THE ABILITY HAND™ MOBILE APP SET-UP

Version 1.3

For App Version 2.9.52

Updated 9/28/2023

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1 Introduction

The Ability Hand™ is an affordable, durable, and accessible bionic hand operated by your own muscles. Powered by long-lasting batteries, the Ability Hand™ provides users with unique bionic abilities and superior technology. Using sensors embedded in the fingertips, the Ability Hand™ provides users with sensory or touch feedback. All of these features are offered at a price point that makes advanced activity accessible by almost anyone. We are excited to provide you with an exceptional bionic hand and truly redefine "human".

This document contains information on the usage of the mobile application correlated with the Ability Hand™. This mobile application set-up guide should be fully reviewed before fitting the Ability Hand™.
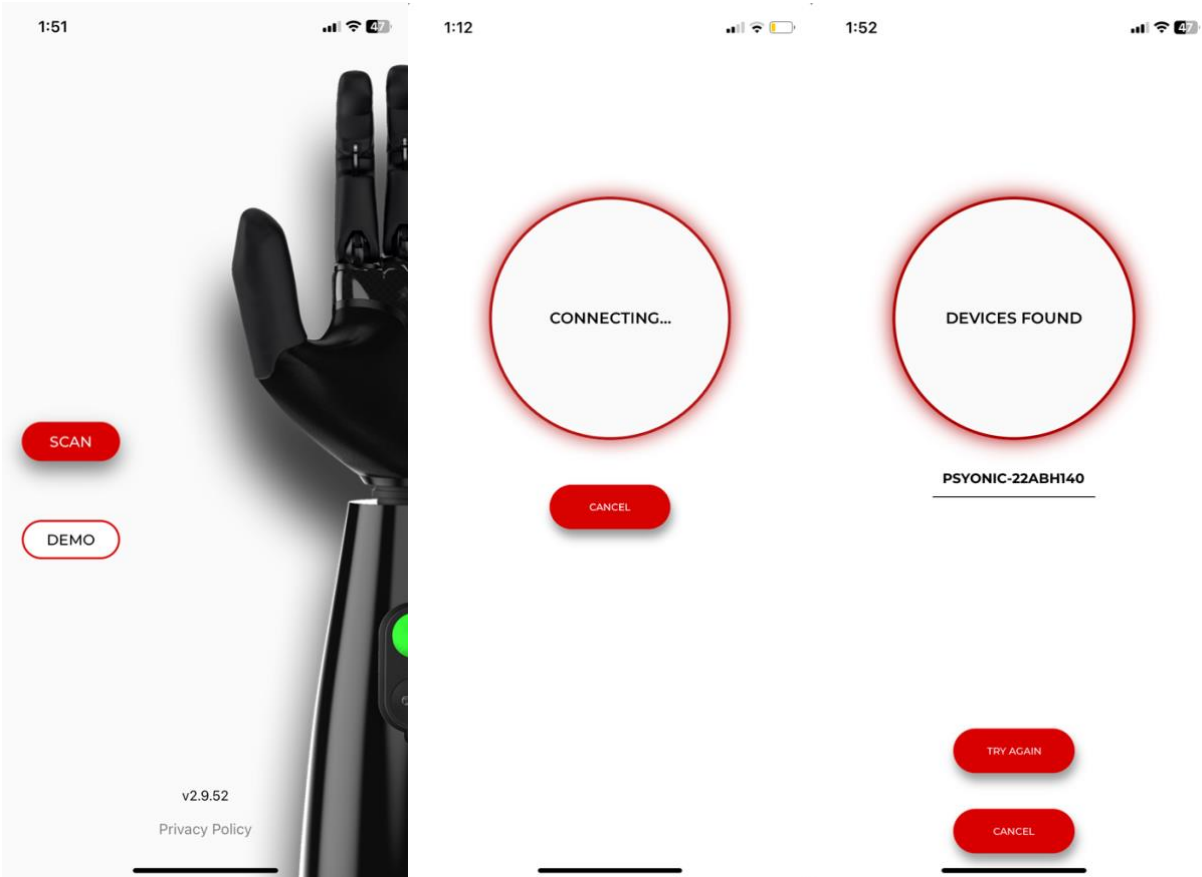
2 Installation

The PSYONIC Ability Hand app is available on both iPhone and android stores. Install the app on an appropriate phone.
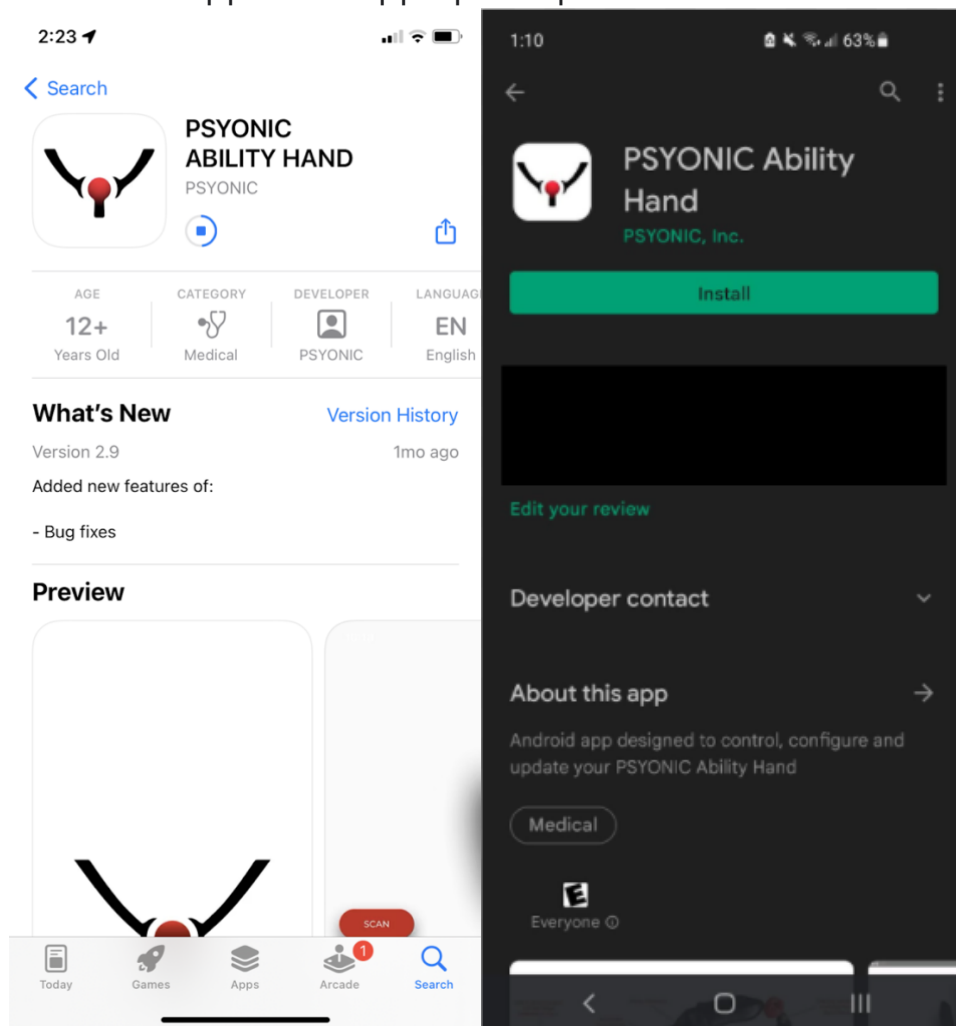
Note:

