



3DSYSTEMS®

# OpenHaptics Toolkit

version 3.4.0

Windows Installation Guide

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# 1 INTRODUCTION

Thank you for downloading the OpenHaptics Toolkit version 3.4!

Should you encounter any difficulties while setting up or learning the application, we provide a variety of resources to help you learn the product. These are described below in “Resources for Learning the OpenHaptics Toolkit”.

## RESOURCES FOR LEARNING THE OPENHAPTICS TOOLKIT

The following documentation and other materials are provided to assist you in learning about OpenHaptics:

**OpenHaptics Installation Guide** This guide walks you through installing the toolkit and deploying your haptically enabled application. Detailed instructions for installing the Geomagic® Touch™ haptic device can be found in the Geomagic Touch Device Guide that came with your device.

**OpenHaptics Programmer’s Guide** This guide explains the OpenHaptics toolkit (which includes the QuickHaptics™ micro API), and introduces you to the architecture of the toolkit, how it works, and what you can do with it. The guide will also introduce you to the fundamental components of creating haptic environments.

**OpenHaptics API Reference** This manual is meant to be used as a companion to the OpenHaptics Toolkit Programmer’s Guide. It contains reference pages to all the QuickHaptics micro API and OpenHaptics toolkit HDAPI and HLAPI functions and types as well as appendices with tables that describe all the parameters.

**Source Code Examples & Guide** Several examples with source code to illustrate commonly used functionality of the HDAPI and HLAPI are installed with the toolkit. These include both console examples and graphics examples. A guide to these examples is located in <OpenHaptics\_Developer\_Edition directory>\doc.

**Developer Support Center** To access the Developer Support Center (DSC), go to <http://dsc.sensable.com>. The DSC provides customers with 24 x 7 access to the most current information and forums for the OpenHaptics toolkit. Please note that you will be asked to create a registration profile and have your customer information authenticated before you will have access to the DSC.

# SYSTEM REQUIREMENTS

**IMPORTANT** See the ReadMe in the <OpenHaptics Install directory> or visit [www.geomagic.com](http://www.geomagic.com) for the most current system requirements information.

The OpenHaptics toolkit requires certain hardware and software components in order to function properly. These requirements are listed below.

## Hardware:

- Intel Core 2 Duo or better
- 512 MB disk space and 2 GB RAM
- One of the supported devices from the Touch™ family of haptic devices (note that PCC stands for Phantom Communication Converter):

Touch 3D stylus haptic device (USB connection)	Phantom Premium 1.5 6DOF/1.5 HF 6DOF (Enhanced Parallel Port connection)
Geomagic® Touch™ haptic device (Ethernet LAN or IEEE 1394A connection)	Phantom Premium 3.0/6DOF (Enhanced Parallel Port connection)
Geomagic® Touch™ X haptic device (Ethernet LAN or Enhanced Parallel Port connection)	Phantom Premium A 1.0/1.5/1.5 HF/3.0 3DOF (Enhanced Parallel Port connection)

## Software:

- Windows 7 and Windows 8

## Compiler:

- Microsoft Visual Studio 2005/2008/2010

## Drivers:

- Latest Geomagic Touch Device Drivers (GTDD) or Phantom Device Drivers (PDD). Please refer to our web site to download the most recent drivers: GTDD or PDD ([www.support.geomagic.com](http://www.support.geomagic.com)).

### OVERVIEW

This installation is for the Windows OS only. Installing the OpenHaptics toolkit is a two step process.

1. Install the required haptic device drivers: Geomagic Touch Device Drivers (GTDD) or Phantom Device Drivers (PDD).
2. Install the OpenHaptics toolkit according to the instructions below.

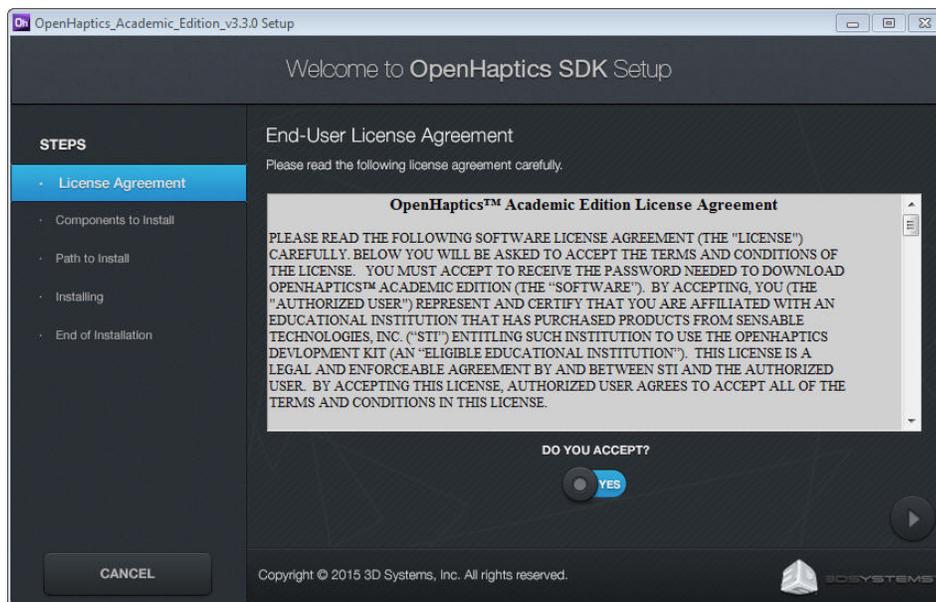
#### Step 1: Install Haptic Device Driver (GTDD or PDD)

