Makers Making Change

A Neil Squire Program

LipSync Macro

SETUP GUIDE

Version 1.0 / September 2019

Table of Contents

PROGRAM OF: Neil Squire

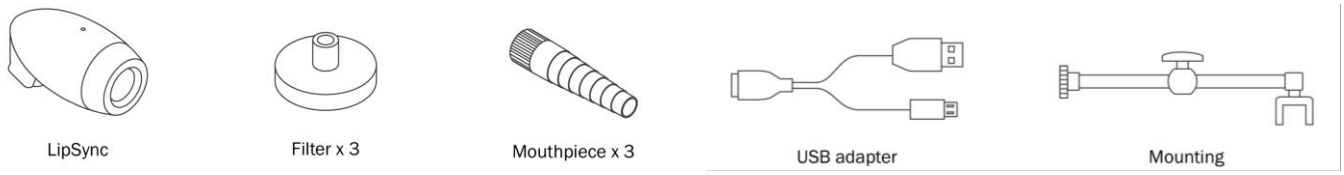
FUNDING PROVIDED BY: Google.org, vancouver foundation, Canada, Calgary Foundation For Community, Forever, Craig H. Neilsen Foundation

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	USB & wireless
LipSync Macro	**Works like a keyboard**	**USB & wireless**
LipSync Gaming	Works like a gaming joystick	USB

Device Compatibility

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

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

Windows
MacOS

Powering the Controller

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

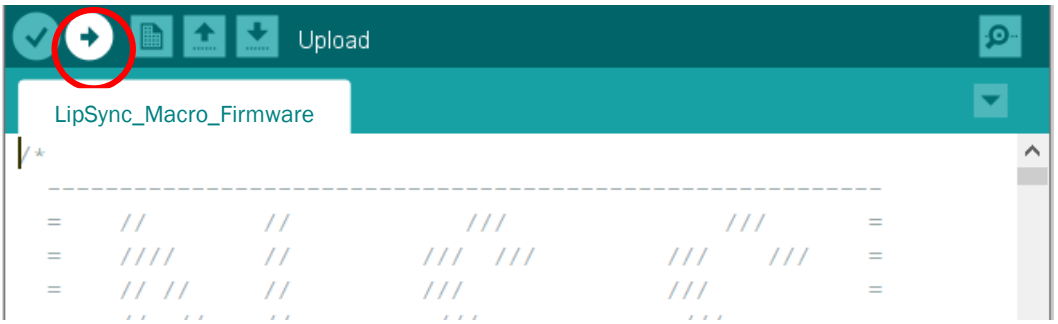
Power bank (>5000 mAh)

USB-C/Lightning to USB adapter

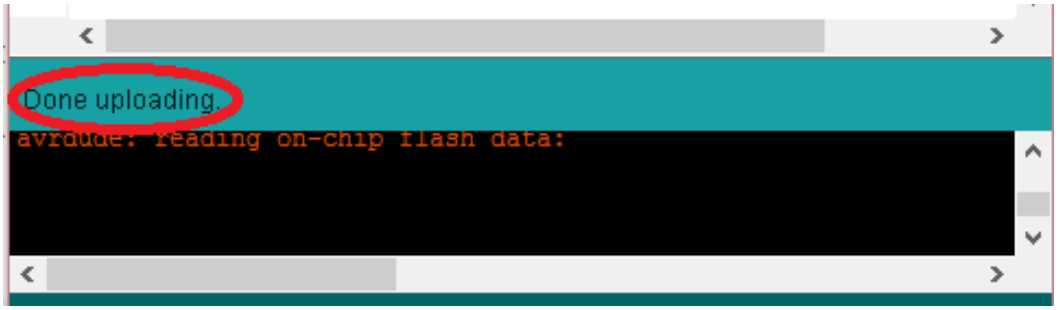
Step 1: Upload the LipSync Macro Firmware

If you are currently using a LipSync Wireless and would like to convert it into a LipSync Macro, skip ahead to the “Reconfiguring the LipSync Macro” on the next page.

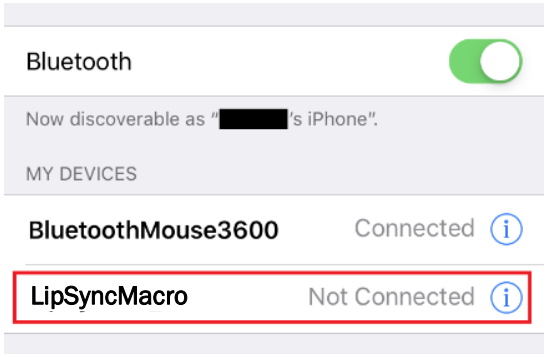
1. Download and install the latest version of Arduino IDE: https://www.arduino.cc/en/main/software
2. Download and save the latest LipSync Macro firmware: https://github.com/makersmakingchange/LipSync-Macro/raw/master/Software/LipSync_Macro_Firmware/LipSync_Macro_Firmware.ino
3. Right-click on the hyperlink of microcontroller firmware, select *Save Target As* (Internet explorer) or *Save Link As* (Chrome or Firefox) to save the microcontroller code.
4. Open the microcontroller firmware (*LipSync_Macro_Firmware*) using Arduino IDE.
5. Click on Tools → Board → Arduino/Genuino Micro
6. Connect to a PC using the LipSync USB cable.
7. Click on *Tools*→ *Port*
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.



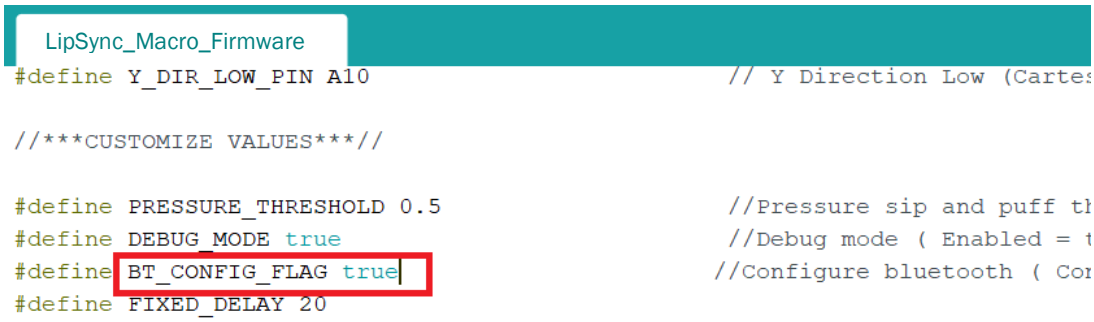
10. You should be able to see a keyboard input device named *LipSyncMacro* under the Bluetooth settings of your computer or your iOS device.