- *The app will request for the user to turn their bluetooth and location on. Please enable bluetooth.*
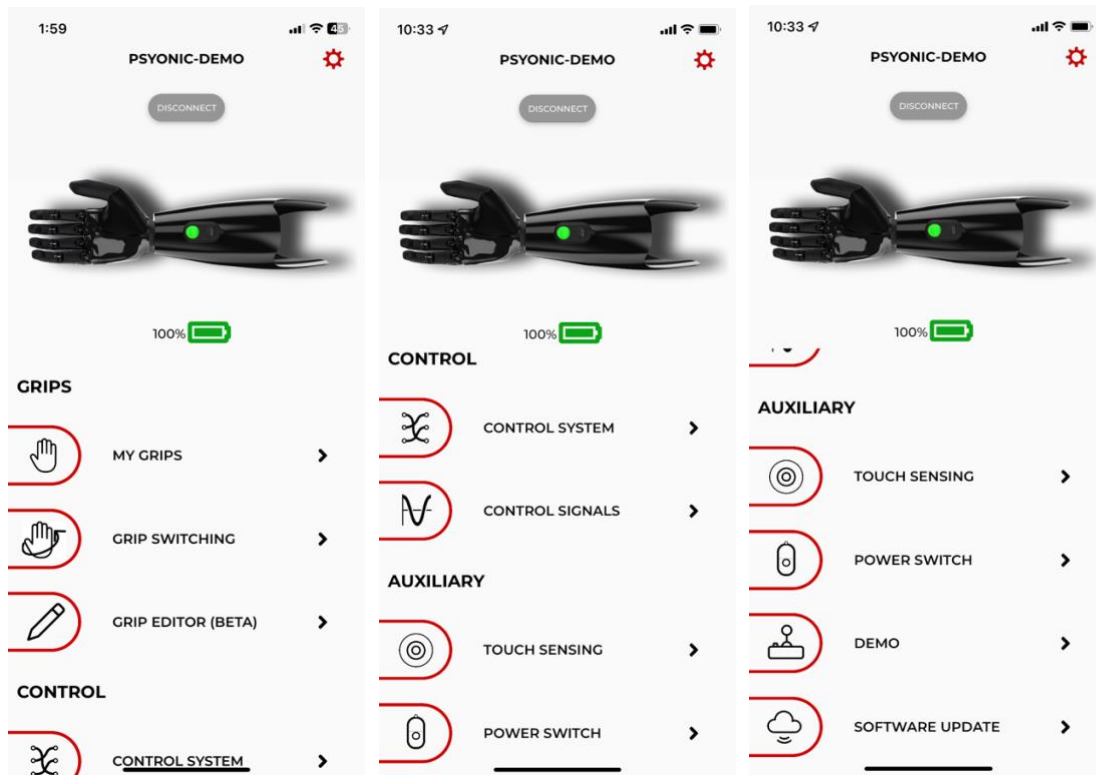
3 Connecting

Open the PSYONIC App and press "Scan". Tap on your PSYONIC hand. The "connecting" screen will appear as your hand is connecting.

Note:

- *Only one device can be connected to the hand via Bluetooth at one time.*
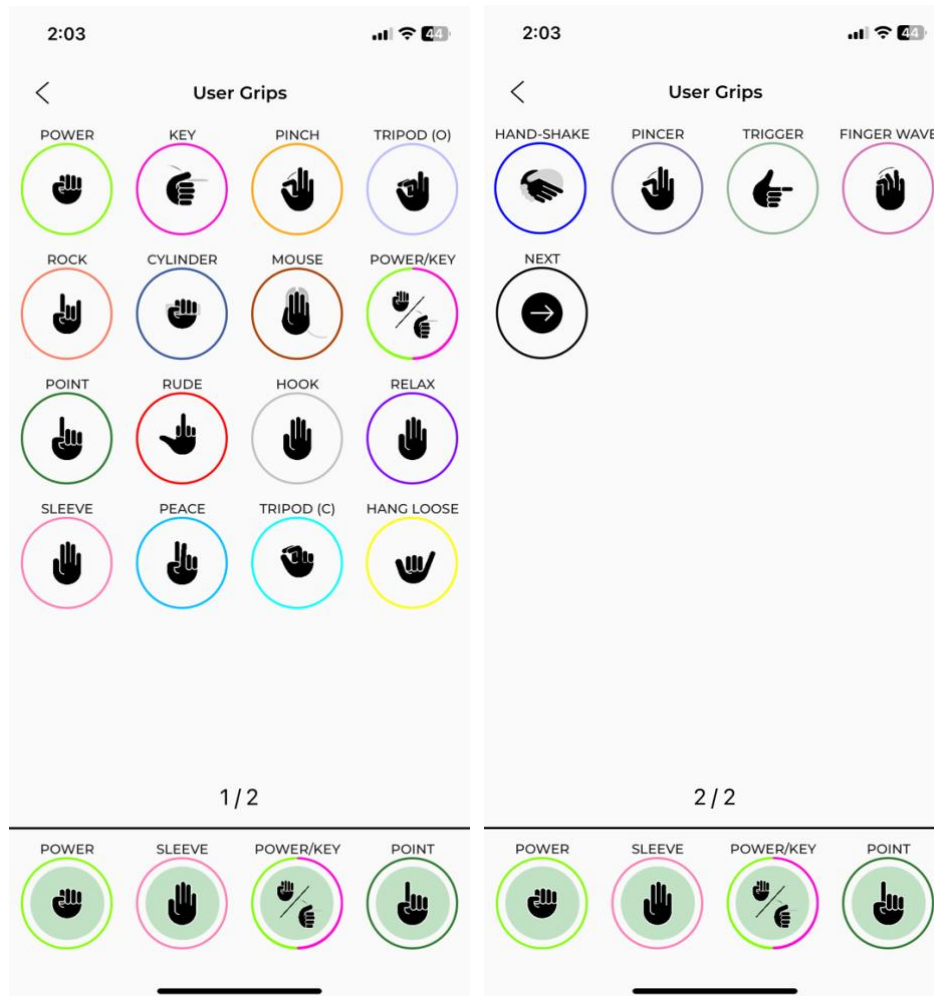- *PSYONIC hand must be on and in range to connect via the app.*

4 Main Menu

The main menu has all of the pages listed out. In the upper right corner, there is a settings icon, and the battery percentage is also listed. The "disconnect" icon can be used to disconnect from the Ability Hand.

5 Pages

5.1 My Grips

There are 2 pages of grips. Up to 4 grips can be chosen to be cycled through and they are located at the bottom of the screen in green. To switch grips in the 4-grip cycle, tap and hold on the grip you would like to replace the current grip. The chosen white grip will turn red. Then press on the green grip you would like to change. The grips will swap.

Swapping a grip

Note:

- *Tapping on a grip in this menu (even if it is not one of the 4 chosen grips) will move the hand to the open configuration for that grip.*
- *Skips, denoted by "Next" or "Previous" can be placed into any of the green cycle grip slots and it allows the user to operate less grips in their cycle.*
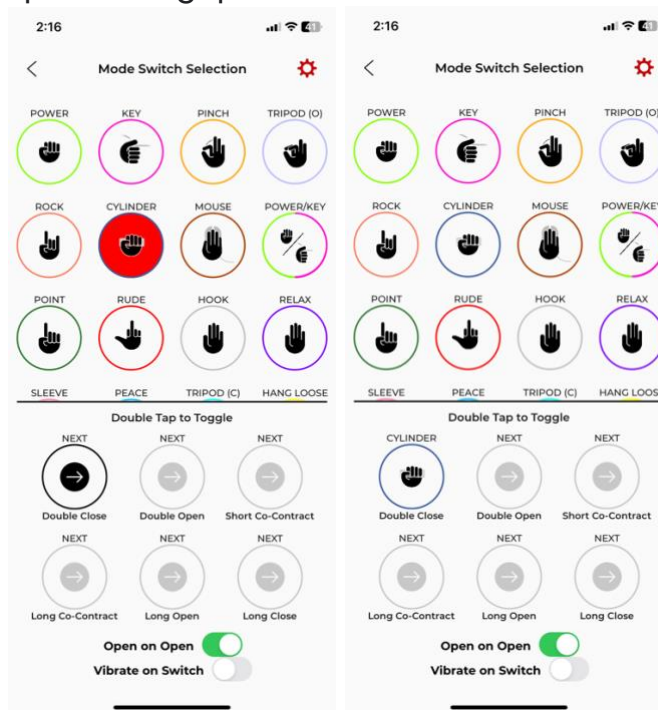
5.2 Grip Switching
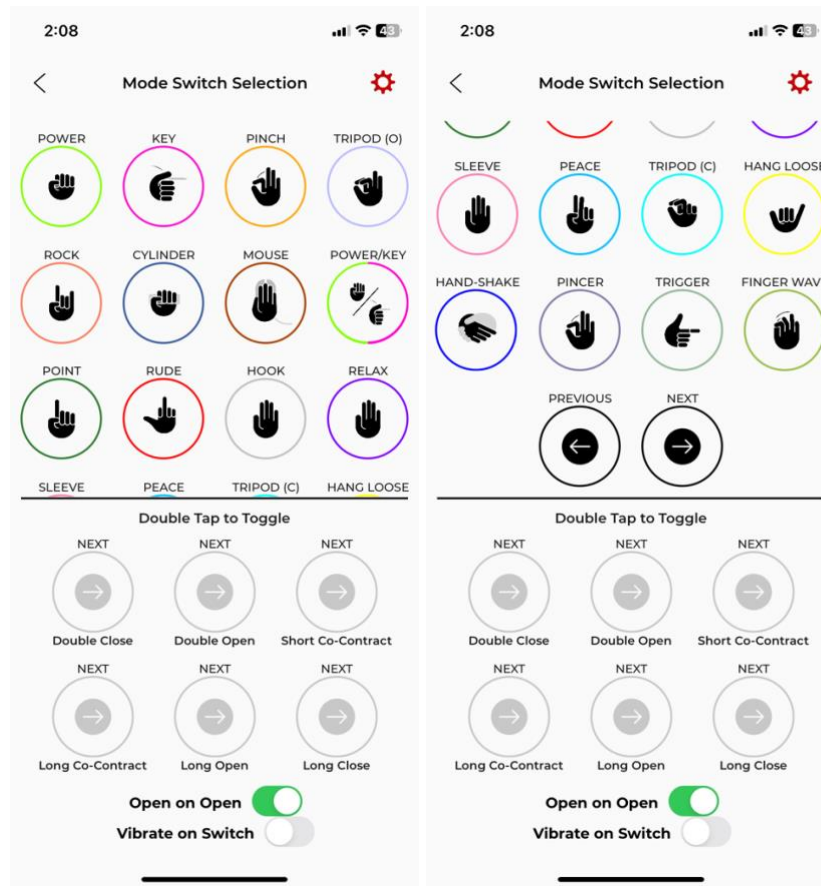
The Grip Switching page is used to change how the user transitions between different grips. Just like in the grip selection page, if a grip icon is tapped on, the hand will move to the closed position of that grip. The default setting for this page is to have the "Open on Open" on. "Open on Open" means that a user must have the hand fully opened and then after firing another open signal, the hand will switch to the next grip in the 4-grip cycle as programmed on the "My Grips" page. If the user wants to have a grip associated with one of the 6 grip switching methods being double close, double open, short co-contract, long co-contract, long open, or long close, they need to first double tap the grayed-out icon. The grip icon will turn black.

