Here is the tutorial of the handsim project:

1. **Environment Setup**
   1. Software Installation

* **Set up the Vuzix hmd:**

1. In the attached folder, double click the “VR\_Manager\_3.1.zip”, uncompressed this and install the VR\_Manager\_Installer.exe.

2. Double click the “Vuzix\_SDK\_3.1.1.zip”, then read the read me file. Install the “Vuzix\_Eyewear\_SDK-3.1.1.exe” first, then install the “AR\_Ext\_Setup\_1.0.exe”.

C:\Documents and Settings\lichen\Application Data\Tencent\Users\248500947\QQ\WinTemp\RichOle\TX$D@O)52LE4S3[LOZ7OK)E.jpg

3.The SDK installer creates the following two directories:

C:\IWEARSDK - SDK installation directory

C:\IWEARSDK\docs - SDK documentation directory

4. Build Instructions:

Debug builds are designed to run in windowed mode to ease debugging, while release builds run in full screen.

Add the following folder paths to your include directories:

<Vuzix SDK Path>\inc ------> <Platform SDK Path>\include

<Vuzix SDK Path>\lib ------> <Platform SDK Path>\lib

* **Set up the cybergloves:**

1. Install VirtualHand SDK from the attached files: “VirtualHandSDKSetupV2\_10\_0.exe”
2. Install VirtualHand for Motion Builder in the attached files:

” VH\_for\_MB\_7\_5\_ext2\_setup.exe”

C:\Documents and Settings\lichen\Application Data\Tencent\Users\248500947\QQ\WinTemp\RichOle\PC5T3OQP{L4K}`2{@9Y_QHI.jpg

1. From the Start Menu select Authorize.
2. Copy the Site Code and send an email to support@cyberglovesystems.com with it asking that you would like a Site Key. (this should take one or two days)
3. Authorize the software when you get the Site Key.
4. Use the programmer's guide to get set up.

**Note:** All the SDK file has been included into an independent folder, so except installing the software, nothing more should be worried about.

* 1. Hardware Setup

There are three different devices we need to set up before running the code.

****

Cyberglove

HMD



Mocap System

All the devices we need:

USB extension cabal

Arm markers sets



HMD glassed with markers

VGA extension cabal

Cyberglove

* + 1. **HMD**

First: Put the HMD on the chair and in center of the mocap area.

****

Second: connect the usb extension line and the VGA extension cable to the HMD.

****

Third: Connecting the cable and line to the desktop.

****

****

Connect to the right slot

* + 1. **Cyberglove**

First: Put the cuff on another chair.

** **

Second: Open the cyberglove box.

Cyberglove Sensor cable

Nylon glove inserts and Tracker accessory kit

Cyberglove data glove

****

Interface module

Serial conversion box with power converter

AC/DC power supply

Then put the glove on the chair, too

****

Third: connect the power convert to the desktop

****

Fourth: connect the power supply

****

Fifth: connect the power supply to the plug-base.

****

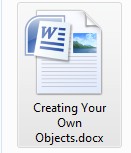
Finally: turn on the cybergleve

****

* + 1. **Mocap**

**Find the desktop which controls the mocap system and follow the instruction of the attached file.**

** **



1. **Code implementation**

**2.1 CCyberglove**

CCyberglove is the class used to connect the cybergolve hardware, to get all the 23 dof’s rotation data and used into our own hand model.

**2.1.1 Parameters**

|  |  |
| --- | --- |
| vhtIOConn \*gloveDict; | Virtual hand connection class |
| vhtCyberGlove \*glove; | Virtual hand glove data glass |
| std::vector<double> g\_d\_rotate\_array; | 23 rotation array |

**2.1.2 Methods**

|  |  |
| --- | --- |
| int connect(); | Connect to the cyberglove hardware |
| void updateRotation(); | Refresh the 23 dof rotation every frame |
| std::vector<double> getRotationArray(); | Get the rotation array from the 23 dof |

**2.2 CHMD**

**2.2.1 Parameters**

|  |  |
| --- | --- |
| float m\_EyeSeparation; | Intraocular Distance: aka, Distance between left and right cameras. |
| float m\_FocalLength; | Screen projection plane: aka, focal length(distance to front of virtual screen). |
| GLint m\_screenWidth, m\_screenHeight; | Screen width and height, same with the PC screen |
| HANDLE m\_StereoHandle; | Handle to connect to the HMD stereo mode |
| bool m\_StereoEnabled; | Flag to switch the Stereo mode |

**2.2.2 Methods**

|  |  |
| --- | --- |
| int connect(); | Function to connect the HMD |
| void SetViewingFrustum( int Eye , GLfloat fovy, GLfloat nearZ, GLfloat farZ, GLfloat aspect); | Set the frustum based on view mode and other parameters to set up the view |
| void prerenderSetting(int Eye); | Set which eye to render |
| void SetStereoViewport(int Eye); | Set view port based on the mode |
| void toggleStereoMono(); | Change between the Mono and Stereo Mode |
| void increaseEyeSeparation();  void decreaseEyeSeparation();  void increaseFocalLength();  void decreaseFocalLengthn(); | Change the Separation and the Focal length to set the 3D effect |

**2.3 CMocap**

**2.3.1 Parameters**

|  |  |
| --- | --- |
| char \*hostname ; | The hostname to connect the server PC |
| int unlabMarkers; | Numbers of the markers in the VR world |
| ViconDataStreamSDK::CPP::Client rtmcClient; | real-time mocap client |
| \_array<rtmcSubjectForDirectControl> m\_rtmc\_Subjects; | real-time mocap subjects |
| double cameraMatrix[16]; | Position and rotation Matrix of the camera |
| Void\* m\_rtmc\_hThread; | thread handle for real-time mocap |
| bool m\_b\_rtmc\_active; | mocap server connected |
| \_array<CMeanFilterSE3> m\_rtmc\_filterT; | filter for each subject |