If you have an older PDD (Phantom Device Driver) installed, you will need to manually uninstall the old device driver before you can use the OpenHaptics toolkit, then install the most recent haptic device drivers. The haptic device driver installation can be found at [support.geomagic.com](http://support.geomagic.com), from Products select Scanners and Hardware, then select the Touch device and Downloads. For complete installation instructions for the device drivers (GTDD or PDD), see the user guide that shipped with your haptic device.

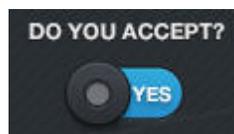
#### Step 2: Install Software

After you have completed the installation of the haptic device drivers, install the toolkit as described below.

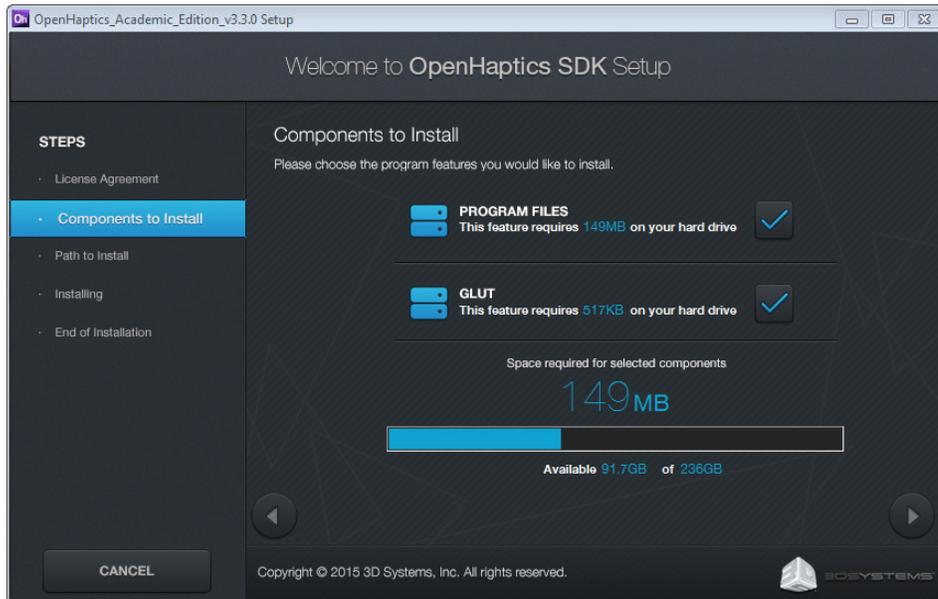
1. First locate the installation files:  
If you are installing from software download:
  - a. Select the appropriate OpenHaptics product from the Developer Support Center.
  - b. Save the Zip file to your local system.
  - c. Locate the OpenHaptics Zip file that you saved to your local system.
  - d. Unzip the data file.
2. Double-click [OpenHaptics\\_Developer\\_Edition.exe](#) to begin the installation.  
The Welcome to OpenHaptics SDK Setup window appears.



3. Read and then click the "Do You Accept" button to display **Yes** to accept the License Agreement, then to continue with the installation, click the **Next Arrow**.



4. In the Components to Install window, by default Program Files and GLUT are selected, click the **Next Arrow**.
  - Program Files: Installs all of the necessary program files, including examples and help documentation.
  - GLUT is selected for install. If you do not already have GLUT installed on your computer, make sure GLUT is selected for install. These are recommended to incorporate visualizations with your haptics programs and are needed to build many of the sample programs.



5. In the Path to Install window, select the destination folder for the install directory. The installation wizard will add a new environment variable, **OH\_SDK\_BASE**, which will point to the install directory.
6. Click the **Install** button.

When the installation is complete, you will receive notification that the installation process was successful.

If you need to end the installation at any time, click Cancel.
7. Click the **Close** button to close the installation window.

**NOTE: The OpenHaptics installation directory is labeled `\OpenHaptics\Developer`.**

File access permissions may not be uniform across all platforms. In some cases, it may be necessary to remove a previous OpenHaptics installation manually before reinstalling the software. Please make sure to back up the code for your project solutions before doing this.