Then to switch out a grip, tap and hold on the grip you would like to replace from the menu of grips until it turns red. Then click on one of the 6 options at the bottom to swap out the grips.

If at any point the user wants to turn this feature off, they need to double tap the grip and it will turn back to gray. Note that if the user *only* wants to use one of the 6 grip switching methods to cycle through the grips set in the "My Grips" page, "Open on Open" needs to be toggled off and "Next" needs to be assigned to the desired grip switching method.

5.3 Grip Editor (Beta)
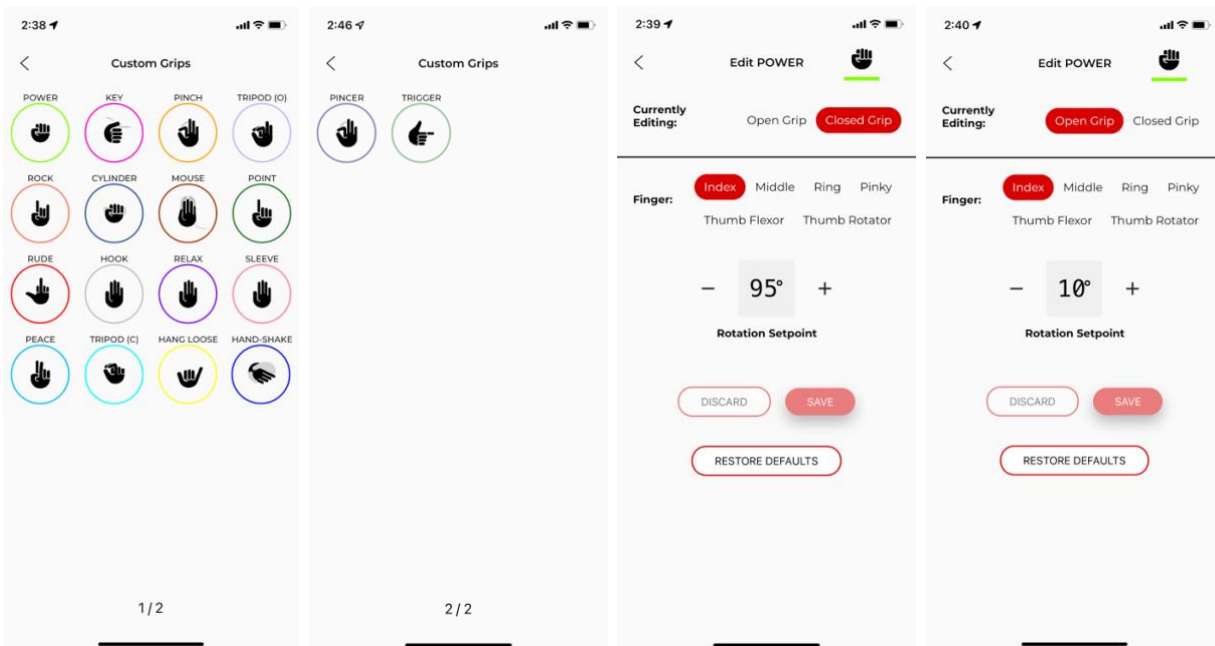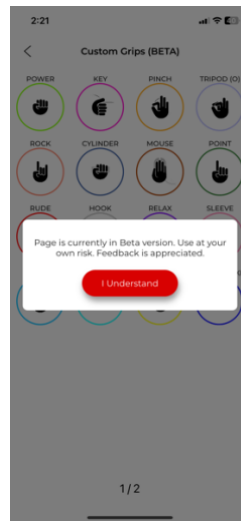
The Grip Editor page is used to customize grips. The user can select a grip from the menu of grips and change the position of a finger. The default

page the user will see when clicking on a grip is the "Closed Grip" configuration. As the degree number is increased or decreased, the user will see the finger move in real time. To change the finger(s) position in the open configuration, the user can click on "Open Grip." To restore all the finger positions back to their original position, the user can click "Restore Defaults."

5.4 Control System
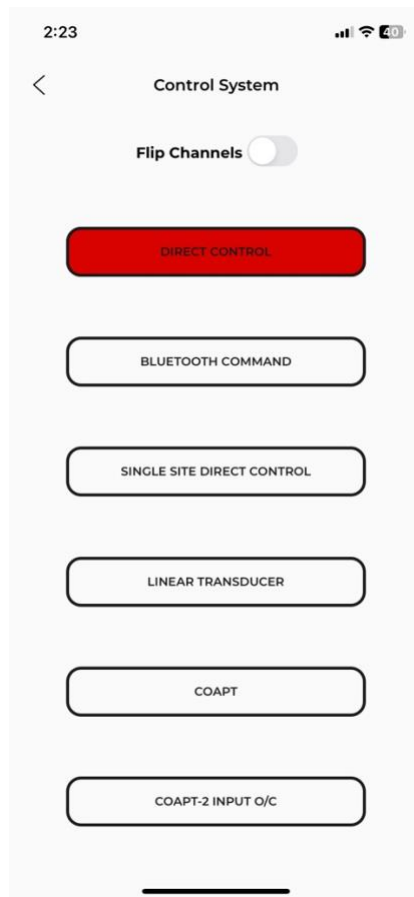
The Control System page is used to decide which signals are coming to the hand. In order to operate the hand, the correct mode must be selected depending on the system. When selected, the mode will be colored red. The options are direct control, bluetooth command, single site direct control, linear transducer, Coapt, and Coapt-2 input O/C.

