

通信

ROS 与 Nokov 动作捕捉系统



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一、Nokov 动作捕捉系统软件 Seeker1.6.x 的安装

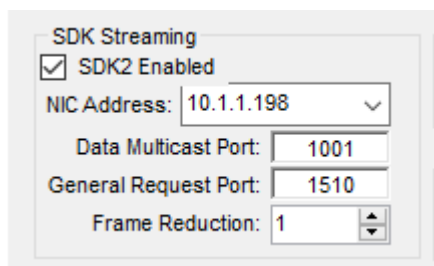
关于动捕软件的安装过程说明，可以跟厂家咨询软件安装说明文档。

二、动作捕捉系统软件 Seeker1.6.x 的使用和配置

关于动捕软件的使用过程说明，可以跟厂家咨询软件的操作手册，主要是关于标定/创建刚体/跟踪等等的使用说明。

三、动作捕捉系统软件 Seeker1.6.x 的网络设置

注意在 Seeker 软件的设置中打开 SDK Streaming 的 SDK2 Enabled，包括 IP 和端口设置如图：

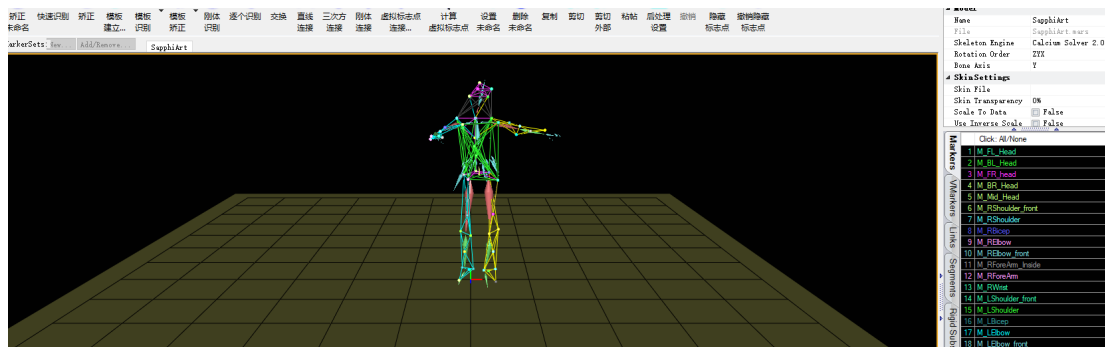


四、动作捕捉系统软件 Seeker1.6.x 配套的 VRPN 服务器设置

(一) 启动 Seeker 软件，

做好对应的配置设置后，启动实时方式的连接或者加载动捕数据进行播放等。

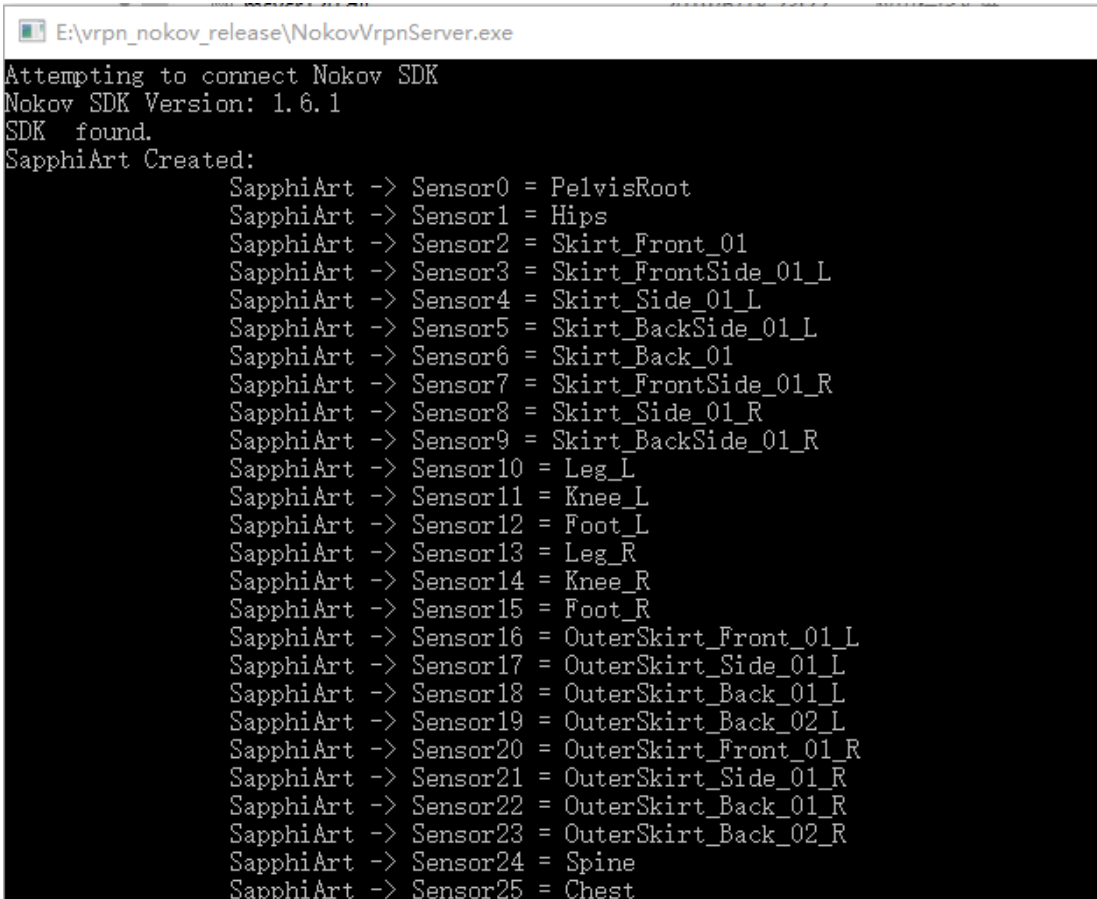
如图所示：



(二) 在 Seeker 软件所在电脑中启动 NokovVrpnServer.exe

(进入目录后双击即可)，软件会自动检查并连接 Seeker 软件

如下图所示：



```
E:\vrpn_nokov_release\NokovVrpnServer.exe
Attempting to connect Nokov SDK
Nokov SDK Version: 1.6.1
SDK found.
SapphiArt Created:
SapphiArt -> Sensor0 = PelvisRoot
SapphiArt -> Sensor1 = Hips
SapphiArt -> Sensor2 = Skirt_Front_01
SapphiArt -> Sensor3 = Skirt_FrontSide_01_L
SapphiArt -> Sensor4 = Skirt_Side_01_L
SapphiArt -> Sensor5 = Skirt_BackSide_01_L
SapphiArt -> Sensor6 = Skirt_Back_01
SapphiArt -> Sensor7 = Skirt_FrontSide_01_R
SapphiArt -> Sensor8 = Skirt_Side_01_R
SapphiArt -> Sensor9 = Skirt_BackSide_01_R
SapphiArt -> Sensor10 = Leg_L
SapphiArt -> Sensor11 = Knee_L
SapphiArt -> Sensor12 = Foot_L
SapphiArt -> Sensor13 = Leg_R
SapphiArt -> Sensor14 = Knee_R
SapphiArt -> Sensor15 = Foot_R
SapphiArt -> Sensor16 = OuterSkirt_Front_01_L
SapphiArt -> Sensor17 = OuterSkirt_Side_01_L
SapphiArt -> Sensor18 = OuterSkirt_Back_01_L
SapphiArt -> Sensor19 = OuterSkirt_Back_02_L
SapphiArt -> Sensor20 = OuterSkirt_Front_01_R
SapphiArt -> Sensor21 = OuterSkirt_Side_01_R
SapphiArt -> Sensor22 = OuterSkirt_Back_01_R
SapphiArt -> Sensor23 = OuterSkirt_Back_02_R
SapphiArt -> Sensor24 = Spine
SapphiArt -> Sensor25 = Chest
```

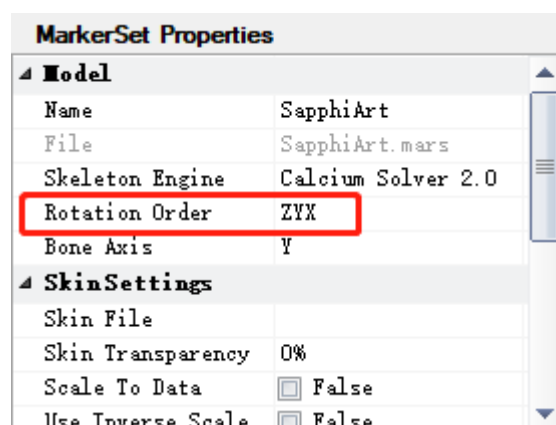
E:\vrpn_nokov_release\NokovVrpnServer.exe

```

SapphiArt -> Sensor38 = Pinky_01_L
SapphiArt -> Sensor39 = Pinky_02_L
SapphiArt -> Sensor40 = Thumb_01_L
SapphiArt -> Sensor41 = Thumb_02_L
SapphiArt -> Sensor42 = Breast_L
SapphiArt -> Sensor43 = Breast_R
SapphiArt -> Sensor44 = Shoulder_R
SapphiArt -> Sensor45 = UpperArm_R
SapphiArt -> Sensor46 = Forearm_R
SapphiArt -> Sensor47 = Hand_R
SapphiArt -> Sensor48 = Index_01_R
SapphiArt -> