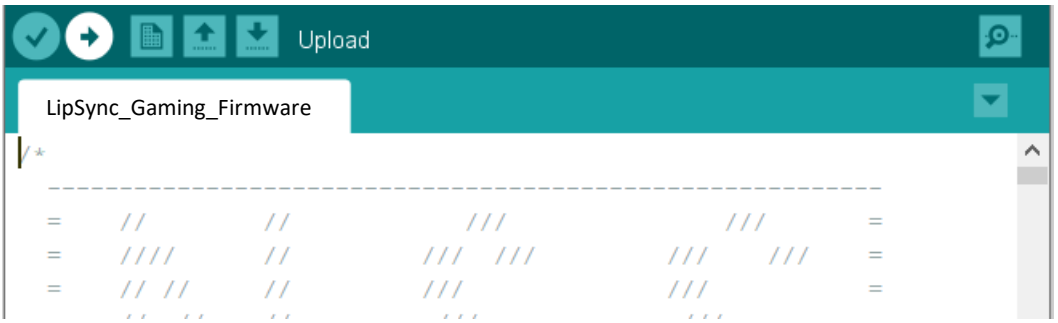
Mouthpiece x 3

Types of LipSync

	Description	Connection Type
LipSync	**Works like a mouse**	**USB**
LipSync Wireless	Works like a mouse	Wireless
LipSync Macro	Works like a keyboard	USB & wireless
LipSync Gaming	**Works like a gaming joystick**	**USB**

1 LipSync Gaming Firmware Installation

1. Download and install the latest version of Arduino IDE: https://www.arduino.cc/en/main/software
2. Visit the LipSync Gaming firmware page: https://github.com/makersmakingchange/LipSync-Gaming/raw/master/Software/LipSync_Gaming_Firmware/LipSync_Gaming_Firmware.ino
3. Right click on the webpage and select ***Save Page As***. Add an ***.ino*** extension to the file name and click ***Save***.
4. Visit the ***ArduinoJoystickLibrary*** GitHub repository using following link: https://github.com/MHeironimus/ArduinoJoystickLibrary
5. Download the ***ArduinoJoystickLibrary*** by clicking on ***Clone or Download*** button and then selecting ***Download ZIP*** option.
6. Extract the "ArduinoJoystickLibrary-master.zip" file.
7. Copy the Joystick folder to the Arduino libraries folder. An example of path to Arduino libraries folder in Windows: ***C:\Program Files (x86)\Arduino\libraries***
8. Once the folder is copied, the Joystick library should appear in the Arduino IDE list of libraries.
9. Plug the LipSync USB cable into the computer port.
10. Open Arduino IDE and you should be able to see Joystick examples under ***File*** > ***Examples*** > ***Joystick***
11. Now open the ***LipSync_Gaming_Firmware.ino*** file using Arduino IDE.
12. Select ***Tools*** > ***Board*** > ***Arduino/Genuino Micro***.
13. Select ***Tools*** > ***Port*** > ***COM##*** (number may be different for each user)
14. Click on upload button to upload the code.



15. With the LipSync Gaming plugged into a power source, perform the joystick calibration.

2 Getting Started

The LipSync Gaming requires the following items to get started:

- A LipSync Gaming
- External power bank (optional but recommended)
- Mounting solution for securing the LipSync to a surface

Mounting

Wheelchair: Every wheelchair has different points available for mounting. Common mounting points available on power wheelchairs are the headrest rail, back of wheelchair, armrest rail, under chair cushion, chair rail, and footplate. Try out different areas and see what works best. If you are not familiar with mounts, consult with an assistive technology professional.

Desk: Find a clear space on the front edge of your desk or table. Orient the mount bracket toward the user being careful not to move the LipSync. Secure the bracket and adjust the mounting arm so the LipSync is within easy reach. Tighten the knob when the arm is in the desired position.

Checklist for after mounting:

- ☐ Are the clamp and mount secure and do not move?
- ☐ Is there clearance around the wheels, wires, and chair frame with the mount attached?
- ☐ Does the wheelchair fit through doorways?
- ☐ Is the driving view of the user clear with no obstructions?
- ☐ Is the mobile device within viewing angle of the LipSync?
- ☐ Can the user easily reach the LipSync to use it?

Device Compatibility

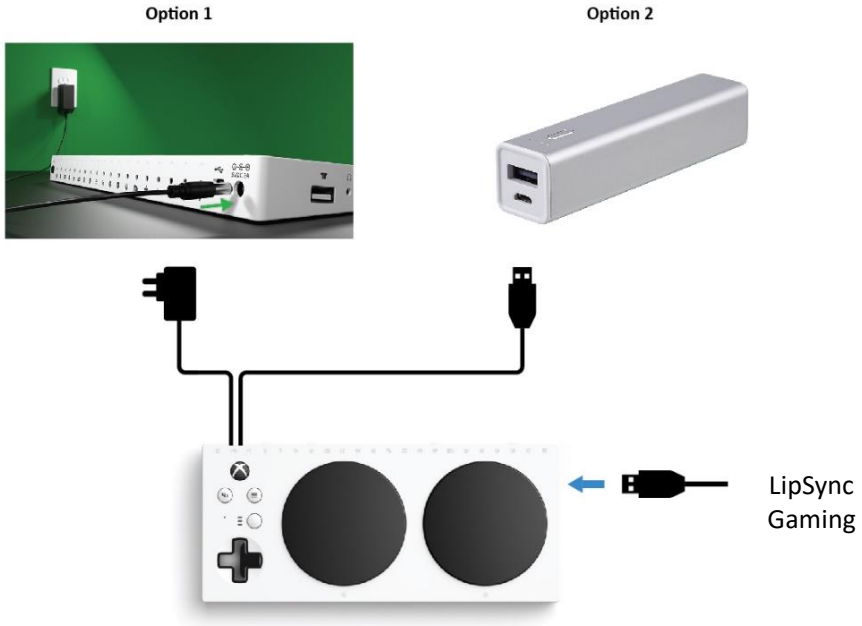
Windows
MacOS

Xbox
(only with the Xbox Adaptive Controller)

Xbox Adaptive Controller

Powering the Controller

The Adaptive Controller has an internal rechargeable battery that allows users to use it wirelessly. Using the LipSync (and any external accessibility switch) will draw additional power. To prevent heavy power consumption, we recommend plugging the Adaptive Controller into to an electrical outlet using an AC Adapter (Option 1) or a power bank of at least 5000mAH (Option 2) using a USB to USB-C cable while gaming.

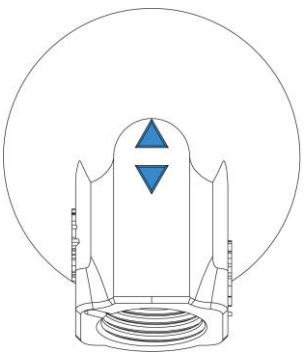


Speed Control

The LipSync has 11 speed levels with the default level set to 5 when first set up.
The LED will blink the speed level number.

Press the ▲ button to increase the cursor speed
Press the ▼ button to decrease the cursor speed.

To adjust the sensitivity and speed, set the device's speed to its slowest setting to start then adjust the LipSync speed control buttons. If it's still not fast enough, gradually increase the speed on the device.



LipSync back view

3 PC and Xbox Gaming Setup

Setting Up for PC Gaming

1. Plug the USB from the LipSync Gaming into any computer or laptop USB Port.
2. Start up the PC game.
3. Adjust the sensitivity of the sip-and-puff features by pressing the triangular speed buttons on the back of the LipSync.
4. If any of the functions starts to drift or behave inconsistently while gaming, release the mouthpiece and hold both ▲▼ buttons at the same time for 1 second to perform the joystick initialization.

Functions (PC Games):

LipSync Action	Time (Seconds)	Mode 1 (Hold ▼ for 2 sec) [1]	Mode 2 (Hold ▲ for 2 sec) [2]
Mouthpiece (Up)	-	Move up	Move up
Mouthpiece (Down)	-	Move down	Move down
Mouthpiece (Left)	-	Move left	Move left
Mouthpiece (Right)	-	Move right	Move right
Puff	1	Button Number 1	Button Number 1
Sip	1	Button Number 2	Button Number 2
Puff	2	Button Number 3	N/A
Sip	2	Button Number 4[3]	N/A
Puff	3	Button Number 5	N/A
Sip	3	Button Number 6	N/A

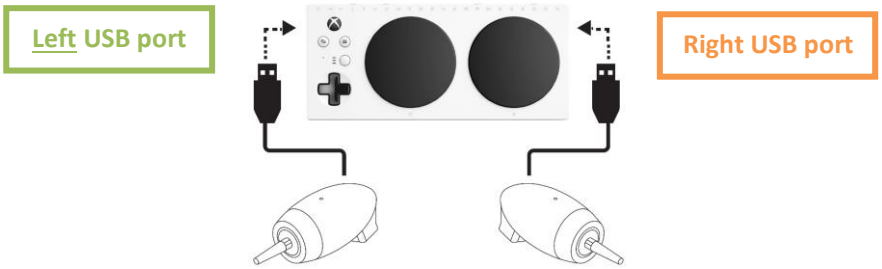
[1] LED will blink red and green 2 times

[2] LED will blink red and green 1 time

[3] The press button 1 or 2 second long sip are reserved for the Xbox Adaptive Controller

Setting up for Xbox Gaming with the Xbox Adaptive Controller

1. Turn on your XBOX Console.
2. Turn on your Adaptive Controller by pressing the XBOX button .
3. Plug the LipSync USB Cable to the right or left USB port on either side of the Adaptive Controller. Each side has different gaming functions so double check with the user.



4. Adjust the sensitivity of the sip-and-puff features by pressing the triangular speed buttons on the back of the LipSync.
5. If any of the functions starts to drift or behave inconsistently while gaming, release the mouthpiece and hold both ▲▼ buttons at the same time for 1 second to perform the joystick initialization.

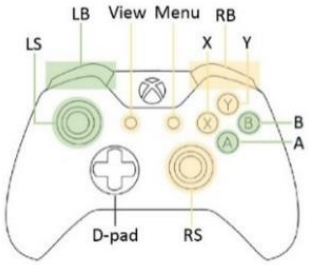
Functions (Xbox Adaptive Controller):

The following Mode 2 functions (highlighted in orange) are default actions and can be modified in profile settings.

Action	Time (Sec)	Mode 1 (Left USB Port) (Hold ▼ for 2 sec)[1]	Mode 2 (Left USB Port) (Hold ▲ for 2 sec)[2]	Mode 1 (Right USB Port) (Hold ▼ for 2 sec)[1]	Mode 2 (Right USB Port) (Hold ▲ for 2 sec)[2]
Right	-	Move right	Move right	Move right	Move right
Down	-	Move down	Move down	Move down	Move down
Left	-	Move left	Move left	Move left	Move left
Up	-	Move up	Move up	Move up	Move up
Puff	1	X1	X1	View	View
Sip	1	X2	X2	Menu	Menu
Puff	2	LS	N/A	RS	N/A
Sip	2	LB / Shift	N/A	RB	N/A
Puff	3	A	N/A	X	N/A
Sip	3	B	N/A	Y	N/A

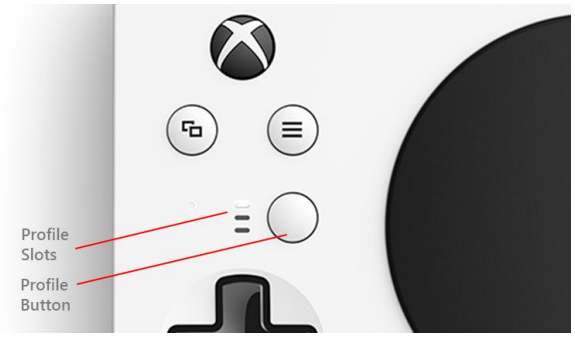
[1] LED will blink red and green 2 times

[2] LED will blink red and green 1 time



Custom Profile

The Xbox Adaptive Controller comes with the option to configure and map buttons using 3 different mapping profiles. Switch between profiles by pressing on the Profile Button or pressing the ***Shift*** button after it's assigned in settings. Please follow the instructions below to map the buttons through the ***Profile*** settings:



1. Press the ***Xbox*** button to open the guide.
2. Select ***Home*** > ***Settings*** > ***Kinect and Devices > Devices & Accessories***.
3. Press the ***A*** button (3 second puff) > Select ***Xbox Adaptive Controller***.
4. Select ***Configure*** option > press the ***A*** button (1 second puff).
5. Select ***New profile*** > press the ***A*** button (3 second puff).
6. Enter the name for the new profile (Example: "***LipSync1***").
7. Under the ***Mapping*** menu, select the Xbox controller button that you would like to map >press the ***A*** button (3 second puff).
8. Assign the ***Primary*** and ***Shift*** button actions for selected button > press the ***B*** button (3 second sip).
9. The following five examples can be used to map the main buttons:
    - ***X1*** button or short puff
        - **A.** Under the ***Mapping*** menu, select the ***X1*** button > press the ***A*** button (3 second puff).
        - **B.** Assign the ***Primary*** and the ***Shift*** button actions for selected ***X1*** button.
        - **C.** The ***Primary*** button action is assigned to the ***A*** button and the ***Shift*** button action is assigned to the ***X*** button for the ***X1*** button in the ***LipSync1*** profile example.
        - **D.** Press the ***B*** button (3 second sip).
    - ***X2*** button (1 second sip)
        - **A.** Under the ***Mapping*** menu, select the ***X2*** button > press the ***A*** button (3 second puff).
        - **B.** Assign the ***Primary*** and the ***Shift*** button actions for selected ***X2*** button.
        - **C.** The ***Primary*** button action is assigned to the ***B*** button and the ***Shift*** button action is assigned to the ***Y*** button for the ***X2*** button in the ***LipSync1*** profile example.
        - **D.** Press the ***B*** button (3 second sip).
    - ***LS*** button or 2 seconds long puff
        - **A.** Under the ***Mapping*** menu, select the ***LS*** button > press the ***A*** button (1 second puff).
        - **B.** Assign the ***Primary*** and the ***Shift*** button actions for selected ***LS*** button.
        - **C.** The ***Primary*** button action is assigned to the ***LS*** button and the ***Shift*** button action is assigned to the ***RS*** button for the ***LS*** button in the ***LipSync1*** profile example.
        - **D.** Press the ***B*** button (3 second sip).

- ***A*** button or 3 seconds very long puff
    - **A.** Under the ***Mapping*** menu, select the ***A*** button > press the ***A*** button (1 second puff).
    - **B.** Assign the ***Primary*** and the ***Shift*** button actions for selected ***A*** button.
    - **C.** The ***Primary*** button action is assigned to the ***View*** button and the ***Shift*** button action is assigned to the ***View*** button for the ***A*** button in the ***LipSync1*** profile example.
    - **D.** Press the ***B*** button (3 second sip).
- ***B*** button or 3 seconds very long sip
    - **A.** Under the ***Mapping*** menu, select the ***B*** button > press the ***A*** button (1 second puff).
    - **B.** Assign the ***Primary*** and the ***Shift*** button actions for selected ***B*** button.
    - **C.** The ***Primary*** button action is assigned to the ***Menu*** button and the ***Shift*** button action is assigned to the ***Menu*** button for the ***B*** button in the ***LipSync1*** profile example.
    - **D.** Press the ***B*** button (3 second sip).

10. Under the ***Mapping*** menu, select the button that you would like to map to the ***Shift*** button action > press the ***A*** button (1 second puff).

11. Select the ***Use as Shift*** button check box > press the ***A*** button (1 second puff) > press the ***B*** button (1 second sip).

12. Press the ***B*** button (1 second sip) to enter the ***Profiles*** page again.

13. Select the new created ***LipSync1*** profile > press the ***A*** button (1 second puff).

14. Save the new profile by selecting the ***No Slot*** dropdown menu >press the ***A*** button (1 second puff).

15. Select one of the three available slots > press the ***A*** button (1 second puff).

16. The ***LipSync1*** profile is now ready to use. Press the Profile button on the Xbox Adaptive Controller to switch between profiles and select ***LipSync1*** profile for these functions:

LipSync Action	**Time (Seconds)**	**Mode 1** Primary	**Mode 2** Secondary
Mouthpiece (Up)	-	Move up	Move up
Mouthpiece (Down)	-	Move down	Move down
Mouthpiece (Left)	-	Move left	Move left
Mouthpiece (Right)	-	Move right	Move right
Puff	1	A	X
Sip	1	B	Y
Puff	2	LS	RS
Sip	2	LB (Shift Button)	LB (Shift Button)
Puff	3	View	View
Sip	3	Menu	Menu

4 Maintenance

Cleaning the Mouthpiece and Filter

Each user should have their own set of mouthpiece and filter for hygienic reasons. These pieces are made of acrylic plastic and have a 3-6 month life cycle depending on the usage. Keep unused pieces in a clean sealable bag out of the sunlight.

Follow these steps to clean the pieces during its life cycle:

1. With the LipSync facing you and wearing clean gloves, twist the mouthpiece and filter **counter clockwise** to detach it. If you're having trouble removing the filter, see the next page.

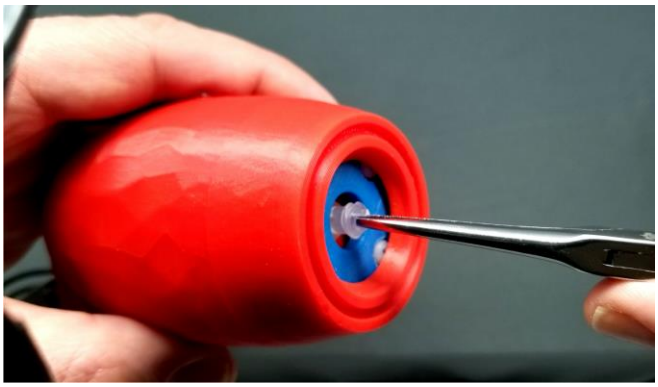

2. **To clean the mouthpiece:** mix 1 cup (250 mL) of water with 2 tsp (10 mL) of 5% bleach (sodium hypochlorite). Soak the mouthpiece for 10 minutes and then air dry or wipe with a clean cloth.
   To clean the filter: throw away used filters that have trapped saliva and use a clean piece.

3. Wearing clean gloves, twist the mouthpiece and filter **clockwise** until finger tight. Do not overtighten.


Broken stem removal

If you're unable to screw in a new LipSync air filter, it may be because a portion of the old filter has broken off and is stuck inside the air fitting. To remove this broken piece, the best tool to use is a medical hemostat or very small vice grips. You can also use fine nose needle nose pliers, however, you'll need to be more careful with pliers so as not to not to break the plastic and make the problem worse.

To remove using a hemostat: Insert one side of the hemostat tip into the middle of the broken off filter stem and the other side of the tip to the outside of the protruding broken stem. Be extra careful not to grip on the outside of the fitting that it's in or you will damage the LipSync. Squeeze the handle on the hemostat until the teeth between the finger holes lock. Finally, rotate the tip of the hemostat counter-clockwise to remove the broken stem.



If a hemostat is not available, use an extra fine tip needle nose pliers or vice but be even more careful as these larger tools can damage the LipSync easily.

Cleaning the LipSync Shell

- ✓ Wipe with a non-abrasive cloth lightly dampen with water or cleaning alcohol
- × Don't use abrasive cleaning materials.
- × Don't soak the LipSync shell in any cleaning solutions

5 Troubleshooting

If users encounter drifting or inconsistent LipSync controls, follow these steps in order:

1. Release the mouthpiece and press both ▲▼ speed buttons simultaneously for 1 second.
2. Unplug the LipSync USB from the power source (e.g. power bank or device), wait a few moments before plugging back in, and let the LipSync initialize.
3. Perform the joystick calibration. Follow the video tutorial here: http://tiny.cc/CalibrateLipSync.

6 Feedback

The LipSync is an open-source project, which means that anyone and everyone is able to build the device and improve upon the design. If you have suggestions for how to improve the LipSync or require technical help, please reach out using one of the following routes:

1. Contact your LipSync maker
2. Makers Making Change Forum (https://forum.makersmakingchange.com/)
3. Makers Making Chance R&D team at info@makersmakingchange.com
4. Leave a review on the LipSync page (https://www.makersmakingchange.com/project/lipsync/)