



CyberGlove® Data Glove

including the CyberTouch® vibrotactile feedback option



User Guide

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Introduction

Product Description

The CyberGlove® data glove is a lightweight, comfortable, fully instrumented glove that provides up to 22 high-accuracy joint-angle measurements. It uses proprietary resistive bend-sensing technology to transform, with high accuracy, hand and finger motions into real-time digital joint-angle data. An option to the glove, the CyberTouch system provides vibrotactile feedback to the fingers and palm. All information provided on the CyberGlove system applies to the CyberTouch vibrotactile feedback system.

CyberGlove Features

The CyberGlove data glove has the following features:

- Up to 22 high-accuracy joint-angle measurements
- Real-time digital joint data
- Lightweight comfort
- Repeatable, high-resolution data

System Requirements

The CyberGlove data glove requires a host computer with the following minimum requirements:

- Microsoft Windows 2000 SP 4 or XP SP 2 compatible
- Intel P4 2 GHz CPU or equivalent
- 512 MB RAM
- 60 MB of disk space
- Serial port (or USB-to-serial adaptor)
- AGP 64 MB or better graphics card (hardware OpenGL® support recommended)

Packing List

The CyberGlove data glove comes with the following items:

- CyberGlove data glove
- Nylon glove inserts (2)
- AC/DC power supply with country-specific plug adapters (not shown)
- CyberGlove sensor cable (permanently attached to interface module) with in-line powered serial conversion box
- Tracker accessory kit
- Belt clip and accessories (see page 5)
- This user guide



The power cable plugs into the conversion box on the CyberGlove serial cable.

Installation and Setup

Unpack and ensure all parts are accounted for. You may have additional CDs or documentation if you purchased additional software packages with your CyberGlove system.

Setup Procedure

To prepare your CyberGlove system for use the first time, install the Device Manager and Device Configuration Utility (DCU), software included in the VirtualHand SDK, as described below. CyberGlove Systems does not recommend operating the CyberGlove System without this software.

Device Manager and Device Configuration Utility (DCU) Installation

The DCU builds a registry of all CyberGlove Systems motion capture devices and their network connection architecture, allowing you to simultaneously integrate data from devices running on several computers. In addition, the CyberGlove Systems driver for external software, such as Autodesk's MotionBuilder, draws on this registry, which can also include Polhemus, Ascension, and InterSense tracker software.

To install and authorize the SDK:

- Double click the setup file on the CD.
- Once installed, authorize the SDK using the authorization utility by selecting Start Menu → Programs → CyberGlove Systems Corporation → VirtualHand SDK. A dialog box will display a Site Code number. Send this number to CyberGlove Systems at support@cyberglovesystems.com. CyberGlove Systems will reply with the Site Key that will give you access. Enter the Site Key in the proper field.



Authorization Utility

- NOTE: If you did not purchase the SDK, you can download a copy from the CyberGlove Systems website and try it free of charge for 30 days. Fill out the form at www.cyberglovesystems.com. Launching the Authorization Utility once supplies the 30-day license. To convert the trial license to a permanent one, send the Site Code to us at support@cyberglovesystems.com and request a permanent Site Key. Enter this number in the proper field.

Operating Procedure

Mounting the Interface Module

The interface module of your CyberGlove system is designed to be mounted in three different ways depending on how you will be using the glove:

- 1) A convenient 3 ft. (0.9 m) cable connecting the interface module to the CyberGlove system glove can be used when the wearer is seated or stationary. The interface module can be placed on a nearby flat surface. Rubber feet on the underside help prevent the interface module from sliding.
- 2) The long, 25 ft. (7.6 m) serial cable connecting the CyberGlove system to your computer can be used when you need freedom of movement. You can use the belt clip mounting kit provided with your system to hold the interface module while you move within this range.