        a. Direct Control is used for dual-site control where 2 electrodes are used

b. Bluetooth Command mode allows the user to override any other control systems such as Coapt or other softwares. This mode can be used for troubleshooting purposes to ensure the hand works properly.
c. Single Site Direct Control is used for single-site control where only 1 electrode is used
d. Linear Transducer is used with harnesses where the user can manipulate the hand with finer control simply by moving their shoulder forward and back
e. Coapt is used in two ways:
    1. Pattern recognition for a specific grip
        1. The user can program up to 6 grips including Open, Power, Key, Pinch, Chuck, Point.
        2. To train the software, the user is prompted to reproduce a specific grip. The pattern of muscle firing is then recognized for that grip.
        3. *Note: "COAPT" must be selected in the PSYONIC app and "PSYONIC Hand" must be selected in the Coapt app. The user **will not** be able to see EMG signals in the PSYONIC app in the Control Signals page.*
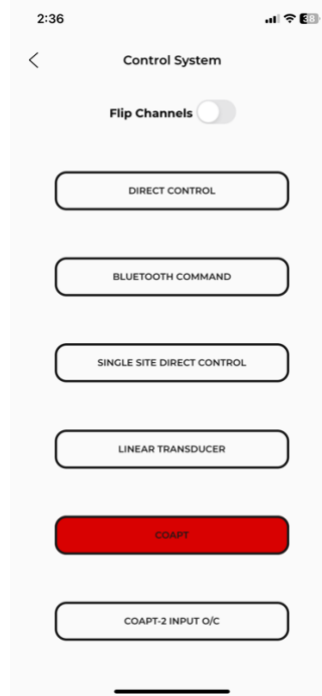
2. 2 input O/C ("O/C" stands for Open/Close)
   1. The user can *only* program Open and Close and will be prompted to train the software by reproducing Open and Close grips.
   2. In this mode, the user will be able to access more than the aforementioned 6 grips allowed.
   3. The user will be able to program and control the hand in the same way a dual site user would.
   4. *Note: "COAPT-2 INPUT O/C" must be selected in the PSYONIC app and "2 input o/c" must be selected in the Coapt app. The user **will** be able to see EMG signals in the PSYONIC app in the Control Signals page.*
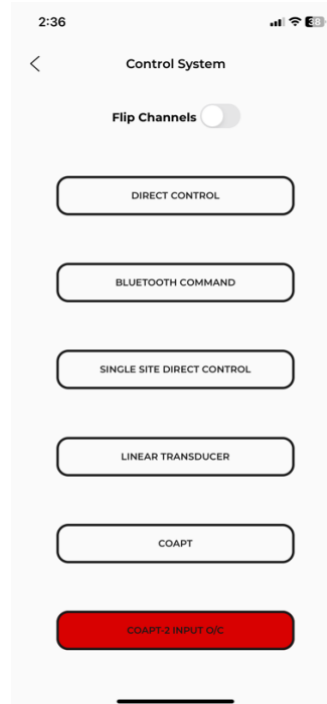
The "Flip Channels" toggle at the top of the screen is used for the Direct Control mode. If the user is attempting to close and the hand opens, reverse the toggle.

5.5 Control Signals
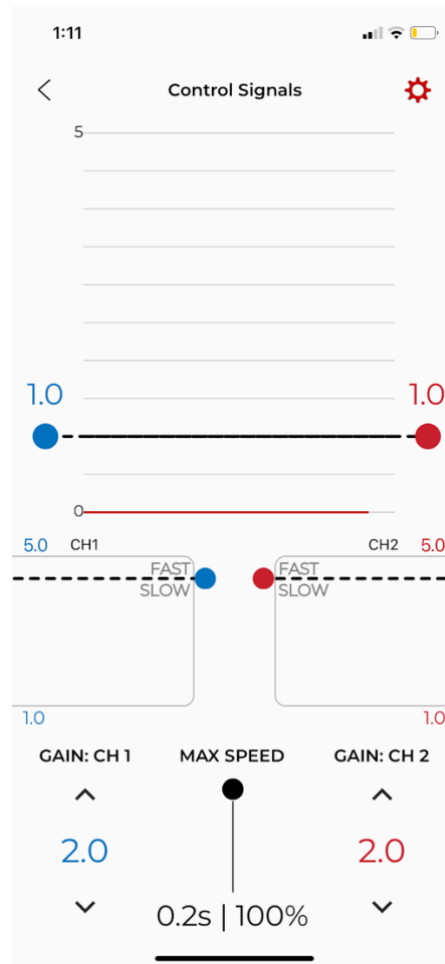
The control signals page is used to adjust the signals from the electrodes. The graph at the top of the screen adjusts the "thresholds". Thresholds are the minimum amount the signal from the sensors must pass to move the arm. To change the thresholds, click and drag the red or blue dot on the sides of the graph up and down. The blue line is *close* and the red line is *open*.

The 2 graphs below containing the "Fast/Slow" thresholds are the "break away plots". These plots represent the area of the graph above the threshold set for open or close. When a signal has been produced, the boxes fill with the color red or blue depending on the signal input. When the color surpasses the "fast/slow" line, the hand moves faster. The line can be adjusted by dragging it up and down. If the line is at the bottom of the box,

the hand **will always move fast**. If the line is at the top of the box, the hand **will always move slow**.
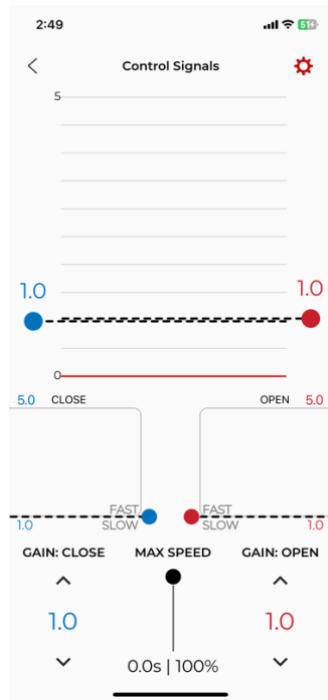

