Makers Making Change

A Neil Squire Program

LipSync Macro

Startup Guide

Version 1.2 / June 2022

www.MakersMakingChange.com

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PROGRAM OF: Neil Squire

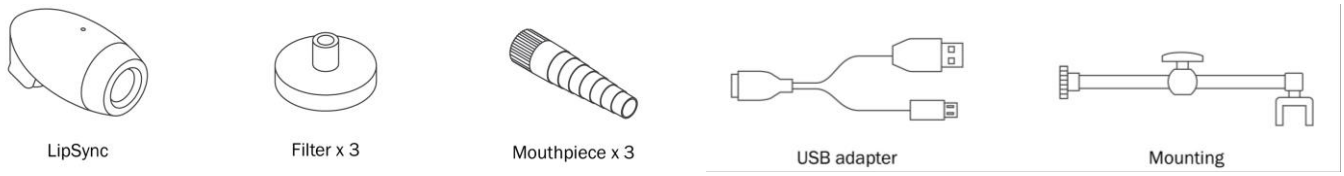
FUNDING PROVIDED BY: Google.org, Calgary Foundation for Community, Forever, The Winnipeg Foundation For Good. Forever., RBC Foundation, Craig H. Neilsen Foundation, Canada

About the LipSync Macro

The LipSync Macro is a sip-and-puff joystick that emulates keystrokes from a keyboard. It allows users to interact with their electronic device without having to physically touch it through a series of recorded touchscreen interactions. This works on phones and tablets that have switch access (Switch Accessibility in iOS devices, Universal Switch in Android).

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. Open source designs are freely released by their creators for people to make for themselves, modify or incorporate in their own designs for free. Join the Makers Makers Making Change to help people in your community: http://www.makersmakingchange.com

What Do You Get?



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 Getting Started

The LipSync Macro requires the following items to get started:

- A LipSync macro
- Computing device (mobile phone, tablet, or laptop)
- External power bank (optional but recommended)
- Mounting solution for securing the LipSync to a surface

Before plugging the LipSync, make sure of the following:

1. Computing device is fully charged and/or uses an external power source (e.g. power bank).
2. Computing device and LipSync are securely mounted to a stable 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

iPhone (iOS7-13.1)
iPad (iOS7-13.1)

Tablet (Android 5.0+, Windows)
Phone (Android 5.0+, Windows)

Windows
MacOS

Powering the LipSync

In order to map the LipSync Macro and to use it after, the device needs be powered at all times with an external power source since there's no internal battery. There are several options:

USB power adapter

Computer USB port

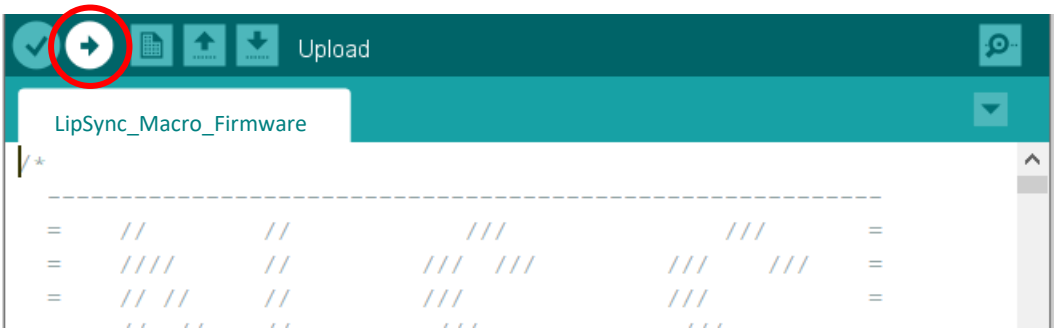
Power bank (>5000 mAh)

USB-C/Lightning to USB adapter

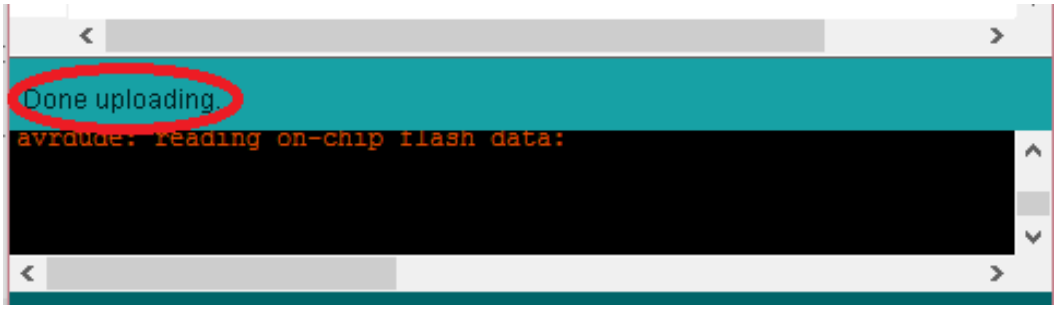
2 Upload the LipSync Macro Firmware

If you are converting a LipSync, LipSync Wireless, or LipSync Gaming into a LipSync Macro, skip ahead to the "Reconfiguring the LipSync Macro" on the next page.

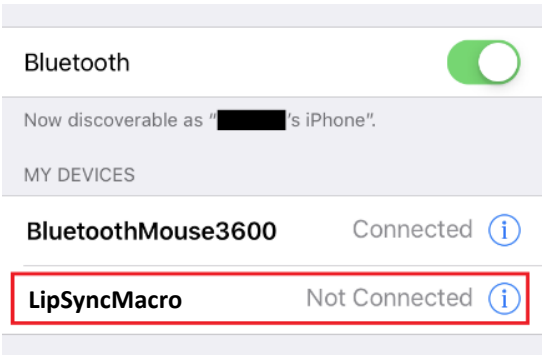
1. Download and install the latest version of Arduino IDE: https://www.arduino.cc/en/main/software
2. Visit the LipSync Macro firmware page: https://github.com/makersmakingchange/LipSync-Macro/raw/master/Software/LipSync_Macro_Firmware/LipSync_Macro_Firmware.ino
3. Right click on the webpage and select ***Save Page As***. Add an ***.ino*** extension to the file name and click ***Save***.
4. Open the microcontroller firmware (***LipSync_Macro_Firmware***) using Arduino IDE.
5. Select ***Tools*** > ***Board*** > ***Arduino/Genuino Micro***.
6. Connect to a PC using the LipSync USB cable.
7. Select ***Tools*** > ***Port*** > ***COM##*** (number may be different for each user)
8. Click the right arrow at the top left of the Arduino IDE to upload the LipSync Macro firmware code to the LipSync device.



