



CAPTOGLOVE™
SYSTEM OVERVIEW

CaptoGlove™ Ver. 1.0

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Ver. 0.1



**CAPTOGLOVE™
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WELCOME TO CAPTOGLOVE

Your new CaptoGlove is the result of more than 5 years of continuous development and passion that the team behind it has put and keeps putting every day in this project. We poured our hearts into making your new CaptoGlove, giving it the best quality in terms of materials used and engineering currently available on the market.



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NOTICE

The information contained in this publication is subject to change without notice. CaptoGlove LLC makes no warranty with regard to this material. CaptoGlove LLC assumes no liability for errors contained herein or for incidental or consequential damages in connection with the furnishing or use of this material.



FCC WARNING

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help



REGISTRATION

To start using your CaptoGlove, please register it by sending an email to support@captoglove.us with your first name, last name and email address you used during the purchase. We will send you a link to **download** the CaptoGlove Suite that **unlocks** all CaptoGlove's features.

CAPTOGLOVE SYSTEM OVERVIEW

General

CaptoGlove satisfies the requirements of scalability, deployability and zero infrastructure needed to run virtual/augmented reality games or applications, simulation environments and a wide variety of applications on different devices. CaptoGlove can currently be deployed on PCs and will be made soon available for iOS and Android devices.

CaptoGlove is predisposed to be used in combination with any Bluetooth Low Energy device provided that an integration with such devices exists.

Every CaptoGlove is composed of:

- 1 textile glove (1)
- 5 bending sensors; (2)
- 1 or more pressure sensors; (3)
- 1 CaptoSensor. (4)



CaptoGlove is shipped in a package composed of:

- 1 or 2 CaptoGlove;
- 1 or 2 mini USB – USB cables;
- 1 or 2 CaptoSensor (Optional).



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Wearing CaptoGlove

A simple but effective way to preserve your CaptoGlove integrity is to wear and undress it accurately. In order not to damage the sensors inside it, CaptoGlove should be removed using the specific rings. In this way, the likelihood of having malfunctioning sensors during CaptoGlove's life will be reduced significantly. Also, before wearing it, verify that all the bending and pressure sensors are correctly inserted and in position. This will provide the best accuracy of finger's tracking.





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CaptoSensor Usage Conditions



Every CaptoSensor contains a rechargeable lithium-polymer battery. Lithium-polymer batteries have high energy densities and can be dangerous if not used and cared for properly. CaptoSensor has been designed to include multiple levels of battery safety assurance. Their circuitry includes smart charging circuitry with thermal management to prevent over-charging the battery. The battery pack itself also includes protection circuitry to prevent over-charge, over-voltage, over-current, and over-discharge conditions.

Most battery issues arise from improper handling of batteries, and particularly from the continued use of damaged batteries. The minimum endurance of the battery is 10 hours but it can guarantee 12-15 hours depending from the employ. An automatic shutdown mode is programmed and all the CaptoSensor will automatically shutdown after 10 minutes of no activity. This prevents CaptoSensor to stay turned on for long hours of inactivity, should the user forget to turn it off. In order to turn it on just push the button. To turn it off press and hold the button for 3 seconds. Pushing the button for more than 6 seconds will reset the Bluetooth and will help discovering CaptoGlove when ready to pair it.

CaptoSensor Overview

The CaptoSensor is a miniature, high-precision, high-reliability, Attitude and Heading Reference System (AHRS). The Attitude and Heading Reference System (AHRS) uses triaxial gyroscope, accelerometer, compass and single-axial barometer sensors in conjunction with advanced on-board filtering and processing algorithms to determine orientation relative to an absolute reference orientation in real-time (10DOF).

Orientation can be returned in absolute terms or relative to a designated reference orientation. The gradient descent calibration process and high update rates increase accuracy and greatly reduce and compensate for sensor error. The CaptoSensor system also utilizes a dynamic sensor confidence algorithm that ensures optimal accuracy and precision across a wide range of operating conditions.



