1) **Hardware requirements:**

- Minimum system requirements: Intel or AMD-based PCs; Windows 2000/XP, 250 MB of disc space.
- Two PHANTOM™ desktop robots by SensAble Technologies, Inc.
- 2 Parallel cards.

  For full description of the cards installation procedure follow the link:
  *http://www.softio.com/doc/ic0534KB_install.pdf*
  Download the parallel card driver from the following links according to your operating system:

  - Windows XP / 2003 (32 bit drivers):
    *http://www.softio.com/drivers/axxon_534kb_win2003.zip*
  - An alternative 3rd party freeware device driver for XP is posted here:
    *http://www.ridgecrop.demon.co.uk/download/ITE8875.zip*
  - Windows XP64 or Windows 2003 (64 bit drivers):
    http://www.softio.com/drivers/ic0534kb_win2003.zip
  - Windows 2000 driver the URL is:
    http://www.softio.com/ite_v350_xp2k.zip

2) **Software requirements:**

- Driver-
  Download drivers from the SensAble technologies website www.sensable.com .
  - Support and Resources → Downloads → PHANTOM device drivers.
  - Fill the relevant information in the blanks.
  - Download the appropriate driver zip file according to your operating system.
  - Unzip the files
  - Run setup.exe
- After finishing installation, restart the computer
- Start → Programs → SensAble → PHANToM Configuration
  - One PHANTOM device- *PHANTOM*: Default PHANToM
    Two PHANTOM device- *PHANTOM*: Add → write the name of the 2nd Phantom device.
  - *PHANTOM model*: Desktop
  - *Interface*: Parallel port
  - *Port number*: Chose the number according to the port number the card is connected to.
  - Select "Use Software interrupts"
- Start → Programs → SensAble → PHANToM test

- Follow the instruction on the screen to calibrate the Phantom devices.

- H3DAPI-
  Download the H3DAPI version 2.1.1 source code from
  http://www.h3dapi.org/modules/PDdownloads/viewcat.php?cid=14.

  Install according to the instructions that are displayed in the installation walkthrough section in
  http://www.h3dapi.org/modules/mediawiki/index.php/H3DAPI_Installation

  While running installation, you will be asked if you would like to download python version 2.5.4 to your computer. Approve the request.

- Download OpenHaptics:
  - Follow the website http://dsc.sensable.com/
  - Choose the *registration profile of OpenHaptics Academic Edition Developers*
  - Fill the relevant information in the blanks.
  - After registration you will get a username and a password to your email. You may now login to http://dsc.sensable.com/
  - Open the link OpenHaptics™ Academic Edition for Microsoft® Windows®
  - Choose *Software Downloads*
  - Click on Download OpenHaptics Academic Edition for Windows - v3.0
  - After the zipped file is downloaded extract it. Open the folders Win32 → OpenHaptics Academic Edition and run the Setup.exe file.
  - Follow the installation instructions until the installation is complete.

- We updated the code to fit our requirements that were not met in the existing code. The updated files can be downloaded from the handshake tournament[1] website http://www.bgu.ac.il/~akarniel/HANDSHAKE//index.html
  The required files are: HS.h; HS.cpp; LogForceEffect.h; LogForceEffect.cpp; HapticHS.h; HapticHS.cpp; ForceField.h; ForceField.cpp. (The 2 ForceField files already exist in the H3D folders. However, the files appear in the website have been modified).
  Each file should be placed in the appropriate folder (notice that the folders are located in the hard drive you chose when installing the program. Here it is C:\):
  - HS.h, LogForceEffect.h and ForceField.h → C:\H3D\H3DAPI\include\H3D

[1] In June 2010, at the Computational Motor Control Workshop at the Ben Gurion University in Beer Sheba, Israel, an international tournament was announced, whose goal is to devise computer models that most resemble the human handshake. The tournament will take place in June 2011.

- HS.cpp, LogForceEffect.cpp and ForceField.cpp → C:\H3D\H3DAPI\src
- HapticHS.h → C:\H3D\HAPI\include\HAPI
- HapticHS.cpp → C:\H3D\HAPI\src

- Open the text file H3DAPISourceFiles in the folder C:\H3D\H3DAPI\build with Visual Studio and add the appropriate lines according to the added files HS.h, LogForceEffect.h, HS.cpp and LogForceEffect.cpp
  For example: `"${H3DAPI_SOURCE_DIR}/../src/HS.cpp"`

  Open the text file HAPISourceFiles in the folder C:\H3D\HAPI\build and add the appropriate lines according to the added files HapticHS.h and HapticHS.cpp.

- After performing the changes, download CMake from: http://www.cmake.org/cmake/resources/software.html
  Select: cmake-2.8.2-win32-x86.exe. After downloading run the installation setup.
  The compiling instructions can be found in http://www.h3dapi.org/modules/mediawiki/index.php/H3DAPI_Installation
  Note: Make sure that when performing "build solution", the solution configuration is in a "Release" mode

- X3D and python handshake codes http://www.bgu.ac.il/~akarniel/HANDSHAKE/HandshakeFiles.zip

  - Download the python and x3d codes TryHandshakeModel.x3d and TryHandshakeModel.py from the handshake website and place the code files in a dedicated directory, for instance: "C:\codeDirectory".

    In the same directory put the following python file functionFileConstantForce.py

  - Each handshake force model should be written in a separate python file which must also be placed in the same code directory. See Figure 1 for an example of a spring force model. This example file can be also downloaded from the website: functionFile.py

- psignifit toolbox version 2.5.6 for Matlab, available at http://www.bootstrap-software.org/psignifit/

```python
#This is an example of a force function
#of a linear spring

#input:
# x - vector of position samples
# t- vector of time samples

#output:
# f - force

def function (x,t):

    springConst = 70

    f= (x[0]-x[-1])*springConst

    return f
```

**Figure 1. Force function in python.** An example of a spring force model for a handshake