9. Once upload is complete, a message saying ***Done Successful*** will show at the bottom left of the Arduino IDE.



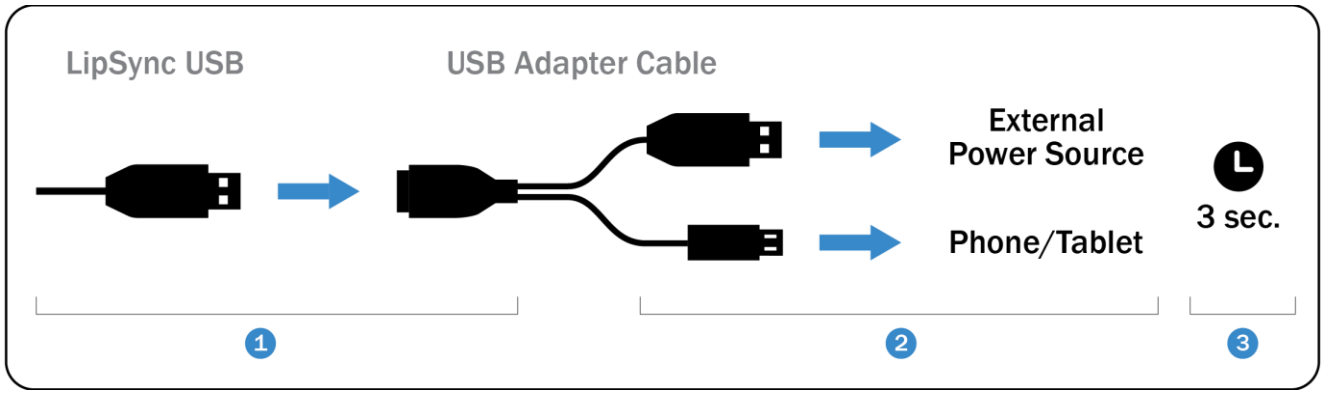
10. You should be able to see a keyboard input device named ***LipSyncMacro*** under the Bluetooth settings of your computer or your iOS device.



3 Using the LipSync Macro

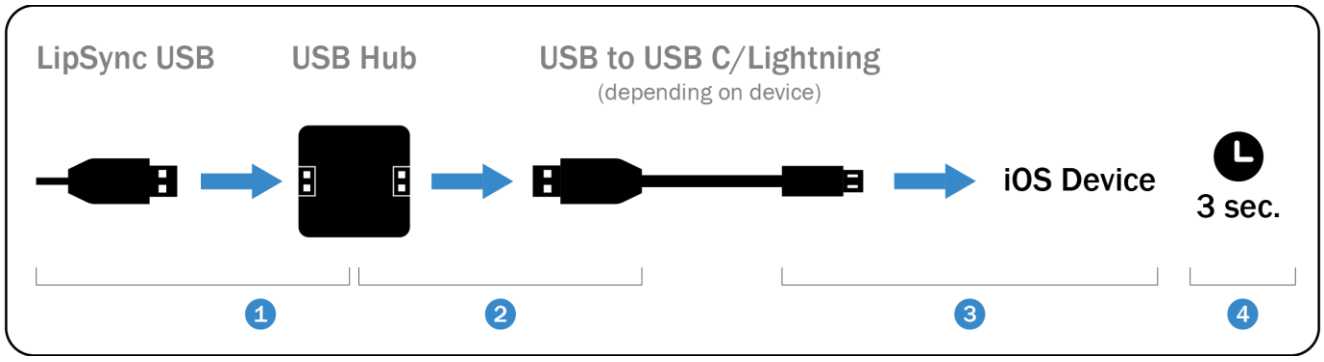
Plugging into an Android or Windows device, laptop, or computer

The order in which you connect the USB cables may affect how the LipSync functions. Plug the cables in the following order:



1. Connect the LipSync USB to the USB adapter cable's receptacle.
2. Connect the other end of the adapter into the computing device and external power source.
3. Wait 3 seconds for the LipSync to initialize. Initialization is complete when the LED blinks red and green four times.

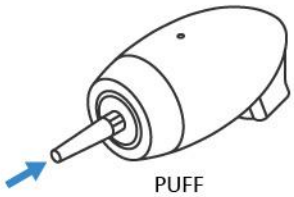
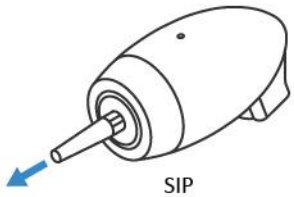
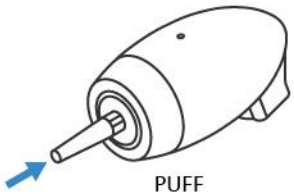
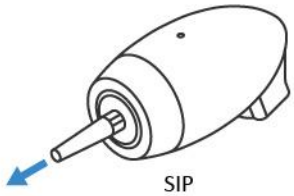
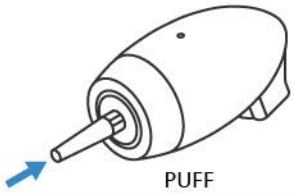
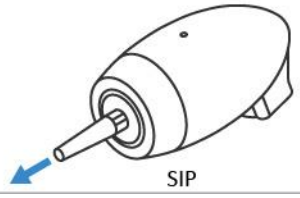
Plugging into an iOS 7-12 device



1. Connect the LipSync USB to a USB hub's receptacle.
2. Connect the USB end of a USB to USB C/Lightning cable into the hub's USB receptacle.
3. Connect the other end of the USB to USB C/Lightning cable into the iOS device.
4. Wait 3 seconds for the LipSync to initialize. Initialization is complete when the LED blinks red and green four times.

Default Functions

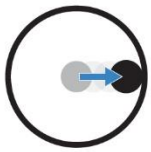
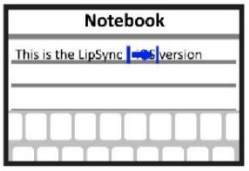
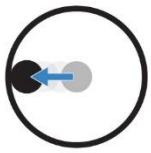
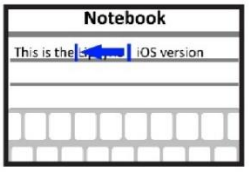
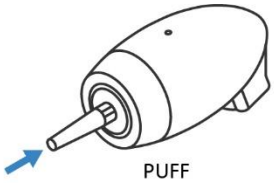
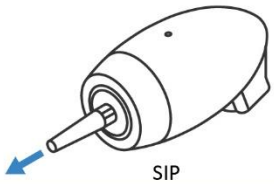
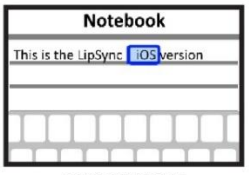
The LipSync Macro will have the following keyboard functions by default for **computers only**. No setup is required for the LipSync to be used with computers. However, **setup is required for use with the phone and tablet**.

Action	Action Duration (second)	Function (Operation Mode 1)	Function (Operation Mode 2)
 PUFF	1	[ ] DEL ‘ ENTER	[ ] DEL ‘ ENTER
 SIP	1	C V B SPACE	C V B SPACE
 PUFF	3	, . / Alt Ctrl ←	, . / Alt Ctrl ←
 SIP	3	0 - = [ ] \	0 - = [ ] \
 PUFF	5	CENTRE RESET	CENTRE RESET
 SIP	5	NO ACTION	NO ACTION

Mapping Custom Functions

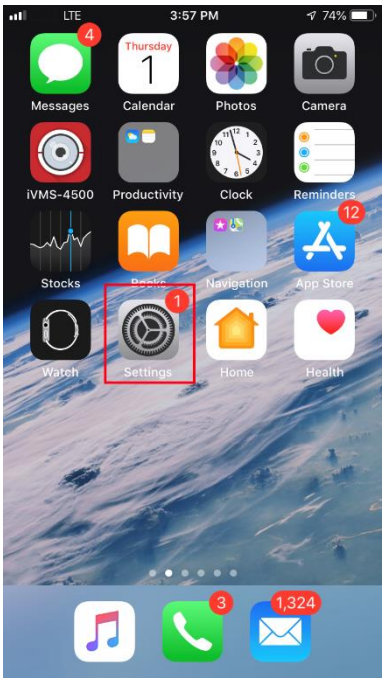
On the LipSync Macro, the four directions (up, down, left, right), sip (1, 3, 5 seconds), and puff (1 & 3 seconds) can be mapped (or programmed) to the computing device. The following functions will be mapped to an iOS device as an example:

Android users can follow along by going to Settings > Accessibility > Dexterity and Interaction > Universal Switch

Action	Action Duration (second)	Function
 MOUTHPIECE RIGHT	N/A	 MOVE TO NEXT ITEM
 MOUTHPIECE LEFT	N/A	 MOVE TO PREVIOUS ITEM
 MOUTHPIECE UP	N/A	 SIRI
 MOUTHPIECE DOWN	N/A	 APP SWITCHER
 PUFF	1	 TAP
 SIP	1	 SELECT ITEM

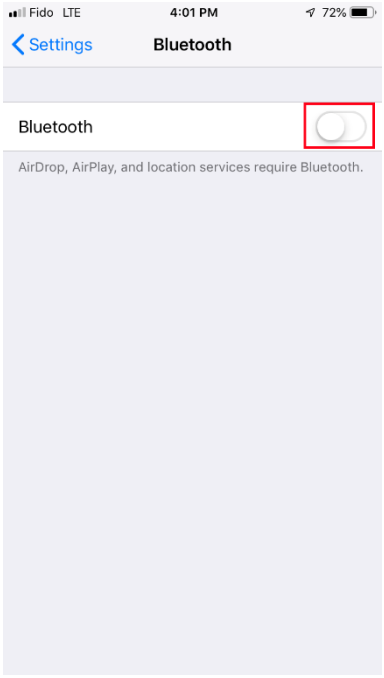
Part A: Connect the LipSync

1. Open the ***Settings*** application.

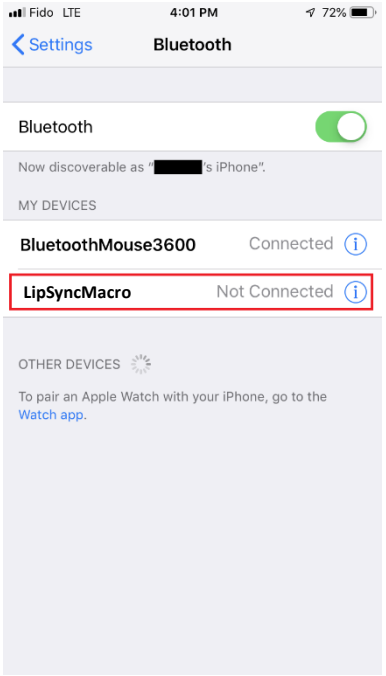


2. Tap on ***Bluetooth***.

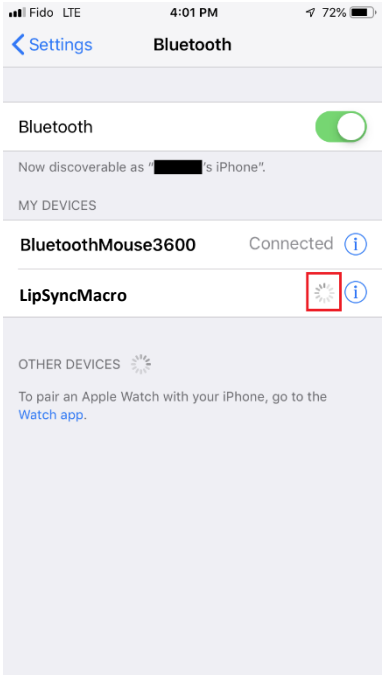
3. Enable Bluetooth if it's not enabled.



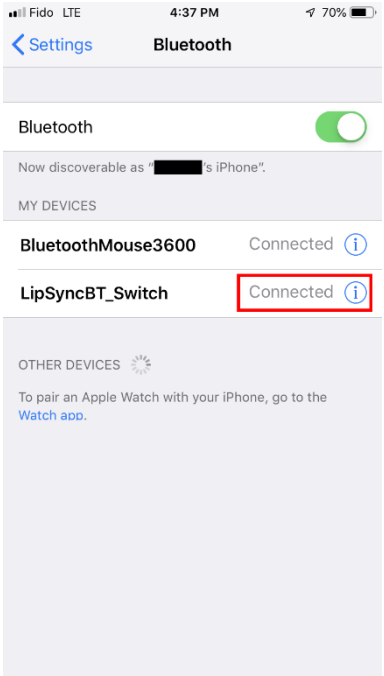
4. Tap on ***LipSyncMacro*** to connect.



5. Wait for the LipSync to connect

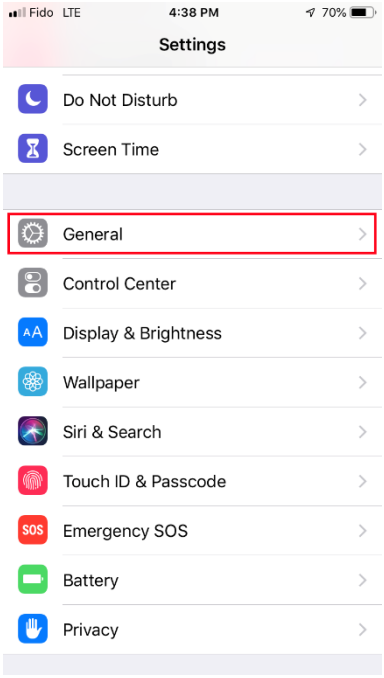


6. iOS will show a ***Connected*** message once it's connected.

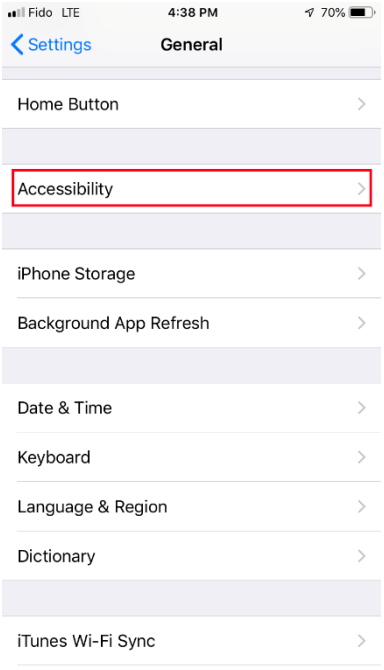


Part B: Map Switches

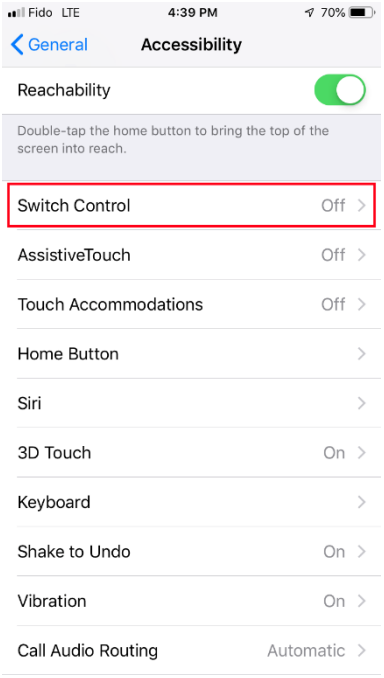
1. Tap on ***General*** option in ***Settings***.



2. Tap on ***Accessibility***.
*Android: Accessibility > Dexterity & Interactions

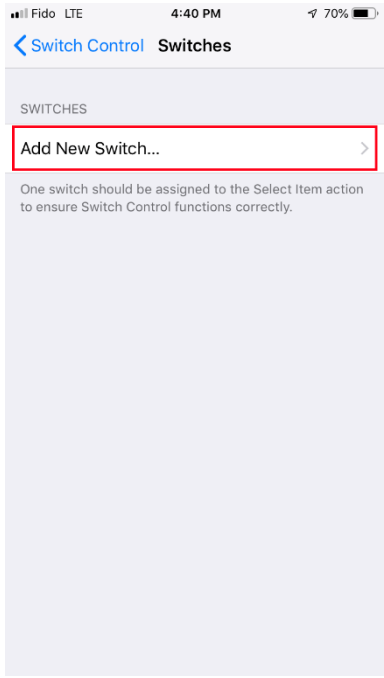


3. Tap on Switch Control.
*Android: Universal Switch

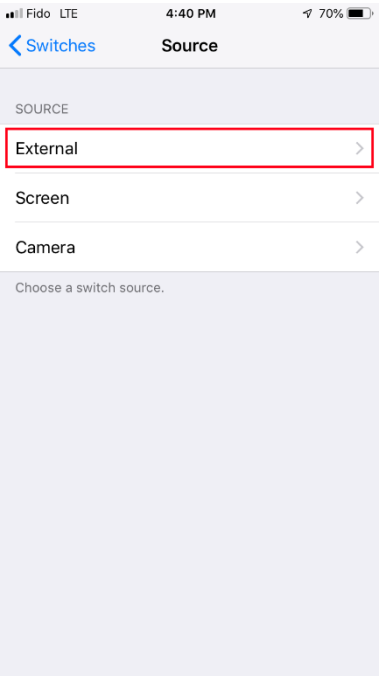


4. Tap on ***Switches*** & delete any previously mapped switches.

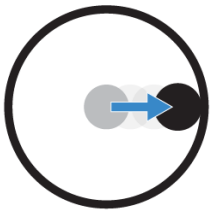
5. Tap on ***Add New Switch***.



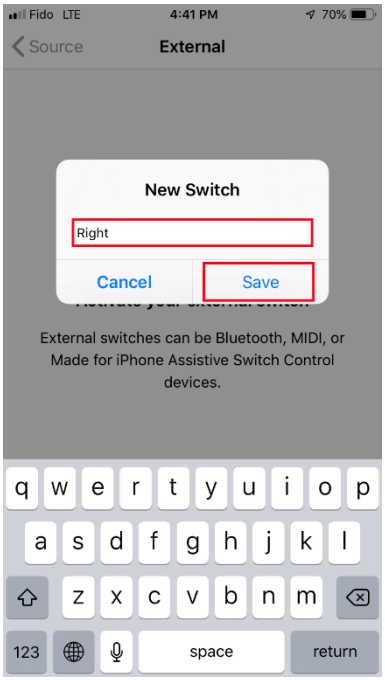
6. Tap on ***External***.

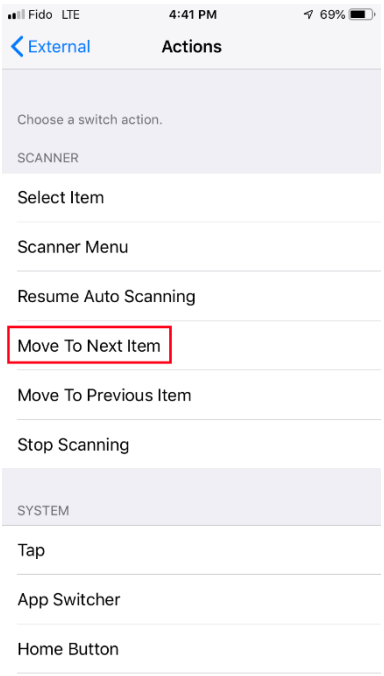


7. Map the joystick mouthpiece right direction to ***Move to Next Item*** action and name it ***Right***.

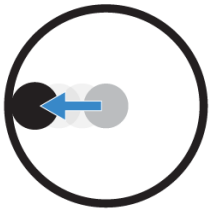


JOYSTICK RIGHT

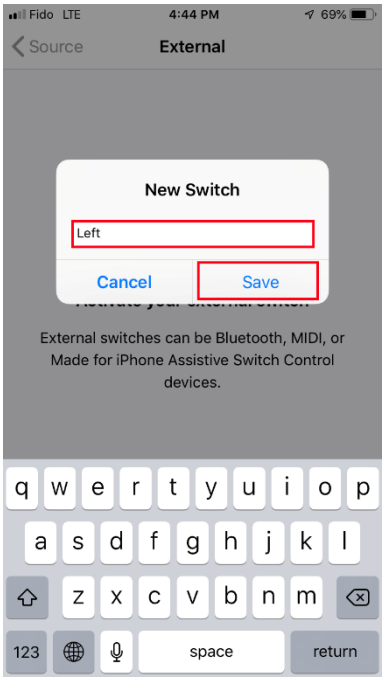


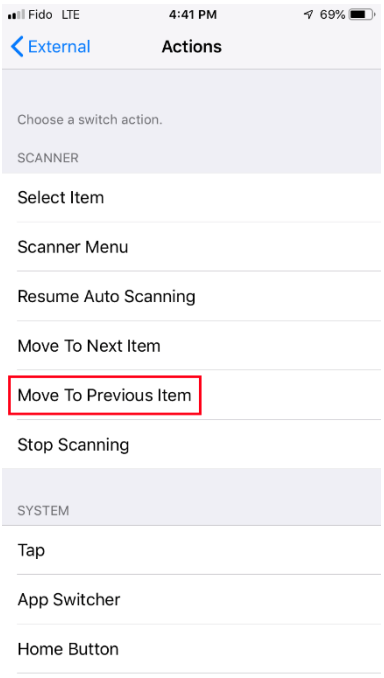


8. Repeat step 5 and 6 to add an external switch. Map the joystick mouthpiece left direction to ***Move to Previous Item*** action and name it ***Left***.

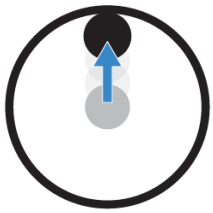


JOYSTICK LEFT

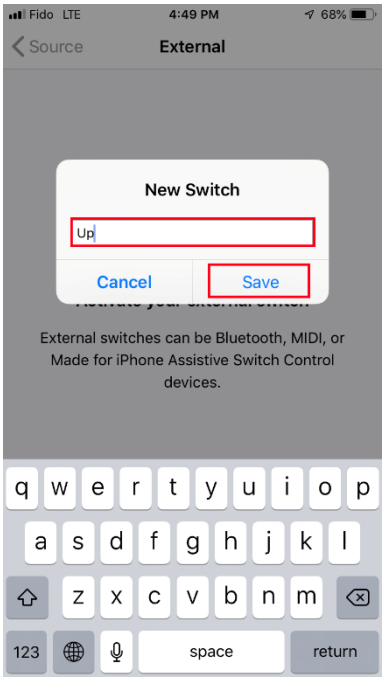


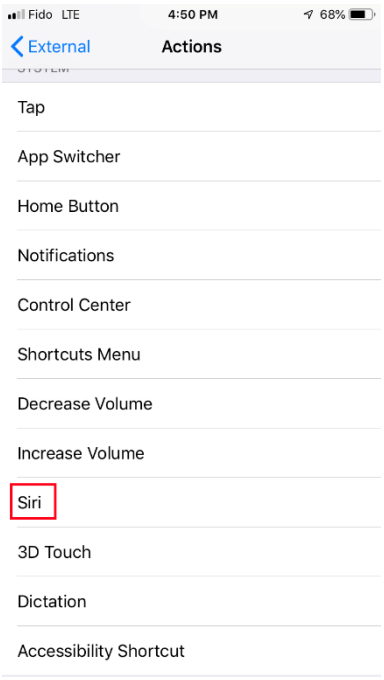


9. Repeat step 5 and 6 to add an external switch. Map the joystick mouthpiece up direction to ***Siri*** action and name it .



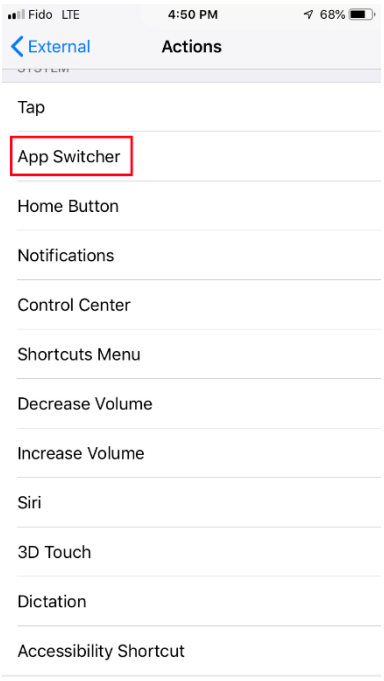
JOYSTICK UP



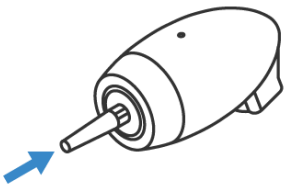


10. Repeat step 5 and 6 to add an external switch. Map the joystick mouthpiece up direction to ***App Switcher*** action and name it ***Down***.

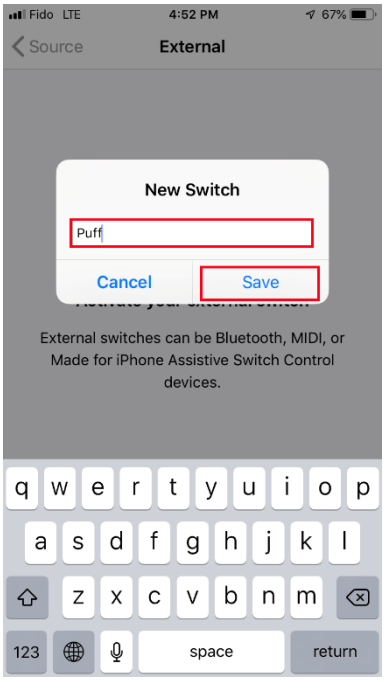
JOYSTICK DOWN

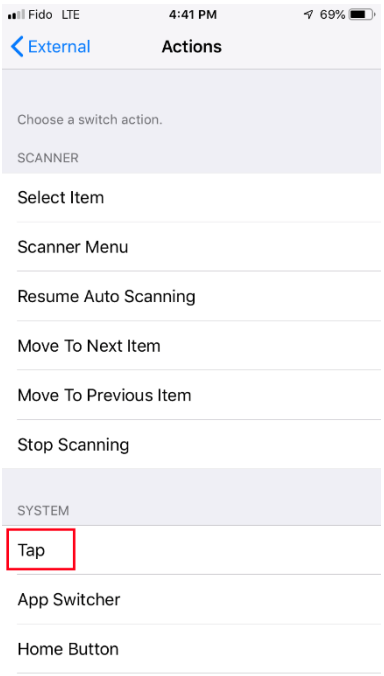


11. Repeat step 5 and 6 to add an external switch. Map a short 1 second puff into the mouthpiece to the ***Tap*** action and name it ***Puff***.

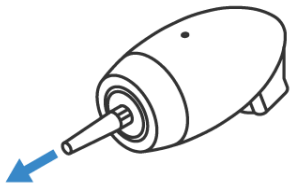


PUFF (1s)

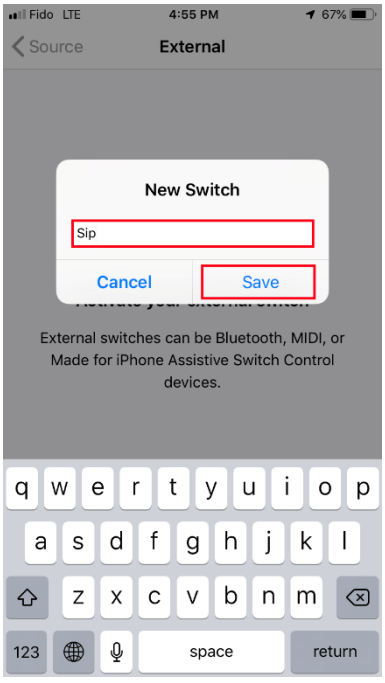


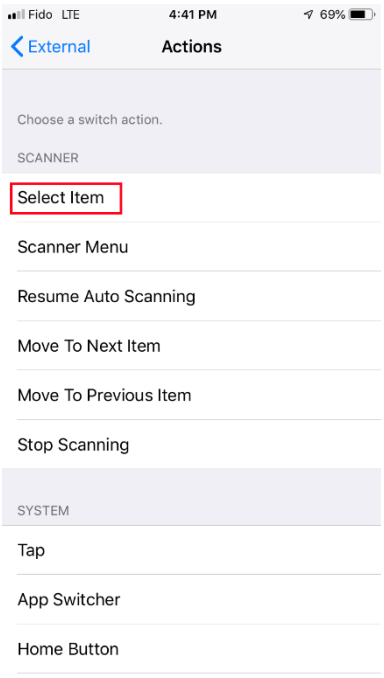


12. Repeat step 5 and 6 to add an external switch. Map a short 1 second sip into the mouthpiece to the ***Select Item*** action and name it ***Sip***.



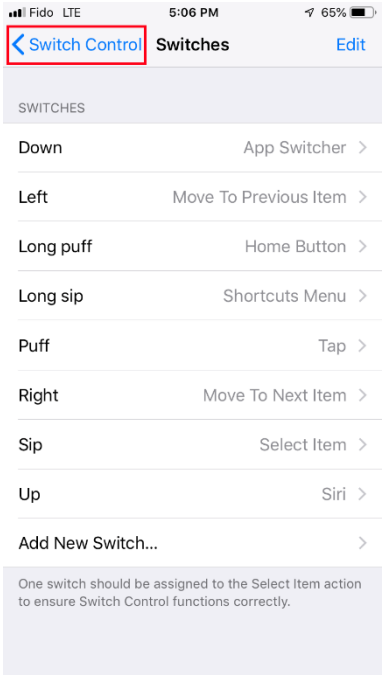
SIP (1s)





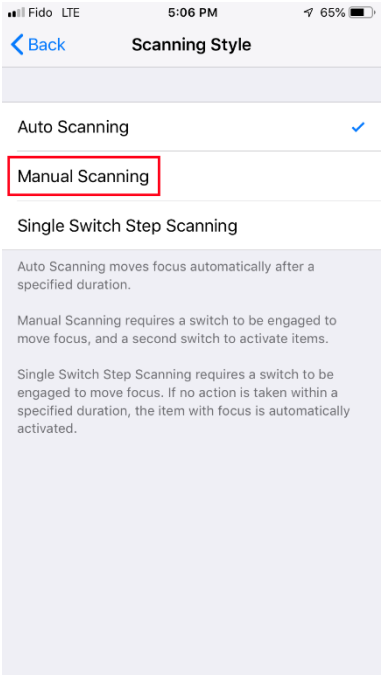
Part C: Enable Switch Control

1. Tap on ***Switch Control*** in the top left corner.
*Android: Universal Switch

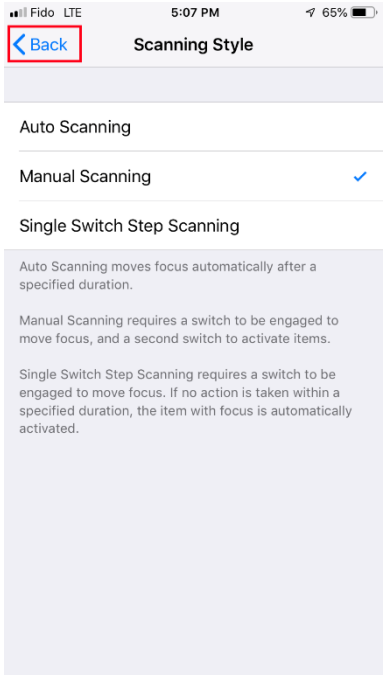


2. Tap on ***Scanning Style***

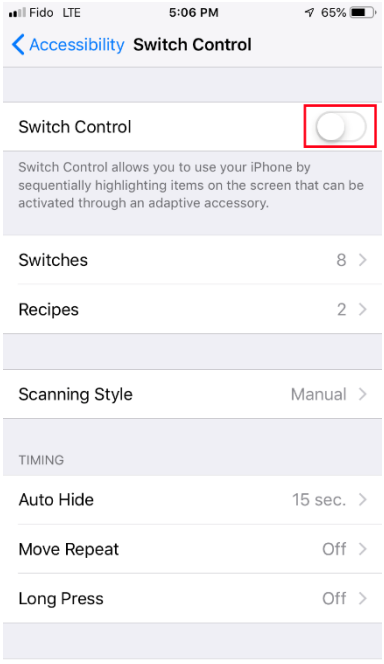
3. Select ***Manual Scanning***.



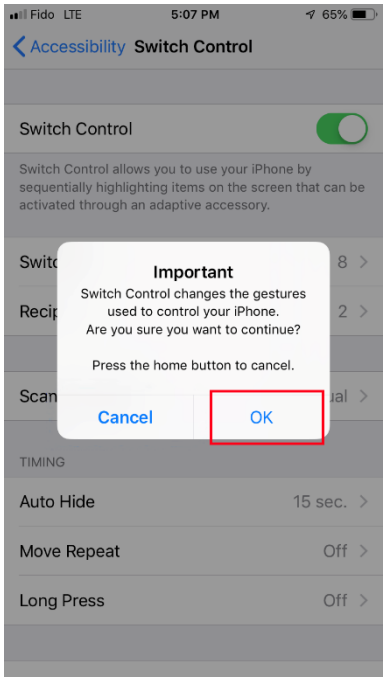
4. Tap on ***Back*** button in the top left corner.

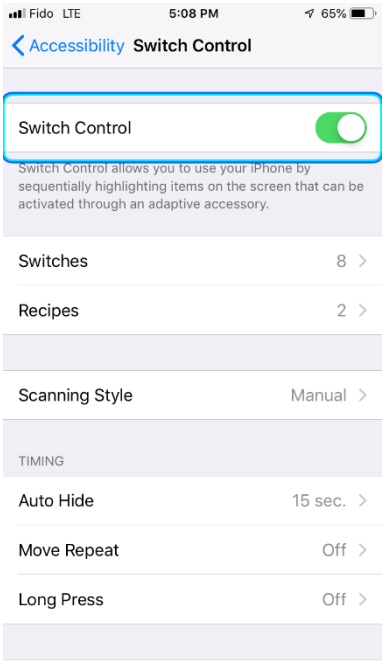
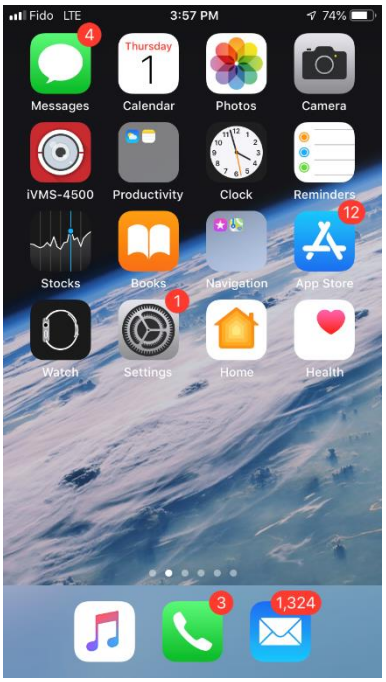


5. Enable Switch Control.
*Android: Universal Switch



6. Tap on ***Ok***.



7. Switch Control is now setup and ready to operate iOS. 	**8.** Test the switch mappings by performing 5 second puff. This should bring up the home screen. 	

See **Appendix** for Advanced Keyboard Functions.

4 Maintenance

Cleaning the Mouthpiece and Filter

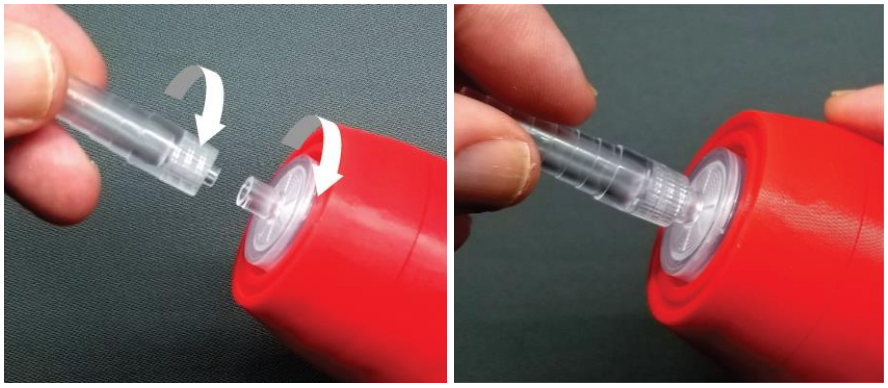
Each user should have their own set of mouthpiece and filter for hygienic reasons. These pieces are made of acrylic plastic and have a 3-6 month life cycle depending on the usage. Keep unused pieces in a clean sealable bag out of the sunlight.

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.

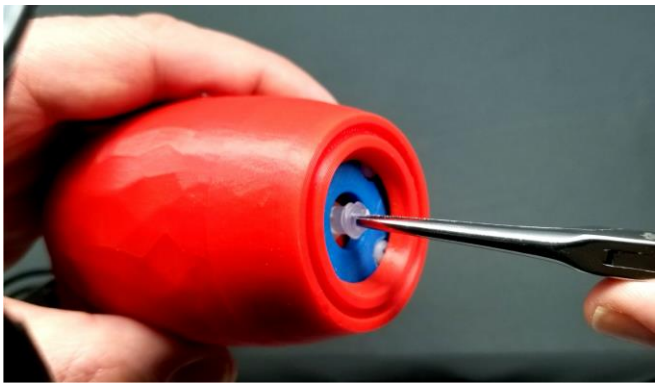
3. Wearing clean gloves, twist the mouthpiece and filter **clockwise** until finger tight. Do not overtighten.



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 inconsistent output actions, follow these steps in order:

1. 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.
2. 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:

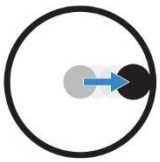
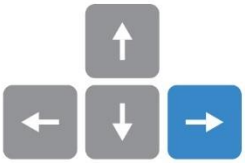
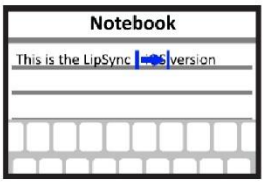
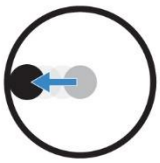
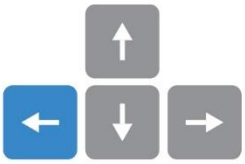
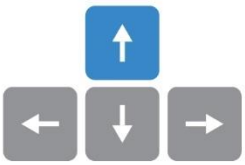
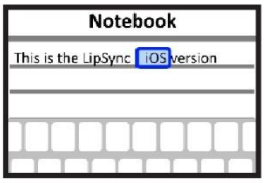
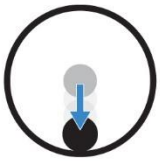
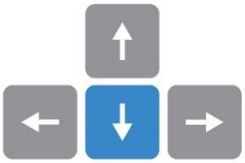
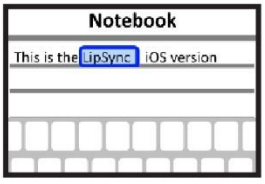
1. Contact your LipSync maker
2. Makers Making Change Forum (https://makersmakingchange.com/forum/)
3. Makers Making Chance R&D team at info@makersmakingchange.com
4. Leave a review on the LipSync page (https://www.makersmakingchange.com/project/lipsync/)

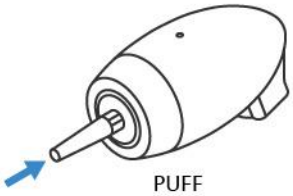
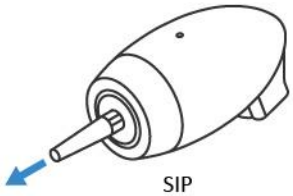
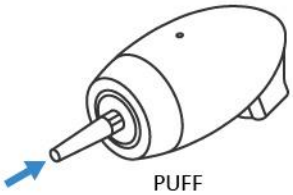
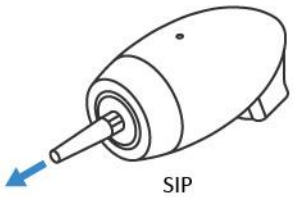
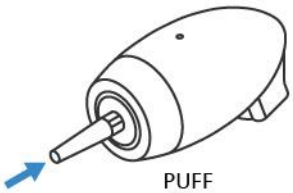
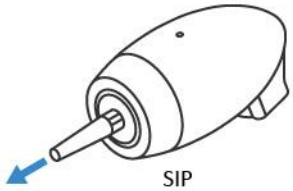
Appendix

Advanced Keyboard Functions

The following functions are the advance keystrokes for the listed LipSync Macro actions. These need to be mapped in ***Settings*** > ***Accessibility*** > ***Switch Control*** before they can be used as adaptive switch buttons on an iOS device (https://support.apple.com/en-ca/HT20137).

The joystick actions can act in two different operation modes which can be switched using a 5 second sip action. The joystick functions can be used as switch buttons in the Operation Mode 1 when they are mapped through ***Switch Control*** and they can be used to move the keyboard cursor easier in Operation Mode 2.

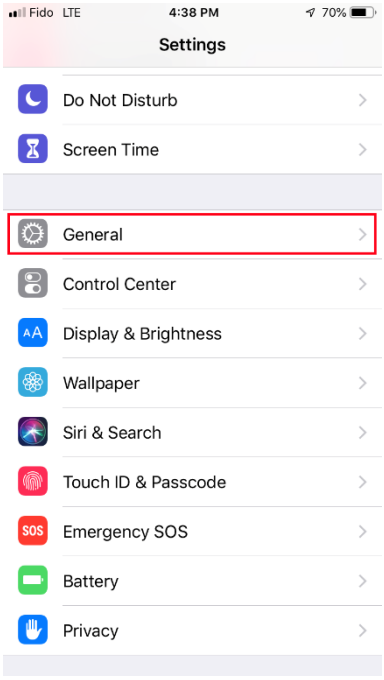
Action	Action Duration (second)	Function (Operation Mode 1)	Function (Operation Mode 2)
 JOYSTICK RIGHT	N/A		 MOVE TO NEXT ITEM
 JOYSTICK LEFT	N/A		 MOVE TO PREVIOUS ITEM
 JOYSTICK UP	N/A		 SELECT THE NEXT WORD
 JOYSTICK DOWN	N/A		 SELECT THE PREVIOUS WORD

Action	Action Duration (second)	Function (Operation Mode 1)	Function (Operation Mode 2)
 PUFF	1	[ ] DEL ‘ ENTER	[ ] DEL ‘ ENTER
 SIP	1	C V B SPACE	C V B SPACE
 PUFF	3	, . / Alt Ctrl ←	, . / Alt Ctrl ←
 SIP	3	0 - = [ ] \	0 - = [ ] \
 PUFF	5	**CENTRE RESET**	**CENTRE RESET**
 SIP	5	**NO ACTION**	**NO ACTION**

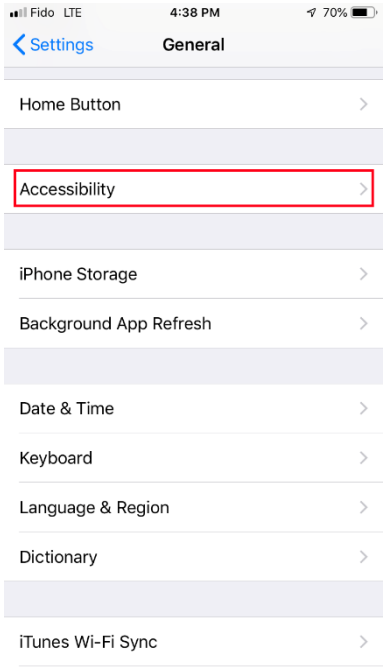
Advanced Switch Mapping

Follow “Part 2: Map Switches” from pages 11-15 first before doing the following steps. If you already enabled switch control in “Part 3: Enable Switch Control” on page 16, turn off the switch control **before** doing the following steps.

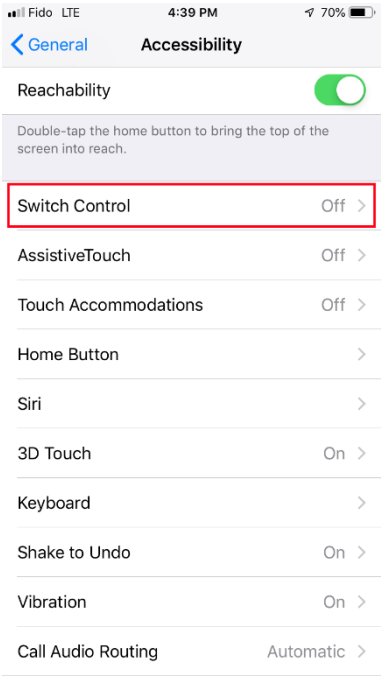
1. Tap on ***General*** option in ***Settings***.



2. Tap on ***Accessibility***.
*Android: Accessibility > Dexterity & Interactions

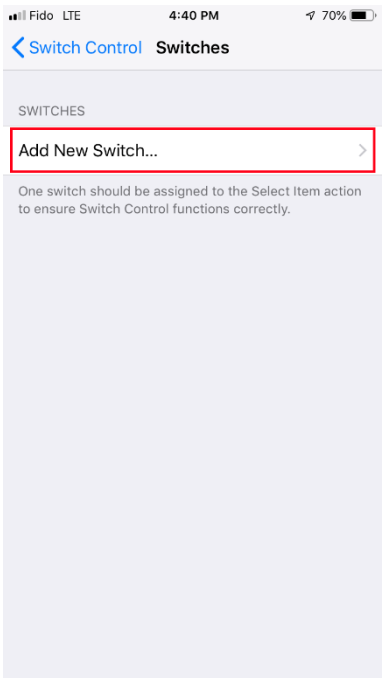


3. Tap on Switch Control.
*Android: Universal Switch

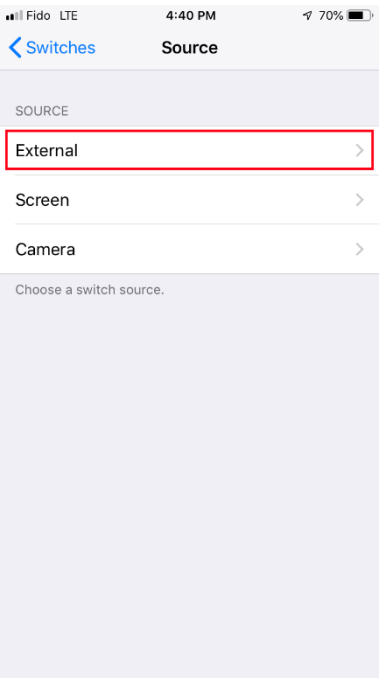


4. Tap on ***Switches***.

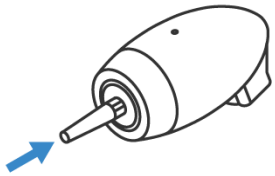
5. Tap on ***Add New Switch***.



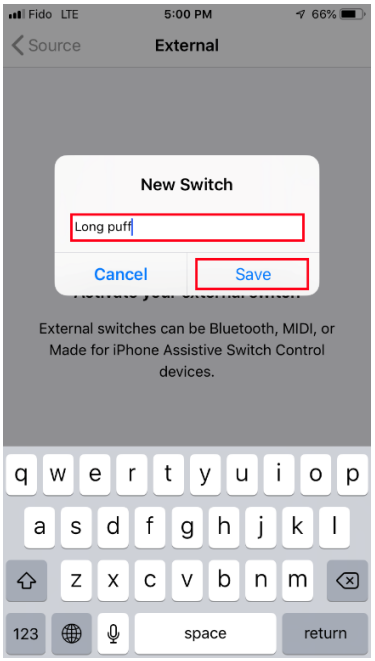
6. Tap on ***External***.

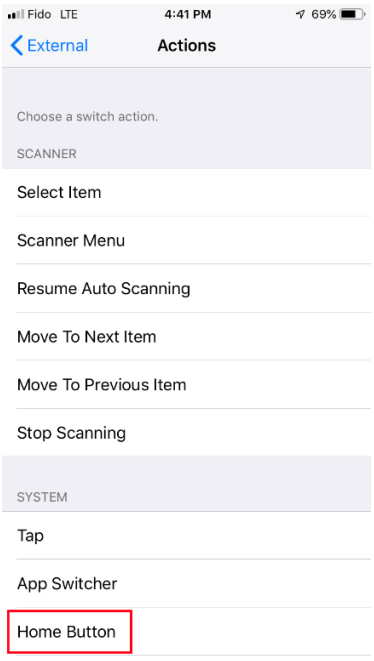


7. Repeat step 5 and 6 to add an external switch. Map a 3 second puff into the mouthpiece to the ***Home Button*** action.

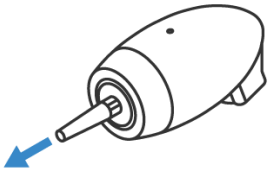


PUFF (3s)

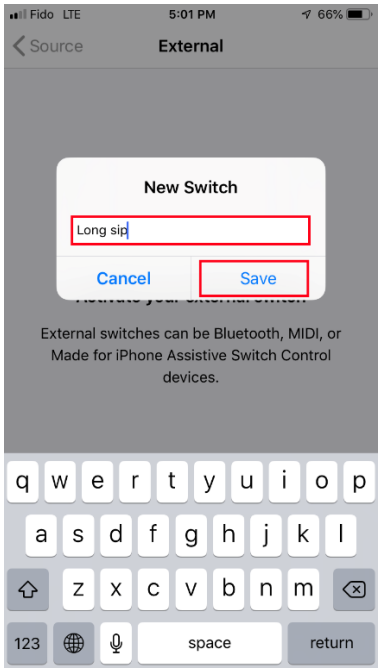


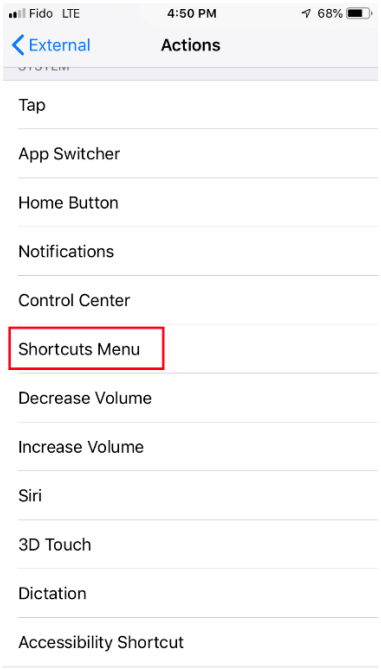


8. Repeat step 5 and 6 to add an external switch. Map a 3 second sip into the mouthpiece to the ***Shortcuts Menu*** action.

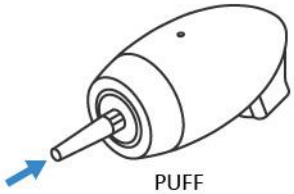
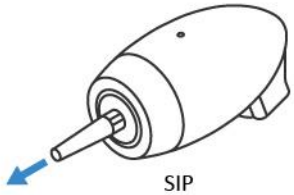
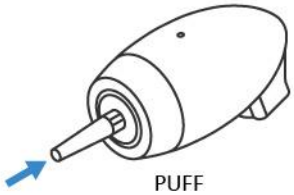
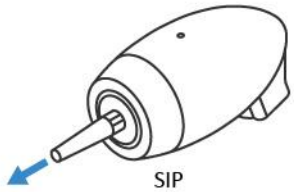


SIP (3s)





Advanced Mapped Functions:

Action	Action Duration (second)	Function (Operation Mode 1)	Function (Operation Mode 2)
 PUFF	3	 HOME BUTTON	 HOME BUTTON
 SIP	3	 SHORTCUTS MENU	 SHORTCUTS MENU
 PUFF	5	**CENTRE RESET**	**CENTRE RESET**
 SIP	5	**NO ACTION**	**NO ACTION**