**2.3.2 Methods**

|  |  |
| --- | --- |
| bool rtmcConnect() | Function to connect the server |
| void rtmcDisconnect() | Function to disconnect the server |
| void rtmcUpdateData() | Update the position and rotation for each object |
| double\* getCameraMatrix() | Return the camera matrix |
| SE3 getHandBasePose() | Return the hand model matrix |

1. **Start Manager Software before run the project**

There are two manager software you should start before running the code. One is the cyberglove manager and the other is the HMD manager. Also you need to change the resolution of the screen.

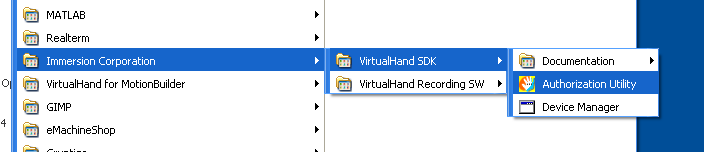
For the desktop in the lab, they are just in the start menu

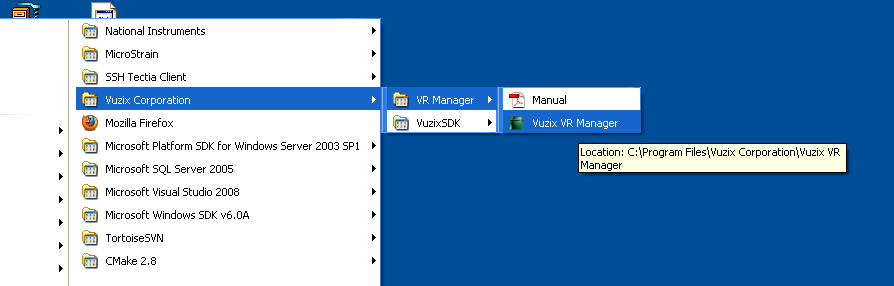


Cyberglove Manager

HMD Manager

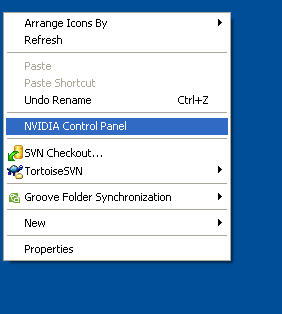
If they are not in the start menu, you can also find them in the program menu

****

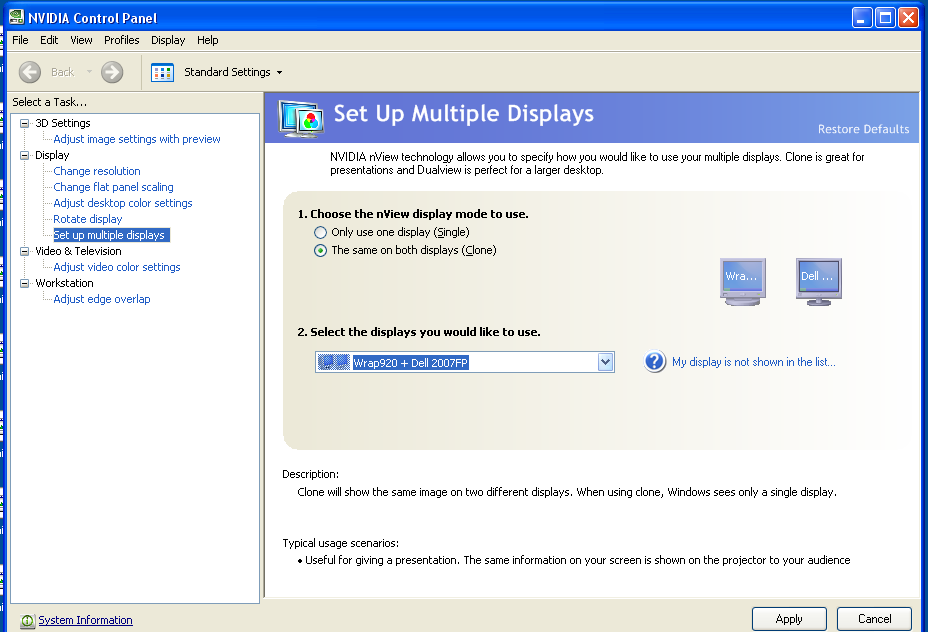
****

Besides, change the resolution of the screen. Once set up the HMD.

Right click the mouse and click the NVIDIA control panel.



Then choose the “The screen on both displays” and “WR902 + Dell 2007FP”, and click Apply.



1. **Attached documents**

There are several attached documents in the folder.

|  |  |
| --- | --- |
| VR\_Manager\_3.1.zip | HMD manager |
| Vuzix\_SDK\_3.1.1.zip | HMD SDK |
| VirtualHandSDKSetupV2\_10\_0.exe | Cyberglove install software |
| VH\_for\_MB\_7\_5\_ext2\_setup.exe | Cyberglove motion builder |
| load\_BMP\_function.cpp | Function about how to load bmp texture |
| Junggon.cal | Junggon’s hand calibration data |
| Creating Your Own Objects.docx | Tutorial about how to set up the mocap |
| calibration guide-v4-4.pdf | File about how to calibrate people’s hand |