Hand will always move fast
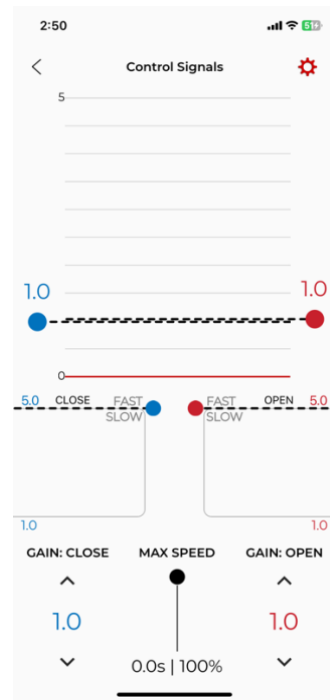
Hand will always move slow

The gains are listed in the bottom left and right corners of the screen. Gains are increased or decreased in order to change the magnitude of the user's signals. The gain can be changed via the up and down arrows.
The "max speed" slider in the bottom center is used to adjust the overall speed of the hand. If the slider is at the top, the fastest the hand will close is in 0.2 seconds or 100% speed. If the slider is at the bottom, the hand will close slower.

Control Signals Settings

Linear Transducer Lock

Flip Channels
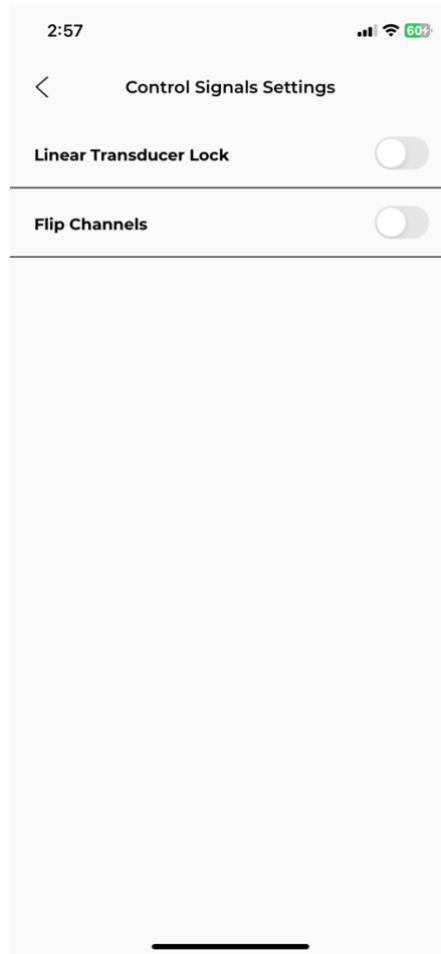
In the settings gear icon at the upper right-hand side of the graph, the app will take the user to the "Control Signals Settings" page. Here there is a toggle for the "Linear Transducer Lock". This lock makes it so that after a few seconds with a prolonged open or closed input, the hand is locked in its current grip.

The user can also toggle on or off "Flip Channels" if the hand is opening when attempting to close and vice versa.

5.6 Touch Sensing
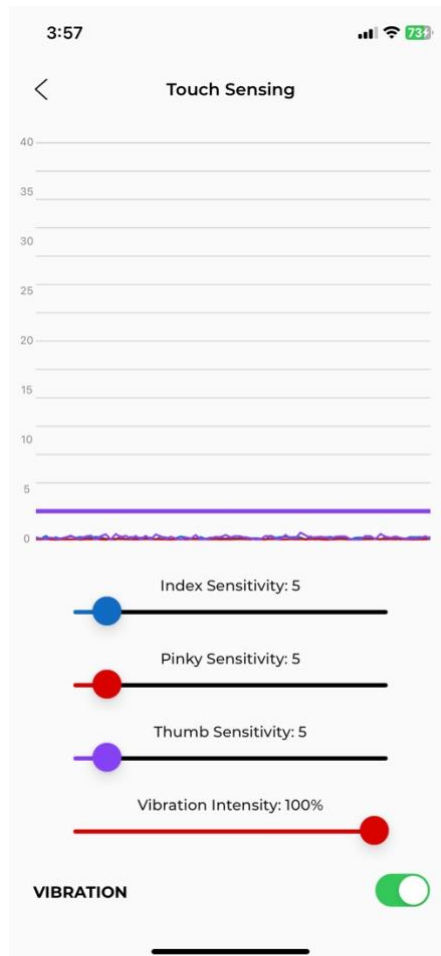
The Touch Sensing page is used to display the magnitude of feedback coming from the touch sensors on the fingers. The pinky, index, and thumb are sensorized. The blue line is the index, the red line is the pinky and the purple line is the thumb. The sliders on the bottom half of the page can be moved to change the threshold the signal must pass to trigger vibration. The further the signal goes above the threshold, the greater magnitude of vibration from the red vibration motor. The "Vibration Intensity" slider can be changed to decrease or increase the magnitude of the vibration. The vibration motor can also be turned off using the toggle at the bottom of the page (green means on, white means off).

5.7 Power Switch Settings

Single Tap	**Double Tap**
Battery Level	Next Grip
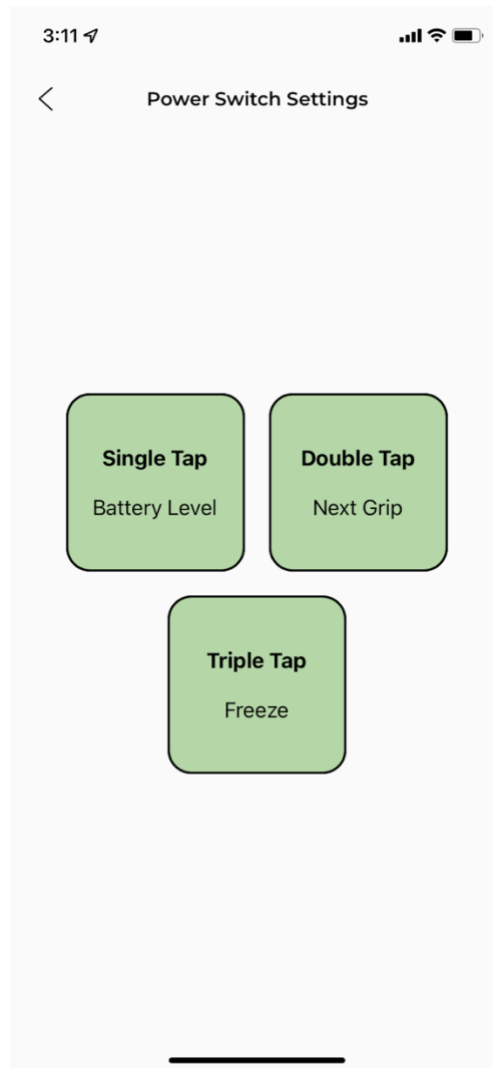
Triple Tap
Freeze

The Power Switch Settings page is used to re-route the command from a single, double, or triple tap of the button on the PSYONIC Power Switch.

The Power Switch's default settings are:

The single tap = battery level. Battery level will fade out red (meaning low battery), orange/yellow (meaning medium battery), and green (meaning high battery).

The double tap = next grip. By double tapping the button, the user can switch to the next grip in their grip selection cycle. (The grip color will

change to the color associated with the next grip when double tap is done correctly).

The triple tap (or more than 3 taps) = freeze. Freeze correlates to a flashing light on the Power Switch and causes the hand to be frozen in a grip where no signals can change its position. To turn off freeze, the user must triple tap the button again.

Note:
- *When using a wrist rotator, the user may still be able to move the wrist even when the hand is frozen.*
- *Tapping the button must be done quickly. In order to trigger a double or triple tap, do not let go of the button in between taps. The user must place their finger on the button and rapidly press the button.*

The user can modify the configuration of the number of taps associated with each action. To change the configuration, the user can click on the number of taps desired to be modified. A menu will appear.
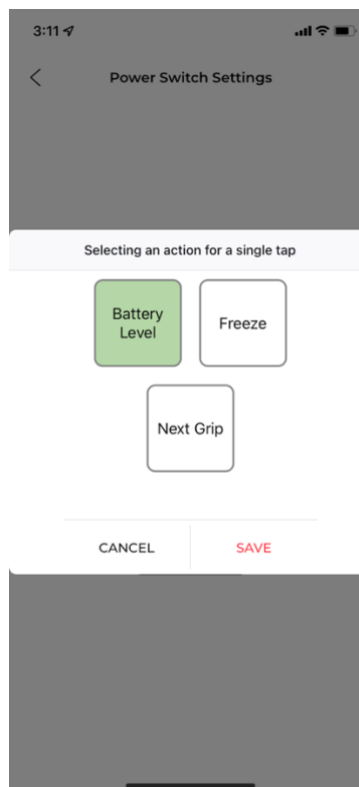
The user can then choose the action to be associated with the selected number of taps and click "SAVE".

5.8 Demo Mode
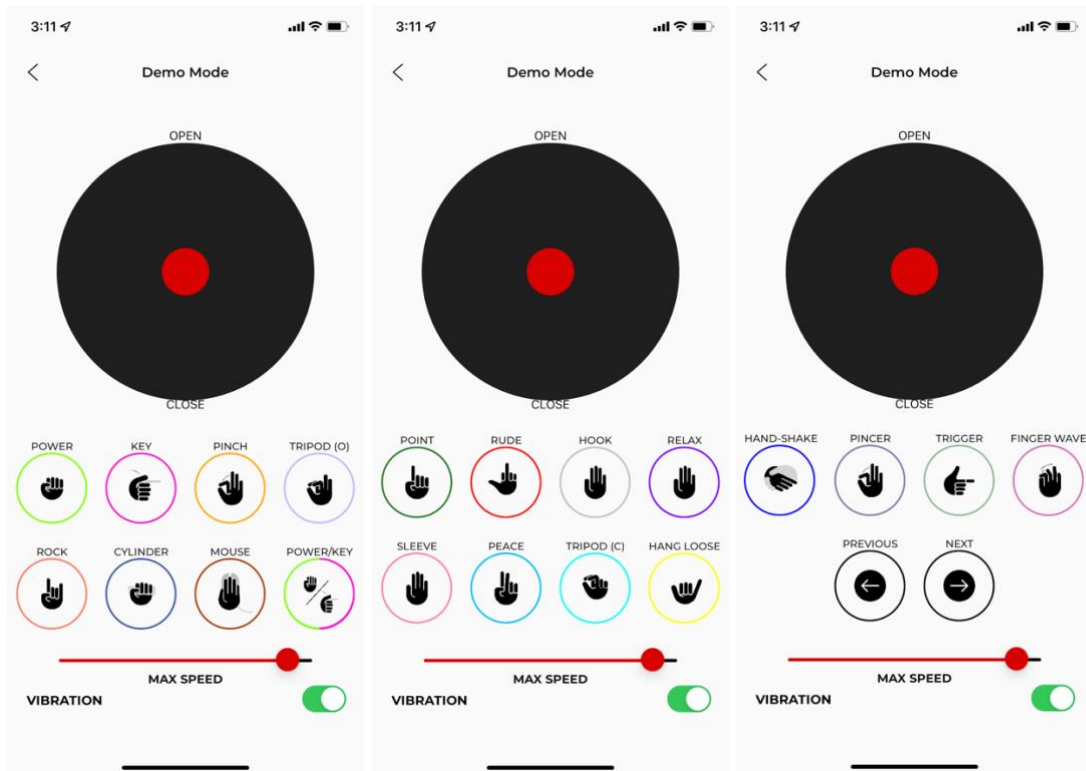
The Demo Mode page can be used when demonstrating individual grips. Similar to the My Grips page, when a grip is tapped on, the hand moves to the closed position of that specific grip. By dragging the toggle (red circle in the center of the black circle; acts like a joystick) up and down the user can open and close the grip, respectively.

On this page the user can also adjust the "max speed" of the hand during the demo with the red slider and turn off and on vibration from touch sensing with the toggle at the bottom of the page.

Note: If the hand isn't moving, either freeze the hand, or switch the hand to Bluetooth Command.

5.9 Software Update
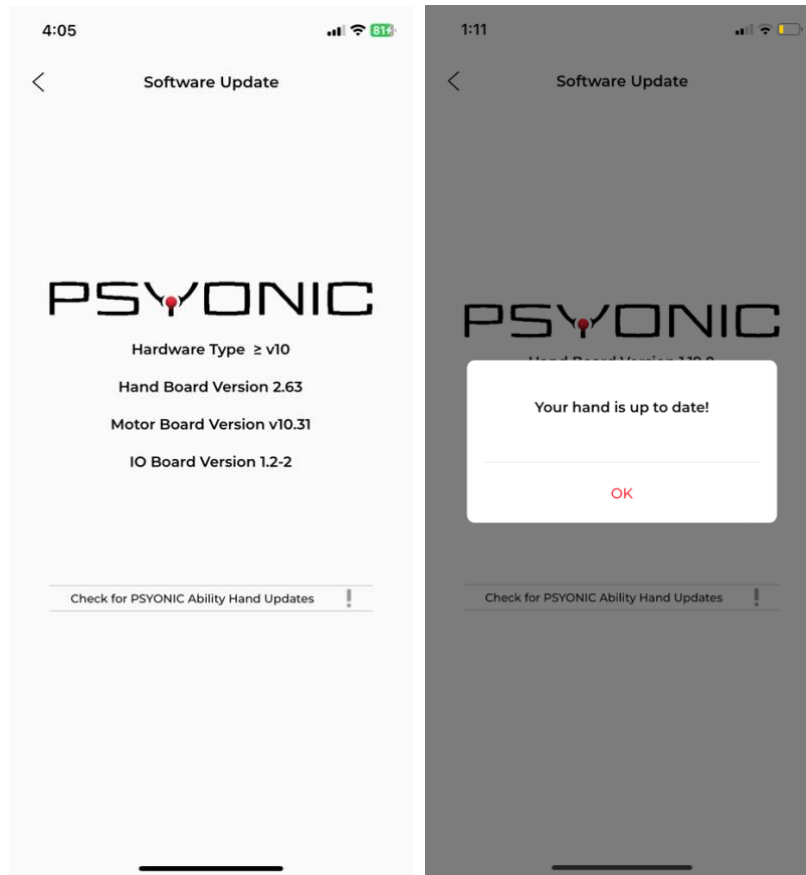
The Software Update page is where the user goes to update the hand. The page displays the "Hand Board Version", "Motor Board Version", and the "IO Board Version". To begin updating the hand press "Check for PSYONIC Ability Hand Updates" (the "!" will be present if there is a new update to the hand). The screen will state "Your hand is up to date!" if the hand does not need an update. If the hand needs to update, the screen will ask "Update PSYONIC Ability Hand?" Press "yes" to update the hand and "no" to not update the hand. The hand will play a tune when updating, then all of the fingers will move. To ensure a successful update, turn off and on the hand.

Note:
- *Only update your hand if instructed by PSYONIC employee.*

6 SETTINGS
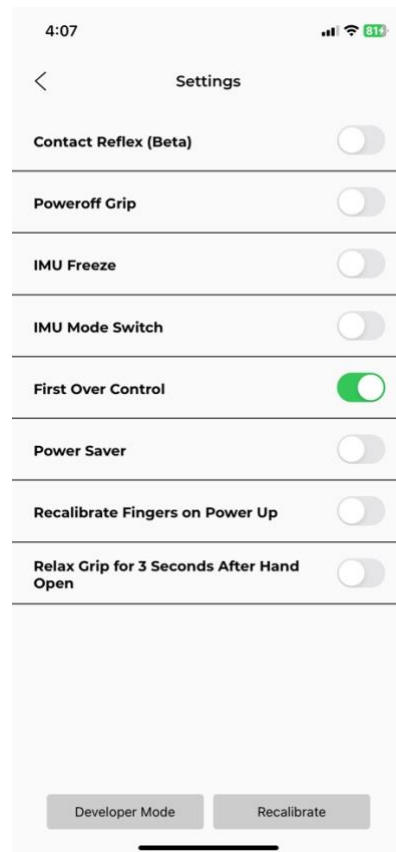
The setting page can be found after tapping the red gear icon in the top right of the main menu page. The items on the Settings page are explained here:

Contact Reflex = (This feature is in beta testing.) This allows the user to have more control when squeezing around an object to prevent inadvertent crushing of a delicate object. The hand will sense an object from the pressure sensors in the fingertips and stop closing, even if the user fires a close signal.

Poweroff Grip = This feature makes the hand close into a Key grip when the hand is powered off.

IMU (inertial measurement unit) Freeze = By physically tapping on the hand the set number of times the Power Switch has been configured to for Freeze mode, the hand will go into Freeze mode. *By default, this is set to 3 times.*

IMU (inertial measurement unit) Mode Switch = By physically tapping on the hand the set number of times the Power Switch has been configured to for Next Grip, the hand will switch to the next grip. *By default, this is set to 2 times.*

First Over Control = This feature makes the hand respond per the stronger signal if a co-contraction occurs.

Power Saver = This feature makes the hand operate slower to save battery life.

Recalibrate Fingers on Power Up = This feature makes the hand recalibrate fingers when powering on the hand.

Relax Grip for 3 Seconds After Hand Open = This feature makes the hand go into the Relax grip after being idled for 3 seconds when fully opened.

*By default, only First Over Control is toggled on (green).

Note:

- *The Developer Mode at the bottom of the page should not be accessed.*

7 ADDITIONAL INFORMATION

Please contact sales@psyonic.io or 773-888-3257 for any questions regarding app setup or app usage.

We deploy app updates often to ensure that the Ability Hand has its maximum capabilities. Please update your PSYONIC Ability Hand app whenever prompted by the app or play store (iPhone and android respectively).