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1. **Bluetooth Connectivity** – The CaptoSensor connects via Bluetooth Low Energy to the PC or to any other desired device if compatible. The Bluetooth Low Energy and the 500 mAh battery allows for more than 10-hour continuous usage.
2. **USB Connector** – The CaptoSensor can also be connected to a computer using a mini USB – USB. The USB connector charges the battery and provides for both power and communication signals;
3. **Push Power Switch** – CaptoSensor can be switched on and off when powered from the internal battery by using the power switch. When connected via USB, the unit is powered and the battery will begin recharging even if the CaptoSensor is turned off. To turn the CaptoSensor on simply click the power button. To turn it off hold the button for 3 seconds and then release it. Holding the button for 6 seconds will reset the Bluetooth connection;
4. **Input Buttons** – The CaptoSensor includes up to 10 input buttons operated by the bending and pushing sensors. The input buttons can be used in conjunction with the orientation sensing capabilities of the device;
5. **Indicator LEDs** – The CaptoSensor includes an RGB LED that can be used for visual status feedback such as successful connection to controlled device or for enabled/disabled emulation.
It also has 3 green LEDs that are used to give information about battery charging status and charge level.

Bending Sensors

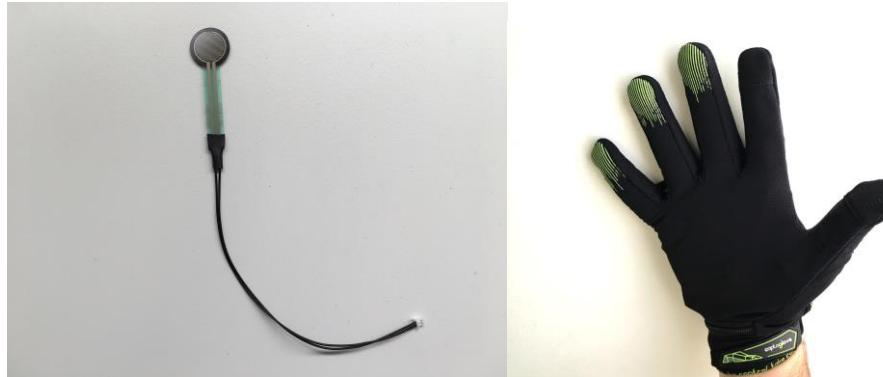


Bending sensors are placed on the top part of each finger, in correspondence of the green lines. For a proper functioning check that they are correctly positioned inside CaptoGlove.

Bending Sensor usage

Bending sensors can be triggered either when the finger closes or when it opens. The user can set the modality he/she prefers through the Suite configuration app. Bending sensors, moreover, can trigger up to two keys per sensor. It is possible to choose two threshold levels at which a key is enabled.

Pushing sensors



Pushing sensors are placed on the palm side of user's hand. For a proper functioning, be sure that they are positioned in correspondence of the fingertips.

Pushing sensors usage

Each pushing sensor can be assigned a function that can be triggered in different ways. Pushing sensors, in fact, can work in "pressing mode" i.e. the function assigned to the sensor is triggered every time a certain (customizable) level of pressure is applied to the sensor or they can work in "release mode" i.e. they are activated every time the sensor has been released.



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Pushing sensors, can trigger up to two keys per sensor. It is possible to choose two threshold levels at which different keys are enabled. These settings can be customized through the Suite configuration app. See below for a more detailed description.

Start using CaptoGlove

To start using CaptoGlove send an email to support@captoglove.us with first name, last name and email address used during purchase and download the CaptoGlove Suite.

The CaptoGlove Suite is a simple but very powerful user interface app that allows CaptoGlove's functionalities to fit the most demanding user or experience.

CaptoGlove's potential is extremely wide. When connected to the PC it can emulate mouse, joystick and keyboard. Thanks to its sensors and their high precision it can perceive the great majority of user's hand and fingers movements. Each one of these movements can be translated into one of the standard inputs sent by traditional controllers (mouse, joystick, keyboard).

The suite displays also information about battery level, firmware version, serial number and manages firmware updates.

Step 1 (Bluetooth Pairing with PC)

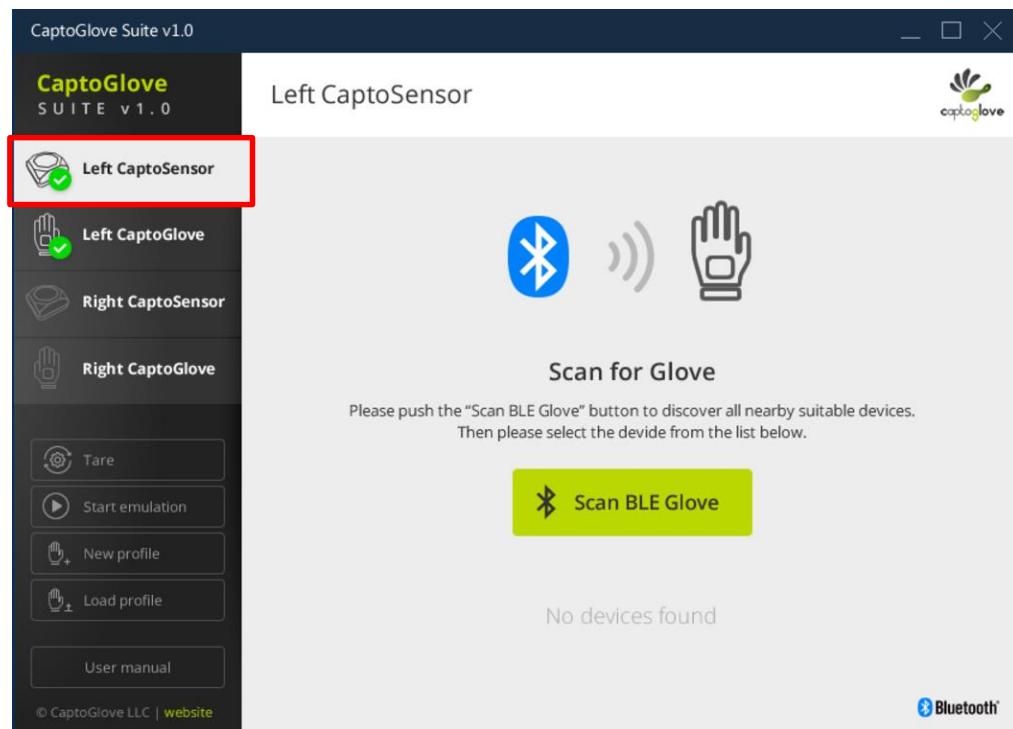
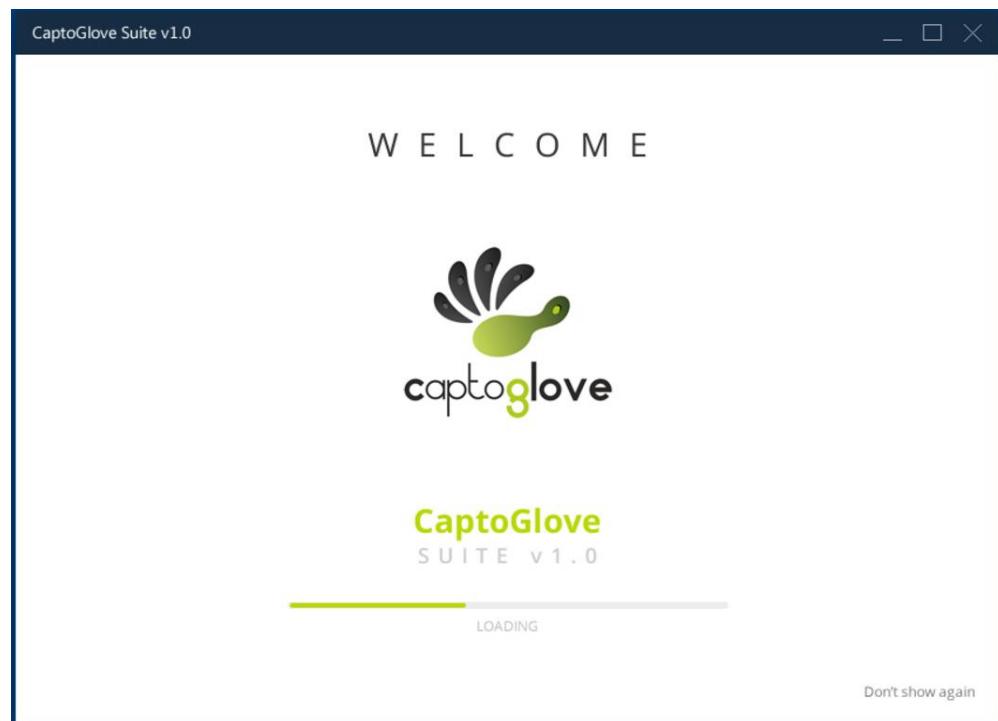
Connect CaptoGlove (or CaptoSensor) to the PC via Bluetooth. To do so, turn on CaptoGlove (CaptoSensor) and open the Bluetooth settings on the PC. A CaptoGlove (CaptoSensor) entry will appear, ready to be paired. Pair it with the PC.

Step 2 (Launch the Suite and connect)

Once the PC and CaptoGlove (CaptoSensor) have been paired, launch the CaptoGlove Suite. A welcome message will appear, followed by a Bluetooth scan screen.



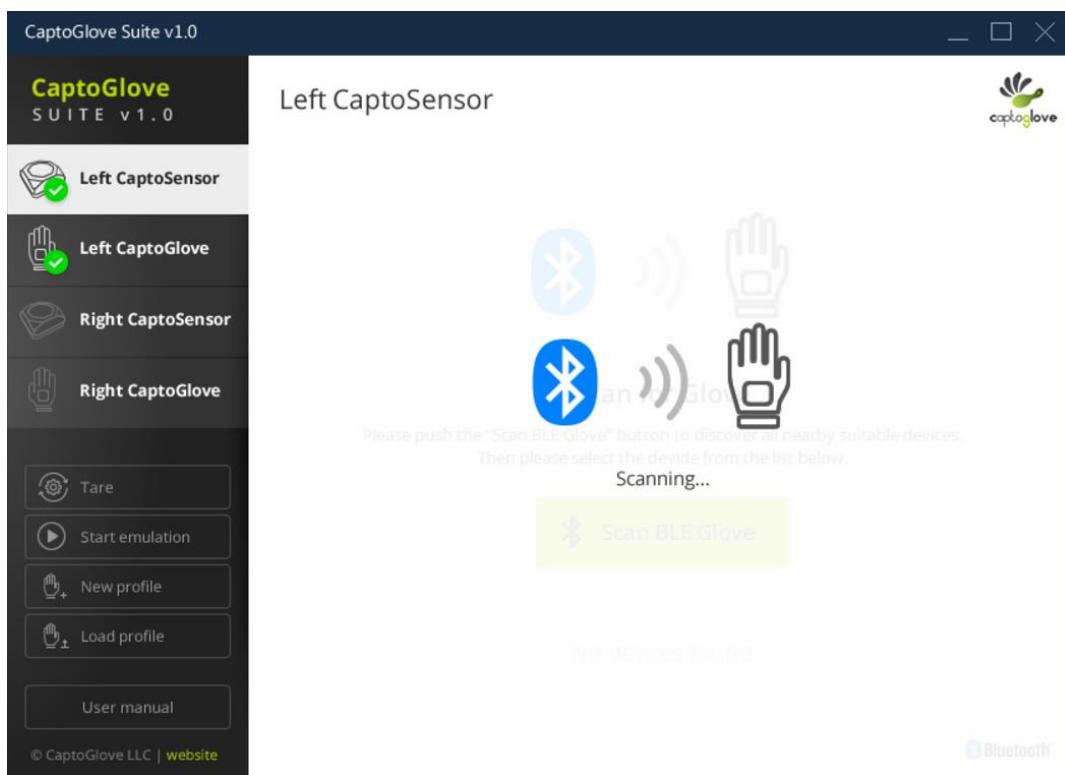
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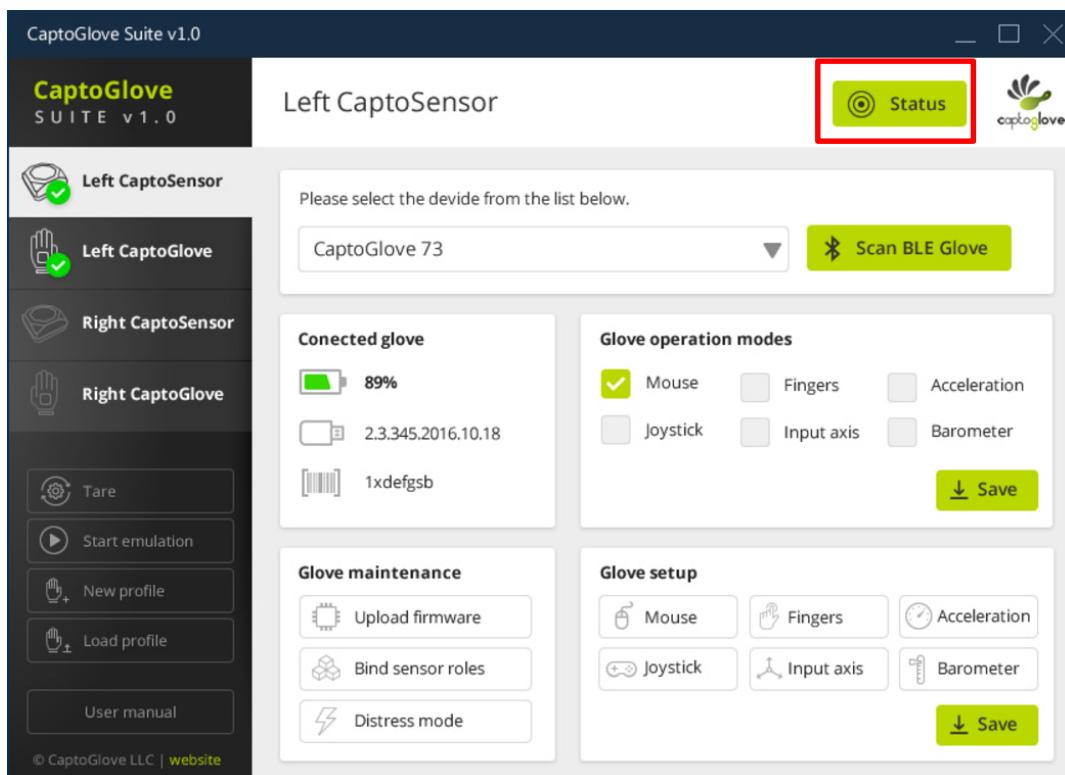
On the left side select the device you want to use and click on “Scan BLE Glove”. The suite will scan for available devices and connect with them.



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Step 3 (Customize)



After having connected CaptoGlove to the Suite, it is possible to check the connection by clicking on the “Status” button on the top right corner. A screen will appear showing a CaptoGlove (CaptoSensor) 3D model that tracks CaptoGlove’s movements.



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N.B. In order to assure an accurate tracking CaptoGlove (CaptoSensor) should be tared by clicking on the “Tare” button to allow it to adjust to the magnetic field/altitude of your current position.

Tare

Once the user has chosen all the settings he wants to apply to CaptoGlove, he/she can tare CaptoGlove by clicking on the “tare” button. At this point a wizard will appear with few instructions on how to tare CaptoGlove. The whole procedure requires generally few seconds and should be done before starting a new game session.

Start Emulation

After the tare process has been completed, in order to start the emulation, the user can simply click on “start emulation”. At this point CaptoGlove (CaptoSensor) will be activated and the RGB led will start blinking.

Profiles

CaptoGlove allows for an incredible high number of configurations that can fit numerous purposes. For this reason and because each application may require a specific configuration, it is possible to save each profile in a separate file. In order to load a saved profile, the user can click on the “Load Profile” button and choose the profile he/she desires. Since profiles are configuration files they can be easily shared or download from different sources as for instance CaptoGlove’s forum at <https://captoglove.com/forums> or friends.