Reconfiguring the LipSync Macro from the LipSync Wireless

If you're converting your LipSync Wireless into a LipSync Macro, the Bluetooth module needs to be reconfigured with the following steps:

1. Open the microcontroller code (LipSync_Macro_Firmware) using Arduino IDE.
2. Change the value of *BT_CONFIG_FLAG* variable to *true.*

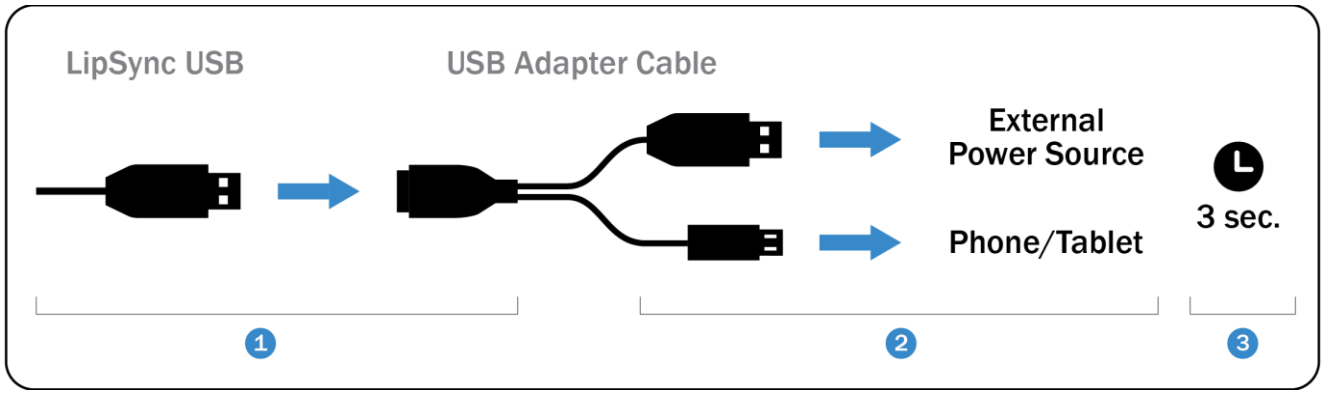


3. Click on Tools → Board → Arduino/Genuino Micro
4. Connect to the PC using the LipSync USB cable.
5. Click on *Tools*→ *Port*
6. Click the right arrow at the top left of the Arduino IDE to upload the LipSync Macro firmware code to the LipSync device.
7. Once upload is complete, a message saying *Upload Successful* will show at the bottom left of the Arduino IDE.
8. Next, change the value of *BT_CONFIG_FLAG* variable to back to *false*.
9. Repeat steps 3 to 7 again.
10. The device should now be discoverable by your phone, tablet, or computer as *LipSyncMacro* in your device's Setting > Bluetooth.

Step 2: Plugging the LipSync Macro into a Device

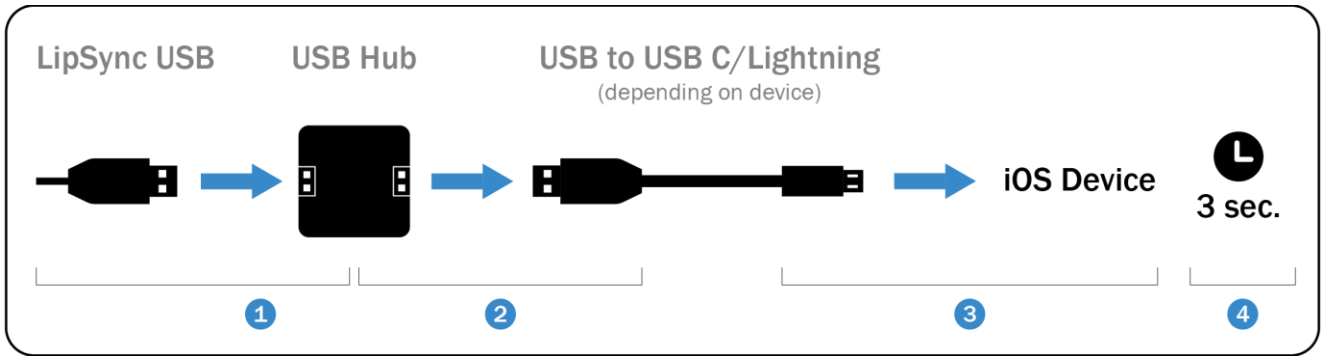
Plugging into a Computer, Laptop or Android & Windows Device

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.
4.

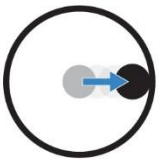
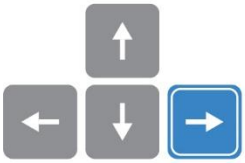
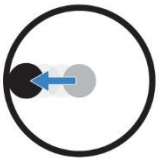
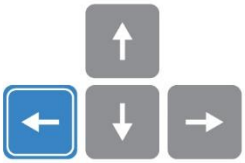
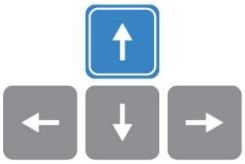
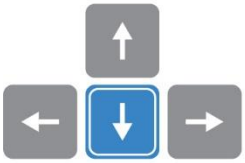
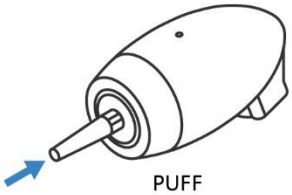
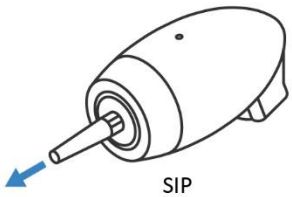
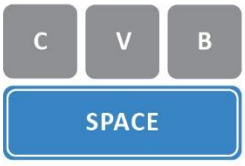
Plugging into an iOS7-12 Device



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.

Step 3: Default Functions and Mapping Custom Functions

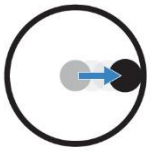
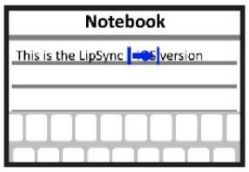
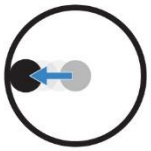
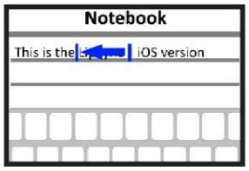
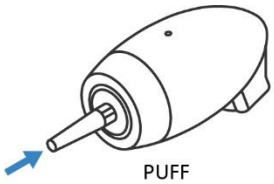
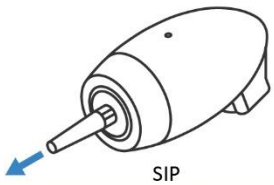
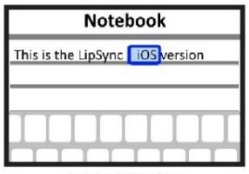
The LipSync Macro will have the following keyboard functions by default for computers only. No setup is required for the LipSync to be used with computers. However, setup is required for use with the phone and tablet.

Action	Action Duration (second)	Function
 MOUTHPIECE RIGHT	N/A	
 MOUTHPIECE LEFT	N/A	
 MOUTHPIECE UP	N/A	
 MOUTHPIECE DOWN	N/A	
 PUFF	1	
 SIP	1	

Mapping Custom Functions:

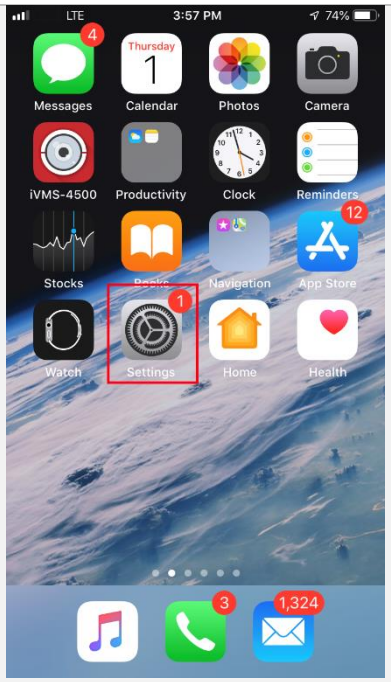
On the LipSync Macro, the four directions (up, down, left, right), sip (1, 3, 5 seconds), and puff (1 & 3 seconds) can be mapped (or programmed) to the computing device. The following functions will be mapped to an iOS device as an example:

> 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

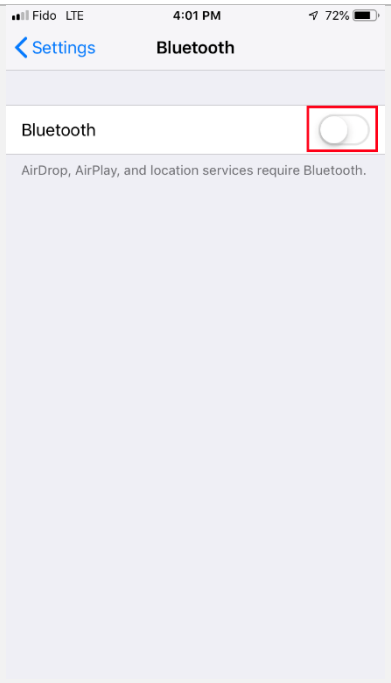
Part A: Connect the LipSync

1. Open the *Settings* application.

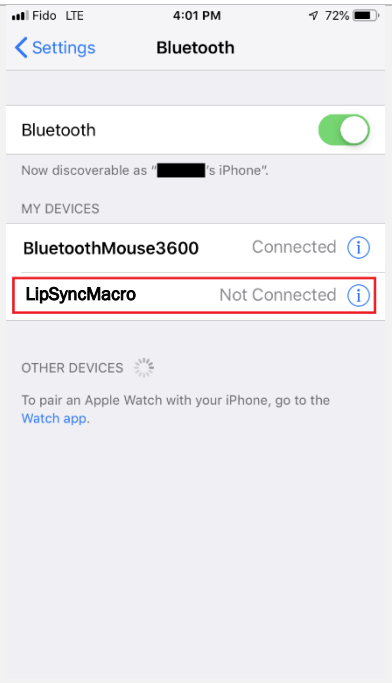


2. Tap on Bluetooth.

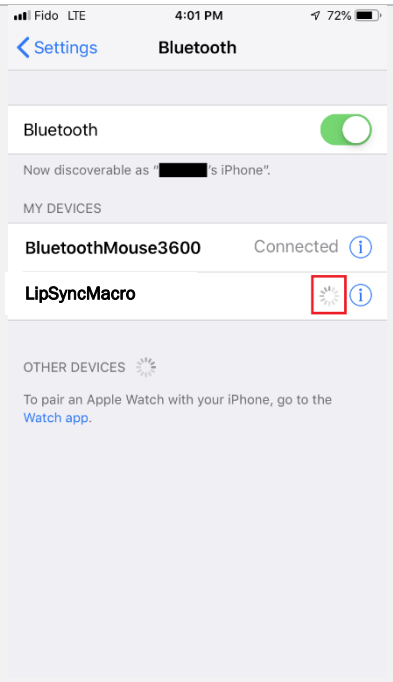
3. Enable Bluetooth if it's not enabled.



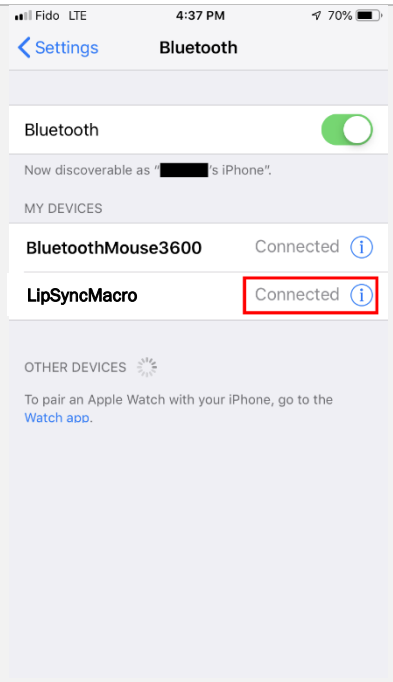
4. Tap on *LipSyncMacro* to connect.



5. **Wait for the LipSync to connect.**

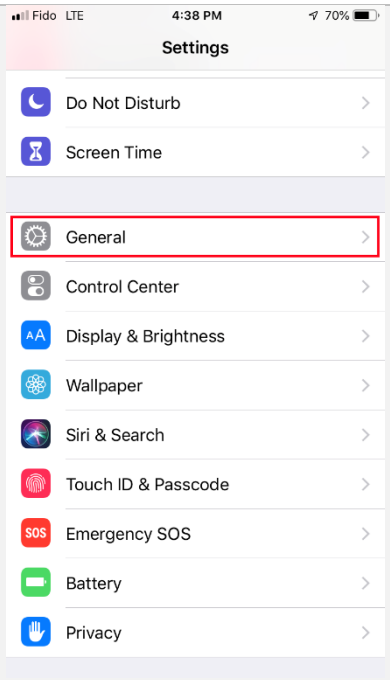


6. iOS will show a *Connected* message once it's connected.

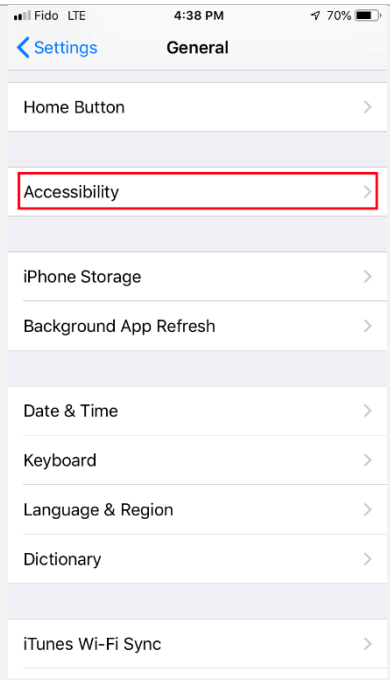


Part B: Map Switches

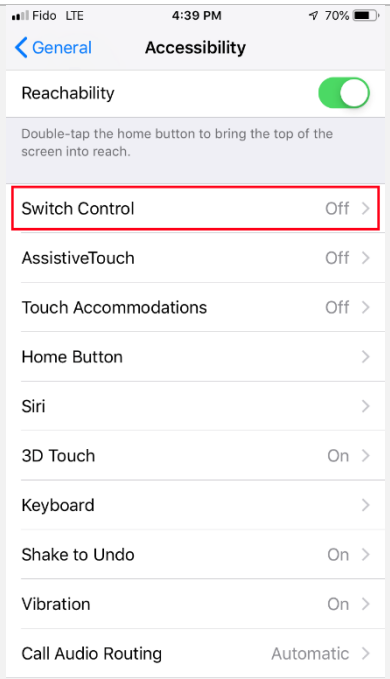
1. Tap on *General* option in *Settings.*