# DIRECTORY STRUCTURE

The toolkit is broadly partitioned into the following directories: Lib, Include, Utilities, Examples, Runtime1, and Docs.

Upon installation, the user can specify an installation directory and optionally install GLUT (see page 7.) The default value of the installation directory is C:\Openhaptics. The installation program also adds a new environment variable, OH\_SDK\_BASE. Upon successful installation of the toolkit, the environment variable points to the install directory. All subdirectories described in this directory are relative to the OH\_SDK\_BASE directory.

**doc** - Contains documents such as the License Agreement, the API Reference, the Programmer's Guide, this Installation Guide, the QuickHaptics Doxygen docs and an HTML page that provides a guide and link to the source code examples.

**examples** - The standard installation includes various examples including complete programs for illustrating: how to query buttons, position, velocity, the end-effector transform matrix as well as basic HLAPI rendering. You may need to copy the examples to your desktop or My Documents directory in order to compile the examples. Within the examples directory are three sub directories.

**bin** - Contains the pre-built executables of the source code examples.

**HD** - Contains console and graphics directories for the Haptic Device API examples.

**HL** - Contains console and graphics directories for the Haptic Library API examples. Within the HD and HL directories you will find the following: (Not included with all editions of OpenHaptics. See your license agreement.)

**console** - Examples that only employ a windows command prompt.

**graphics** - Examples that use OpenGL®; most also use GLUT.

**include** - Contains the header files of the Openhaptics SDK. It is the main include directory of the Openhaptics suite. It is most conveniently referenced by adding \$(OH\_SDK\_BASE)\include to the include path to your project settings.

**lib** - Contains the library objects (.lib) files as well as the dynamically linked libraries (.dll) files. Note that the default runtime path is not set to include this directory, therefore the DLLs that live in this directory will not be loaded by default. We placed the DLLs in this directory to make it easier for end users to maintain multiple versions of the SDK.

**runtime** - Contains the runtime installer that can be used for deployment of the OpenHaptics runtime components. Depending on your license agreement, this directory may not be included. The right to deploy is subject to a separate agreement, and it is not automatically granted to Openhaptics SDK developers.

**utilities** - Utilities include various functions such as simple vector and matrix math, haptic workspace to camera mapping, a haptic device C++ wrapper for state, event synchronization and servo loop data logging and Haptic Mouse which allows users to use the Touch device, in addition to the standard mouse, to manipulate Windows GUI objects.

These are intended to facilitate development by providing commonly used pieces of functionality to support HDAPI and HLAPI. Source code is provided for all utilities. These classes and functions are not required to use the HLAPI and HDAPI. Their interfaces are subject to change with new releases of OpenHaptics. However, they are provided as statically linked libraries so that binary compatibility of programs using HLAPI and HDAPI may be maintained even if the utilities change.

Within utilities you will find the following:

**include** If you want to use the facilities exposed by the utilities, you must add

\$(OH\_SDK\_BASE)\utilities\include to the include path. Each utility is located in a separate subdirectory.

- GL (only if you selected to install GLUT files)
- HapticMouse
- HLU
- HDU
- SnapConstraints

**lib** - This directory contains the .lib files for all the utilities. If you modify and rebuild the utilities source, this will update the .lib files in this directory as a post-build step.

**src** - Like the include subdirectory, each utility library is located in a separate subdirectory.

- HapticMouse
- HLU
- HDU
- SnapConstraints

All utility libraries by default are compiled from MS Visual Studio 2010 developer platform. If you want to use the MS Visual Studio 2005/2008 platform, you must recompile all of the utility libraries. MS Visual Studio 2003 is no longer supported.

## QuickHaptics

Contains the library objects, header files, pre-built executables, and source code examples for the QuickHaptics micro API. The included Project Solution files use the OH\_SDK\_BASE environment variable to locate these files.

*Examples* - Contains the C++ source code for all the QuickHaptics examples described in the OpenHaptics Programmer's Guide. Please note that since relative pathnames are used, if application files are moved then the associated model files should be moved as well.

*header* - Contains the C++ header files that need to be included for a QuickHaptics application

*lib* - This directory contains the .lib files needed to link QuickHaptics applications. This directory also includes a subdirectory for FreeType.

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## EXTERNAL MODULES

The toolkit installation includes, as an option, the ability to install the GLUT (Graphics Library Utility Toolkit). This library is used by most of the graphics enabled examples that are included (with source code) in the SDK distribution.

The files and installation directories are:

glut32.dll	System directory
glut32.lib	\$(OH_SDK_BASE)\utilities\lib
glut.h	\$(OH_SDK_BASE)\utilities\include\GL

## LICENSING

The Developer Edition does not require a license for development and is free for anyone to download and develop haptics-enabled applications. Commercial distribution of any application developed using the Developer Edition is prohibited by the Licensing Terms which are shown during installation and can be found in the installation directory. 3D Systems must be contacted to discuss the terms for commercial distribution.



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