- 3) If you are using the CyberGlove system with CyberGrasp® or CyberForce® products or want a more permanent installation, an additional adhesive mount clip has been included in your accessory kit. This may be attached to a convenient location such as the top or side of the CyberGrasp actuator enclosure.



Adhesive mount clip

Belt clip

Putting on and Removing the CyberGlove System Glove

Your CyberGlove system comes with one or more thin nylon glove inserts, which should always be worn underneath the CyberGlove system glove. The nylon glove inserts not only help keep your CyberGlove system glove cleaner, they facilitate inserting and removing larger hands and help prevent damage to the precision sensors sewn inside. The inserts may make the CyberGlove glove fit tighter, but with use, it will loosen.



- 1) Make sure your hands are dry, put on the nylon glove insert, and then slide your hand into the system glove slowly and gently.
- 2) Pull gently on the reinforced portion of the glove wristband, in the middle of the wrist opening on the palm side. You may also alternately gently pull on the thumb side and the little finger side of the wristband until the glove is fully on.

Caution

Do not pull on the middle portion of the wristband on the top of the wrist, as this may damage wires located directly below the Velcro position-sensor mount. Never over-stress the material or you may permanently damage it. DO NOT pull on the “U”-shaped abduction sensors or on the CyberTouch systems actuators.



- 3) For best performance, after the glove is on, push any fabric creating a web effect between your fingers toward your palm so that it conforms well to each finger.

Removing the Glove

- 1) Remove the glove slowly and gently. Pull only on the reinforced fingertip tabs (the outer 1/2" of the fingertip of the glove that covers the fingernail). If you attempt to grab down further on the finger of the glove, you may damage a sensor and void your warranty.



- 2) Do not yank on the tabs, but rather gradually increase the tension to allow sensor wires inside the glove to adjust and slide relative to the stretching material.
- 3) You may need to successively pull on each fingertip tab before you can insert your other hand into the palm opening and push the glove off. Take your time and do not over-stress the material.



Powering Up the CyberGlove System

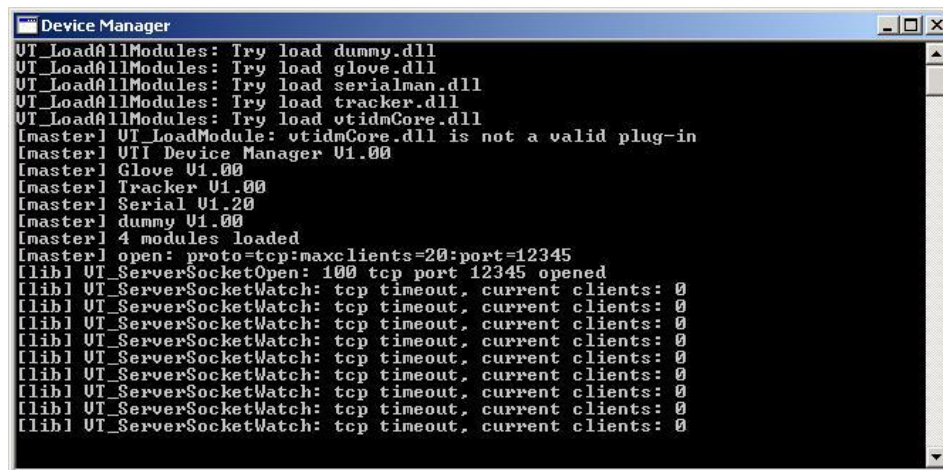
Turn on the CyberGlove system by pressing and holding the button on the interface module until the LED turns green (about 1 second).

To turn off the system, press and hold the button until the LED turns off (about 1 second).

Starting the CyberGlove Systems Device Manager and Device Configuration Utility (DCU)

The DCU supplies a graphical user interface for the CyberGlove Systems Device Manager, which provides a registry of all CyberGlove Systems motion capture devices, and Polhemus, Ascension, and InterSense tracker software, as well. There needs to be one Device Manager on each computer you are using for CyberGlove Systems products. One Device Manager can manage several products, and several Device Managers can work together to let you coordinate and integrate device data across a TCP/IP network of computers.