2. Tap on *Accessibility.*
*(Android) Accessibility > Dexterity & Interactions

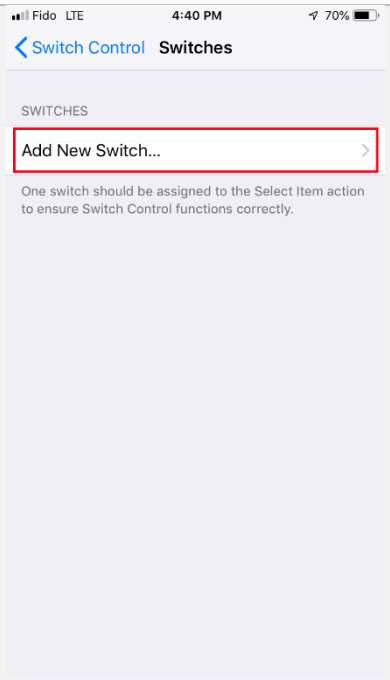


3. Tap on *Switch Control.*
*(Android) Universal Switch

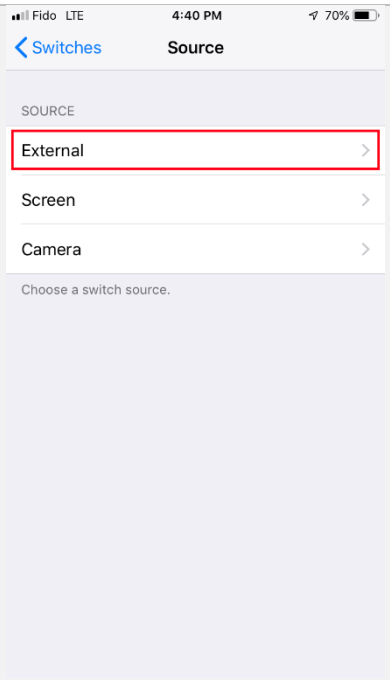


4. Tap on *Switches* and delete any previously mapped switches.

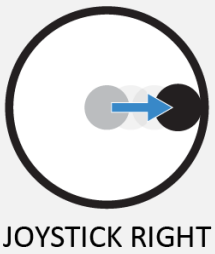
5. **Tap on Add New Switch.**

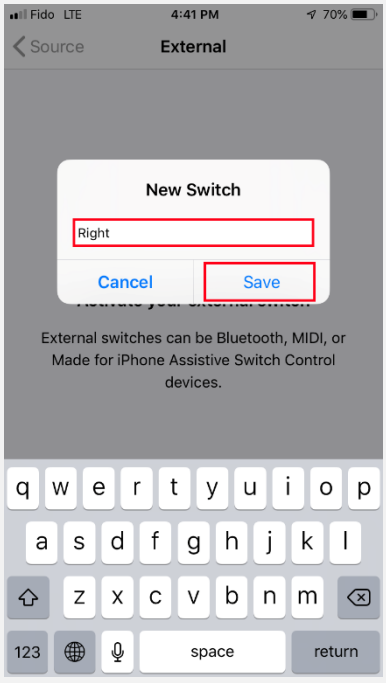


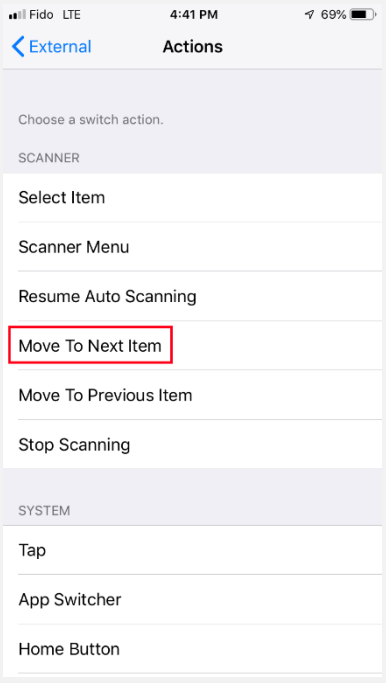
6. Tap on External.



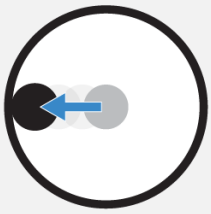
7. Map the joystick mouthpiece <u>right</u> direction to *Move to Next Item* action and name it *Right*.



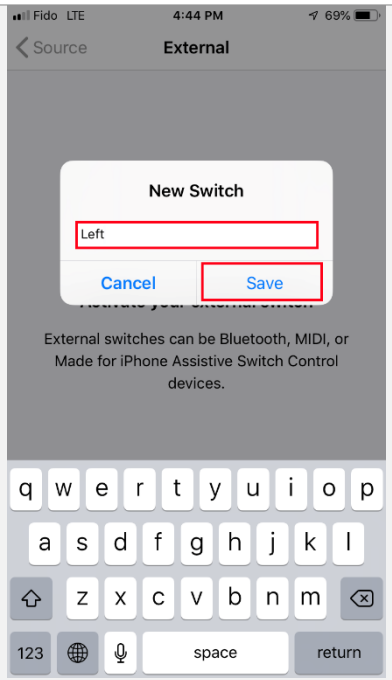


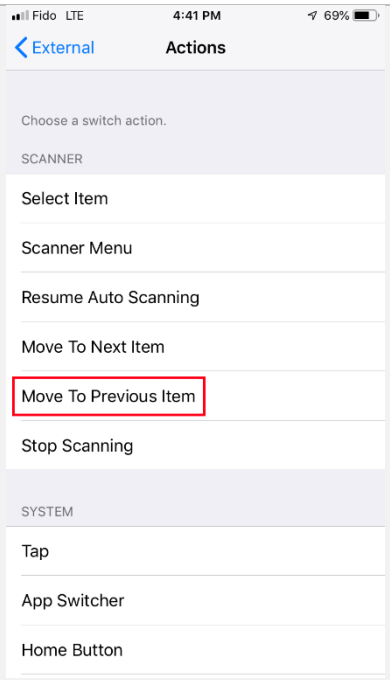


8. Repeat step 5 and 6 to add an external switch. Map the joystick mouthpiece left direction to *Move to Previous Item* action and name it *Left.*

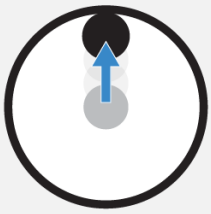


JOYSTICK LEFT

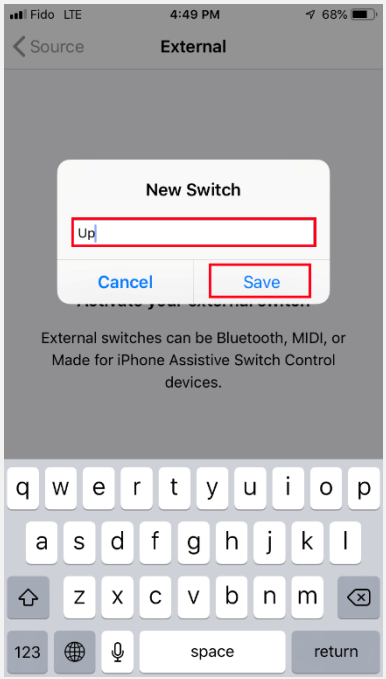


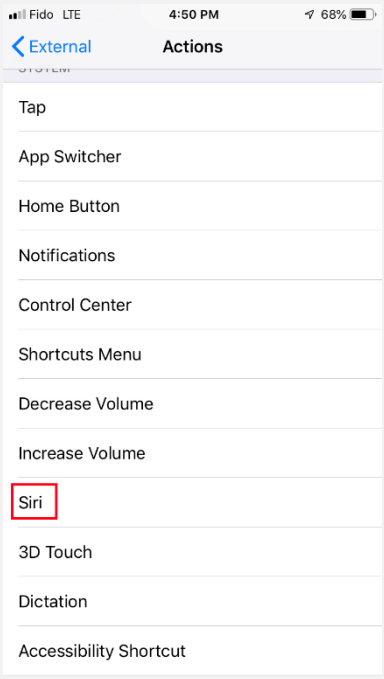


9. Repeat step 5 and 6 to add an external switch. Map the joystick mouthpiece up direction to *Siri* action and name it *Up.*

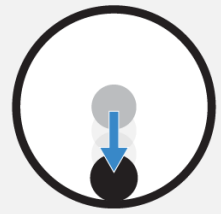


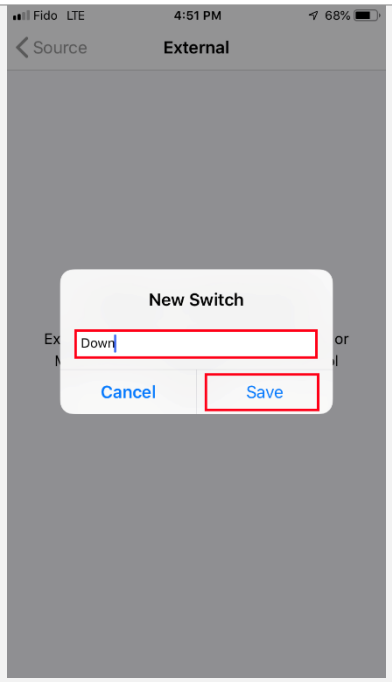
JOYSTICK UP

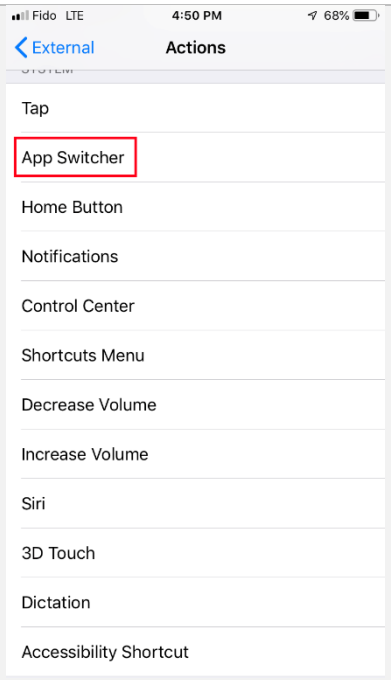




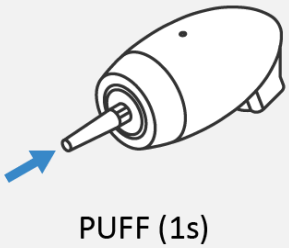
10. Repeat step 5 and 6 to add an external switch. Map the joystick moutpiece down direction to *Siri* action and name it *Down.*

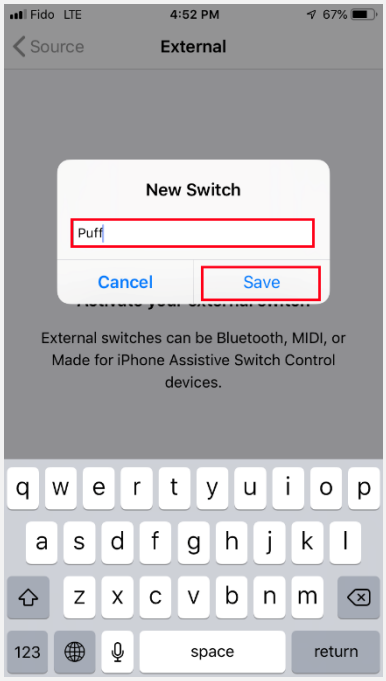


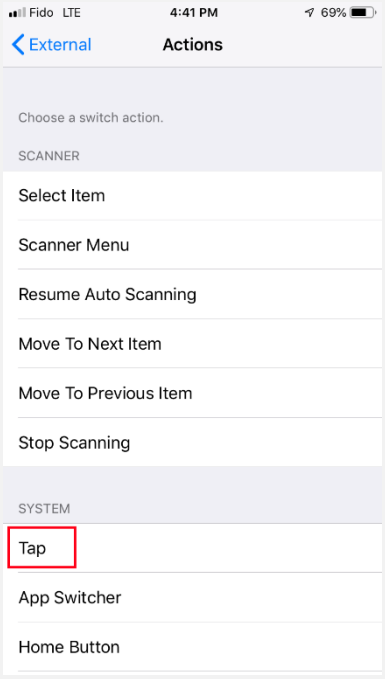




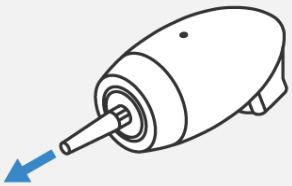
11. Repeat step 5 and 6 to add an external switch. Map a short 1 second puff into the mouthpiece to the *Tap* action and name it *Puff.*



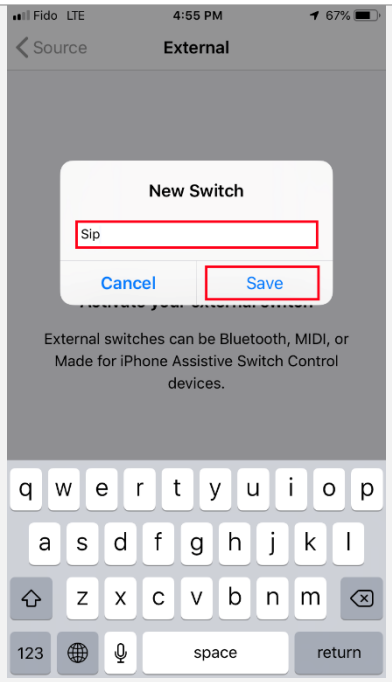


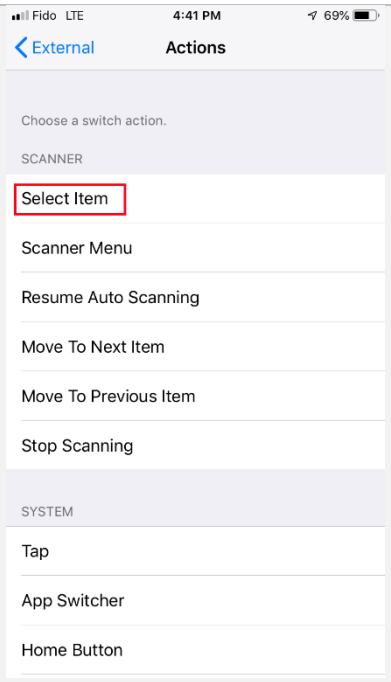


12. Repeat step 5 and 6 to add an external switch. Map a short 1 second sip into the mouthpiece to the *Select Item* action and name it *Sip.*



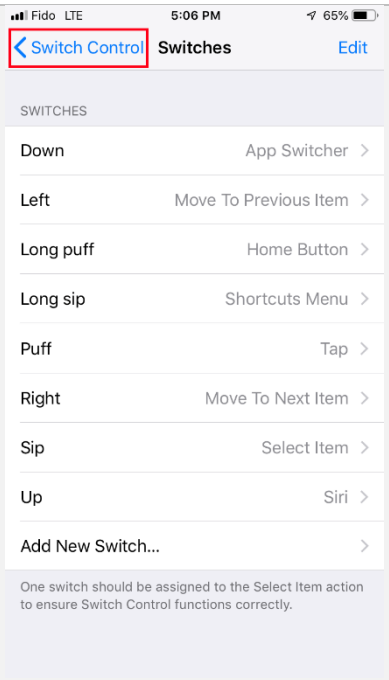
SIP (1s)



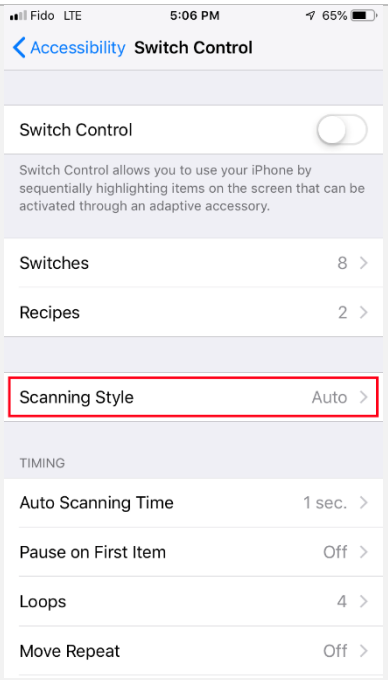


Part C: Enable Switch Control

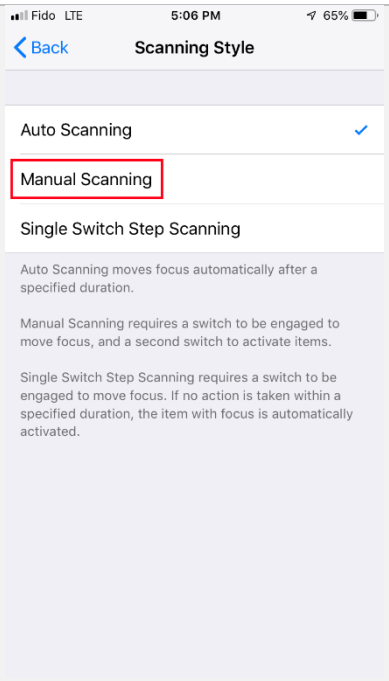
1. Tap on *Switch Control* in the top left corner.
   *(Android) Universal Switch



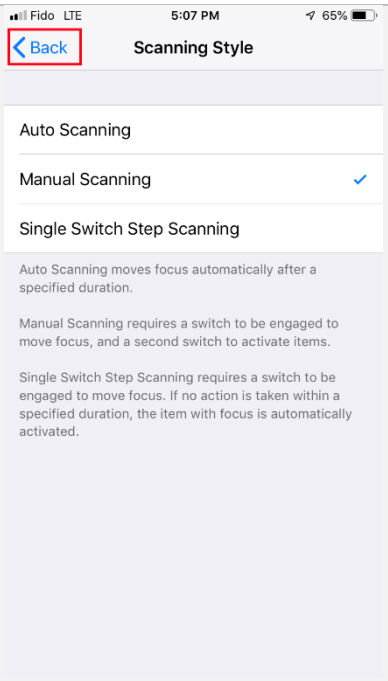
2. Tap on Scanning Style.



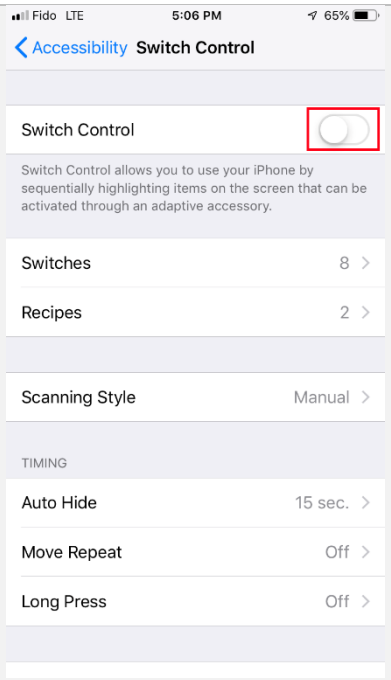
3. Select Manual Scanning.



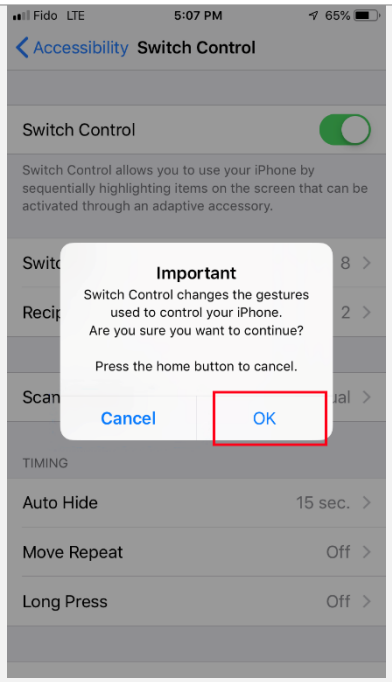
4. Tap on *Back* button in the top left corner.



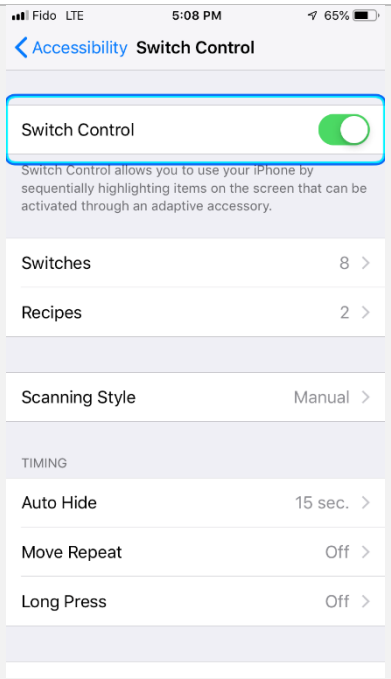
5. **Enable Switch Control.**
***(Android) Universal Switch**



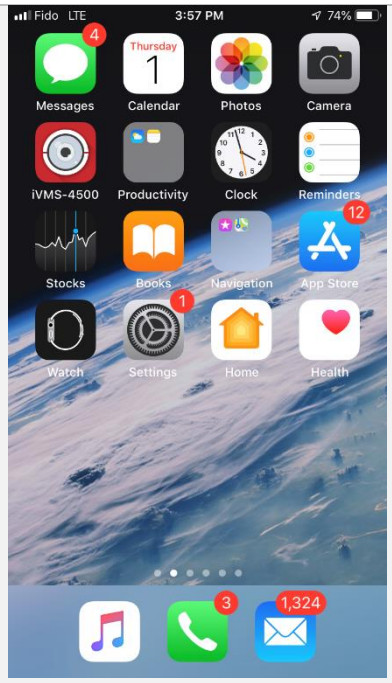
6. Tap on *OK* button.



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.

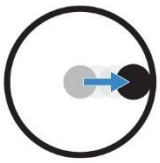
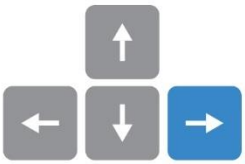
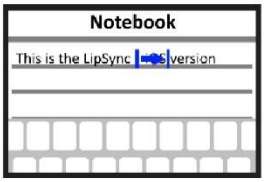
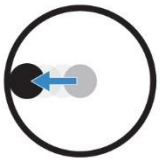
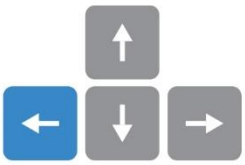
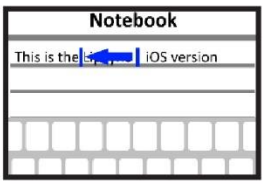
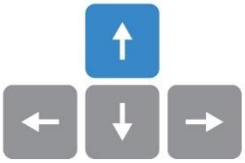
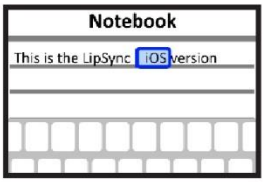
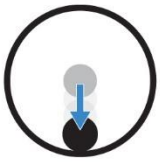
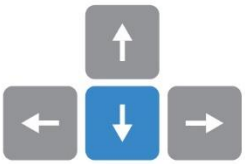
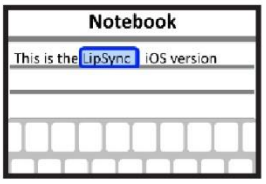


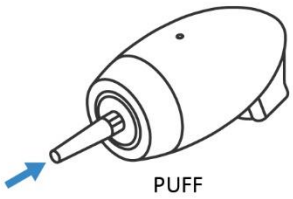
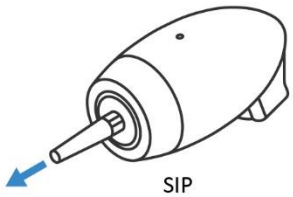
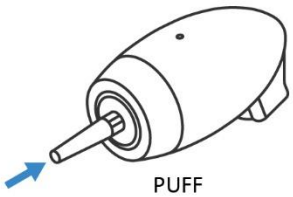
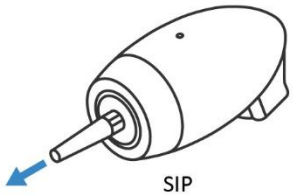
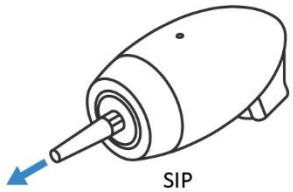
Appendix 1

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. [1]

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

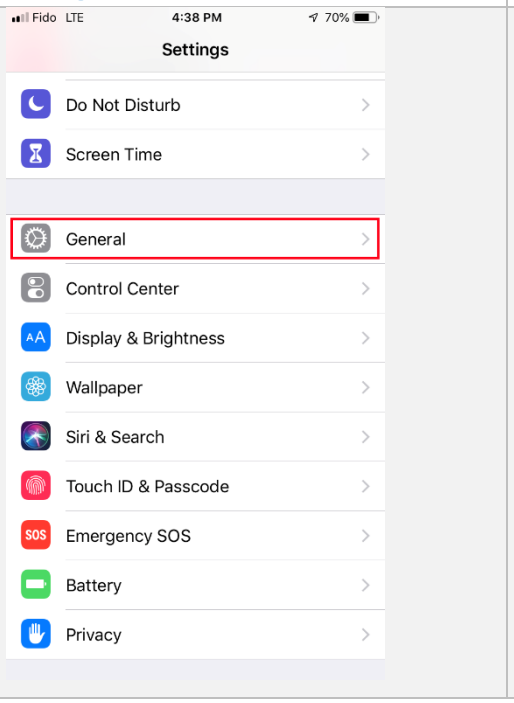
Action	Action Duration (second)	Function (Operation Mode 1)	Function (Operation Mode 2)
 PUFF	1	[ ] DEL ‘ ENTER	[ ] DEL ‘ ENTER
 SIP	1	C V B SPACE	C V B SPACE
 PUFF	3	, . / Alt Ctrl ←	, . / Alt Ctrl ←
 SIP	3	0 - = [ ] \	0 - = [ ] \
 SIP	5	MODE 1 MODE 2	MODE 1 MODE 2

Advanced Switch Mapping

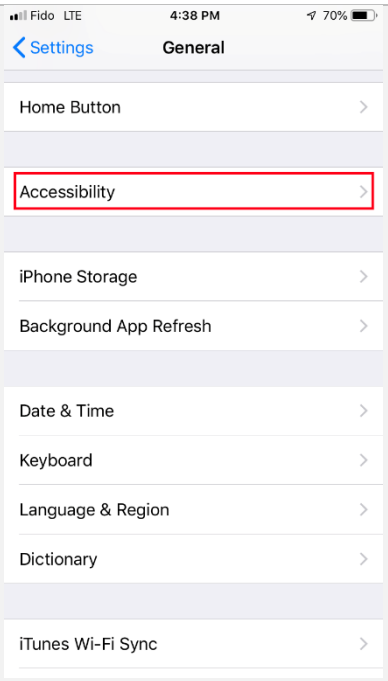
Follow “Part 2: Map Switches” from pages 11-15 first before doing the following steps.

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.

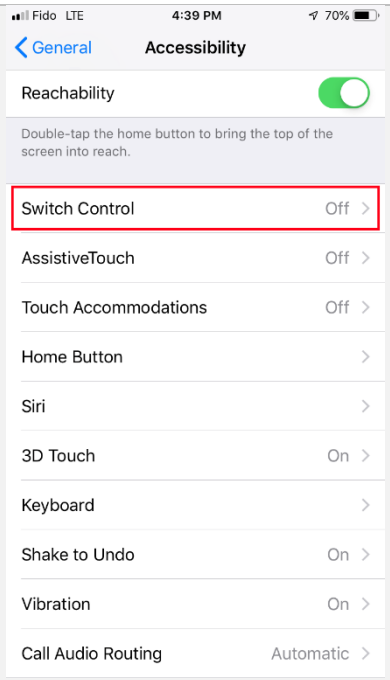
1. Tap on *General* option under *Settings*



2. Tap on *Accessibility* option

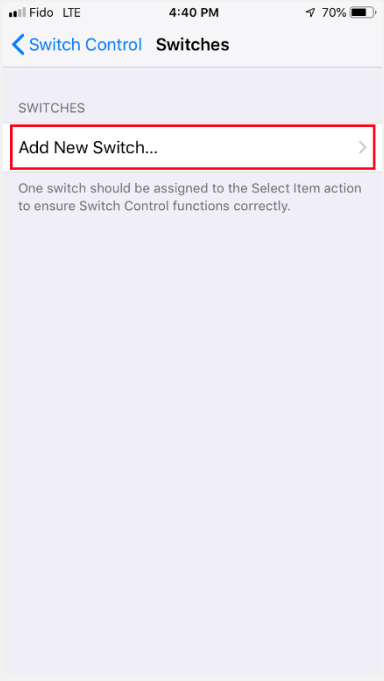


3. Tap on Switch Control

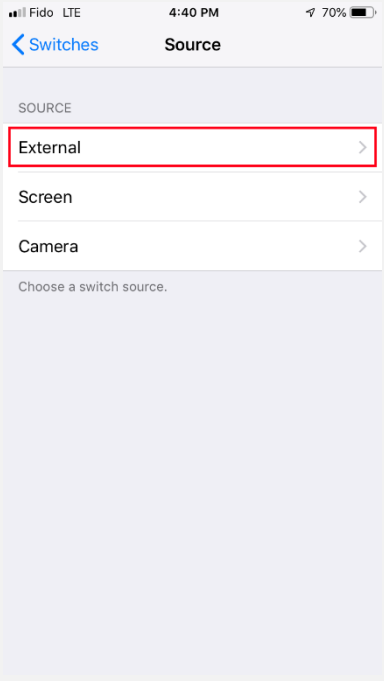


4. Tap on *Switches*

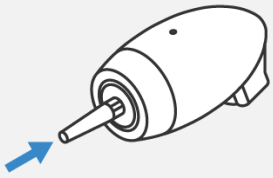
5. Tap on Add New Switch...



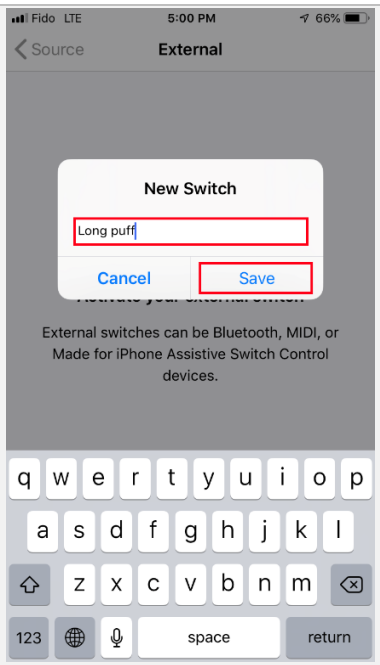
6. Tap on External

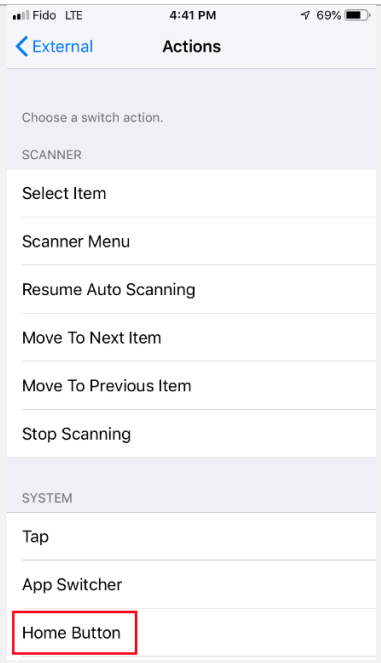


7. Repeat step 5 and 6 to add an external switch. Map a 3 second puff into the mouthpiece to the *Home Button* action.

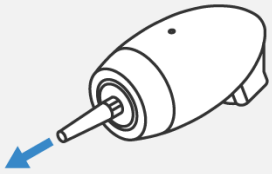


PUFF (3s)

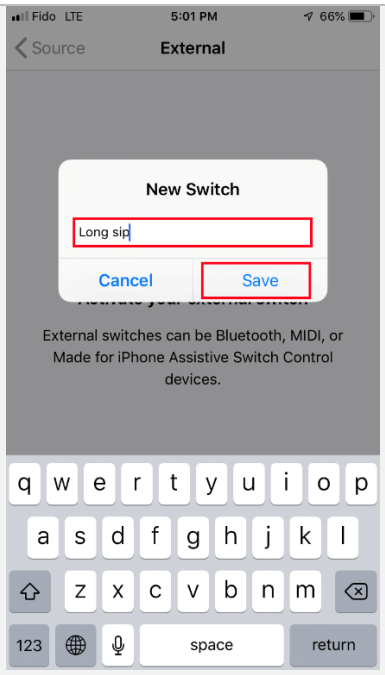


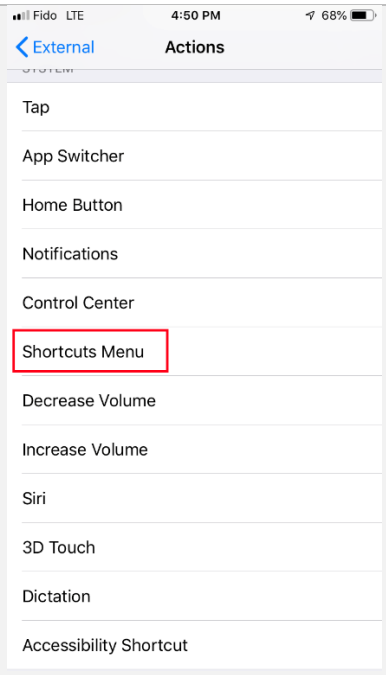


8. Repeat step 5 and 6 to add an external switch. Map a 3 second sip into the mouthpiece to the *Shortcuts Menu* action.

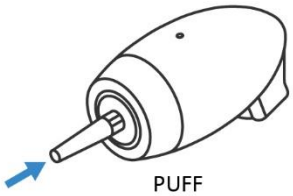
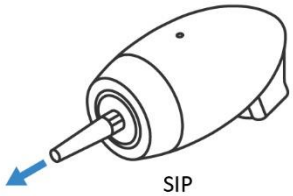
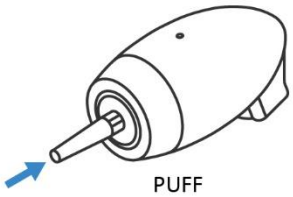


SIP (3s)





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	MODE 1  MODE 2	MODE 1  MODE 2

References

1. Use Switch Control to navigate your iPhone, iPad, or iPod touch: https://support.apple.com/en-ca/HT20137