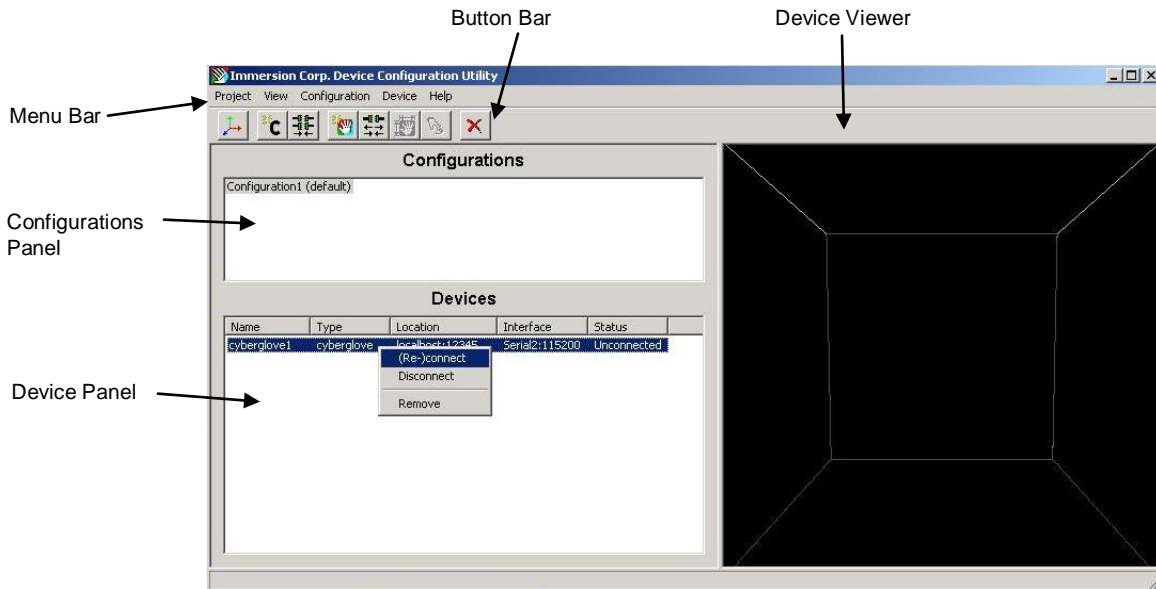
- 1) Click on the Windows Start menu button → Programs → VirtualHand SDK → Device Manager. The Device Manager console window will appear.



```
Device Manager
VT_LoadAllModules: Try load dummy.dll
VT_LoadAllModules: Try load glove.dll
VT_LoadAllModules: Try load serialman.dll
VT_LoadAllModules: Try load tracker.dll
VT_LoadAllModules: Try load vtidmCore.dll
[master] VT_LoadModule: vtidmCore.dll is not a valid plug-in
[master] VT Device Manager V1.00
[master] Glove V1.00
[master] Tracker V1.00
[master] Serial V1.20
[master] dummy V1.00
[master] 4 modules loaded
[master] open: proto=tcp:maxclients=20:port=12345
[[lib] VT_ServerSocketOpen: 100 tcp port 12345 opened
[[lib] VT_ServerSocketWatch: tcp timeout, current clients: 0
[[lib] VT_ServerSocketWatch: tcp timeout, current clients: 0
[[lib] VT_ServerSocketWatch: tcp timeout, current clients: 0
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[[lib] VT_ServerSocketWatch: tcp timeout, current clients: 0
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```

Device Manager

- 2) Click on the Windows Start menu button → Programs → VirtualHand SDK → DCU. This will launch the DCU, consisting of the Menu and Button Bars, Device Panel, Configurations Panel, and Device Viewer.



The Menu Bar provides access to all the functionality provided by the DCU.

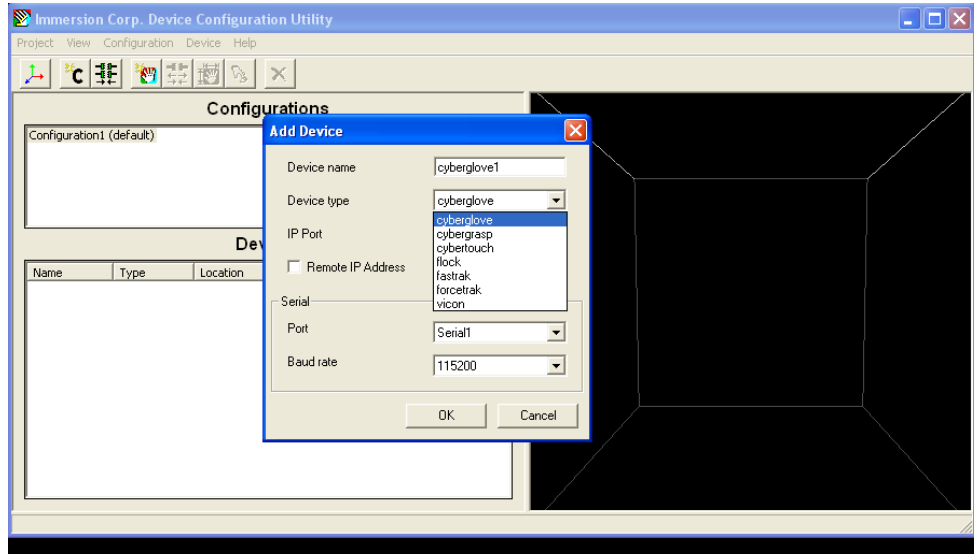
The Button Bar provides access to all the functionality of the DCU through quick one-click buttons.

The Configurations Panel displays preset configurations that include settings for all attached devices, for example CyberGlove, CyberGrasp, and tracking devices.

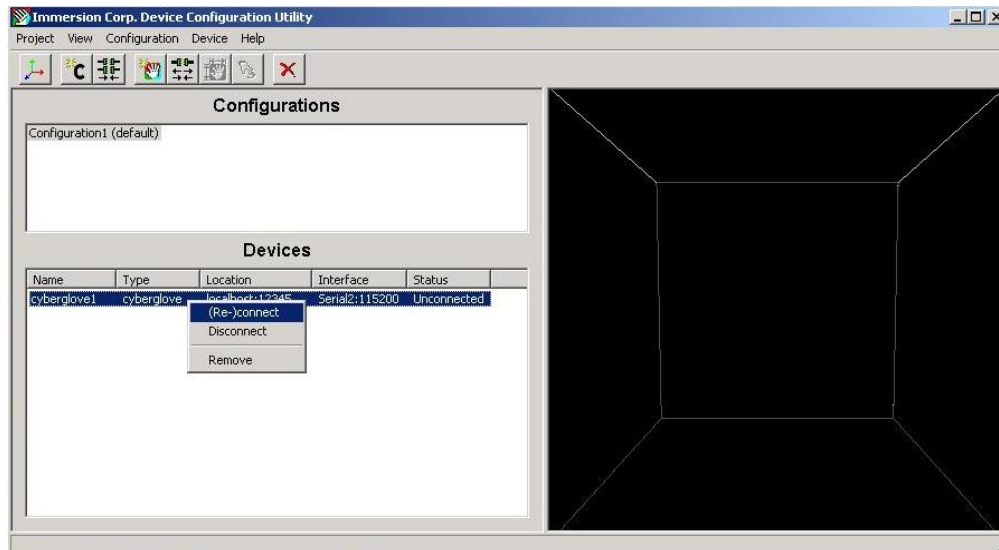
The Device Panel displays only the devices of the appropriate type that you have registered with the DCU. If you have multiple devices listed, you can right-click over the desired device and choose (Re-)connect to connect that device.

The Device Viewer provides a 3D graphical representation of the selected device and allows you to visually inspect the data coming from this device for purposes such as calibration and connection verification.

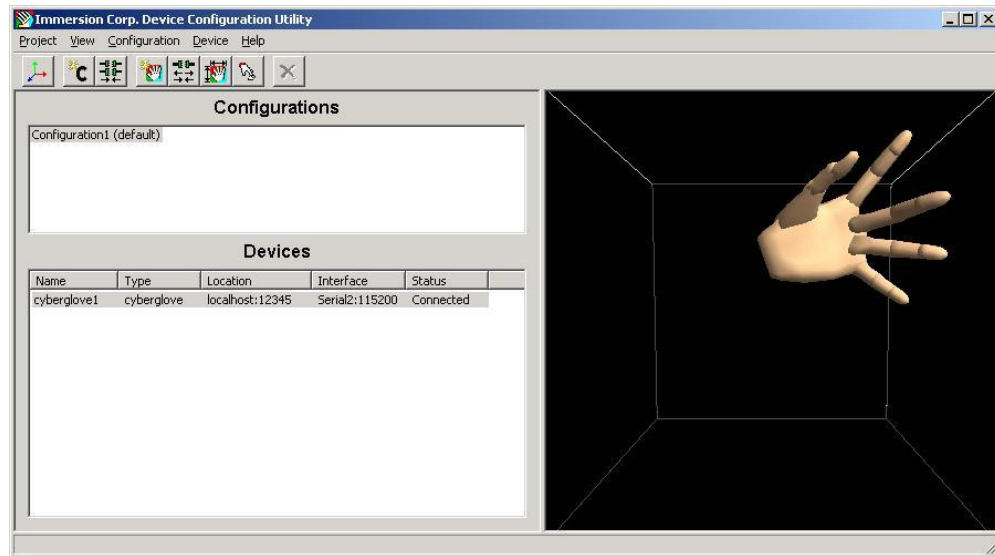
- 3) To add a new device or a new configuration (multiple devices), pull down Configurations → New. A new configuration will appear in the window. Pull down Device → Add. A dialog box will appear. Choose the type of device you want to add, enter its serial COM port, and click OK.



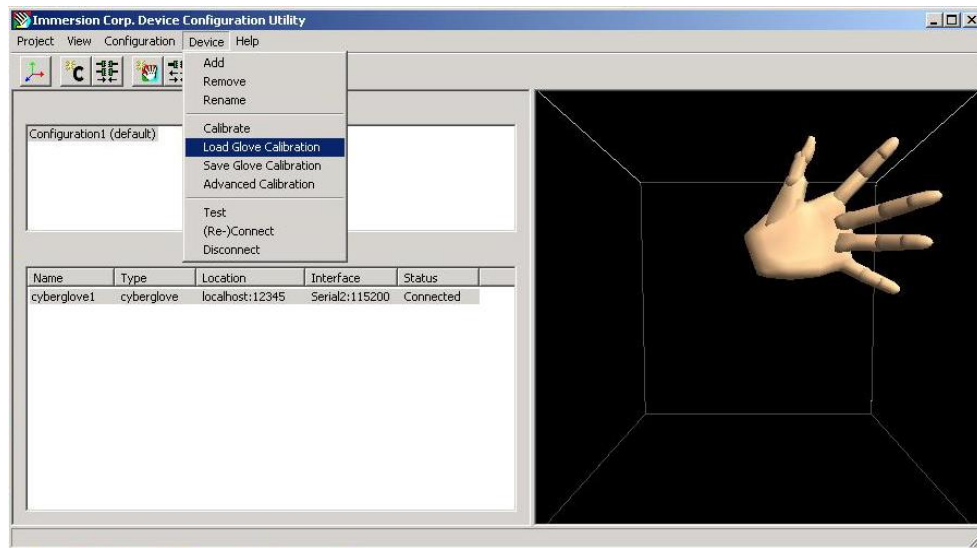
- 4) Right-click the device that now appears in the Device window and choose (Re-)connect to connect the CyberGlove system or other device.



The CyberGlove should now be connected to the DCU.



To assure accurate hand motion rendering, you should calibrate the CyberGlove system. See VirtualHand SDK documentation.



You can reconnect to devices that were added previously through the DCU. This can be done either by re-connecting to all devices in a configuration or re-connecting to individual devices.

Enabling CyberTouch Vibrotactile Feedback

Each of the CyberTouch system's six vibrotactile actuators (one on each finger and the palm) can be individually controlled to provide the desired tactile feedback level. Within the VirtualHand SDK, set the specific vibration amplitude (between 0 and 1) for each actuator using the `setVibrationAmplitude` method in the `vhtCyberTouch` class.

System Care

The CyberGlove system is a precision instrument for measuring hand and finger movement. Handle with care. When handled properly, the CyberGlove system is designed to last for years.

* The sensors in the CyberGlove system are designed to withstand the normal bending of the human hand. Do not attempt to artificially bend a sensor. Bending a sensor with tighter than a 1/4" (6 mm) bend radius may introduce a permanent offset in the sensor output and reduce the sensor life.

* Do not put anything on over the glove. The thumb, middle, ring, and little finger abduction sensors extend above the top surface of the glove and could be damaged. The thumb abduction sensor is particularly vulnerable to damage since it is often oriented such that if something were placed on top of the glove, the sensor would be creased.

* When holding the glove, do not grip it, but allow it to rest lightly on the palm of your hand.

* Do not expose the glove to direct heat (direct sunlight, heaters, etc.) for an extended period of time. This may prematurely deteriorate the glove material or the sensors.

* Do not attempt to wash the glove or immerse it in water. If the glove becomes damp, let it dry naturally, or place it in front of a cooling fan (not in front of a heater and not in direct sunlight).

Troubleshooting

If you are experiencing trouble with the CyberGlove system, refer to our online support FAQ at www.cyberglovesystems.com/forum. If the problem persists, contact CyberGlove Systems Corporation for support: support@cyberglovesystems.com.

Technical Specifications

Number of sensors:	18 or 22
Sensor resolution:	< 1 degree
Sensor repeatability:	3 degrees (average standard deviation between wearings)
Sensor linearity:	maximum 0.6% nonlinearity over full joint range
Sensor data rate:	90 records/sec typical
Weight:	70g (2.4 oz) glove, 470g (16.5 oz) Interface Unit and cable and 55g (1.9 oz) for six CyberTouch actuators
Fabric:	nylon Lycra spandex
Approvals:	CE: EN 61000-4-2:1995/A2:2001 EN 61000-4-3:2006 EN 61000-4-4:2004 EN 61000-4-5:2006 EN 61000-4-6:1996/IS1:2004 EN 61000-4-8:1993/A1:2001 EN 61000-4-11:2004 EN 55022:2006 EN 61000-3-2:2006 EN 61000-3-3:1995/IS1:2005 IEC 60950-1:2001 FCC: Part 15, SubPart B, Class A

CyberTouch System

Vibrotactile actuators:	6; one on each finger, one on the palm
Vibrational frequency:	0 – 125 Hz
Vibrational amplitude:	1.2 N peak-to-peak at 125 Hz (max)
Interface unit:	3.0 x 4.55 x 1.04 in (7.62 x 11.56 x 2.64 cm)
Cable:	standard 25 ft (7.62m)
Interface:	RS-232 (115.2 kbaud max)

Operating Specifications

Input power:	100 to 240 VAC, 50/60 Hz
Operating voltage:	6.0 to 8.4 VDC

Storage Specifications

Temperature range	-20°C to 60°C (Recommended < 25°C for extended storage periods)
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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

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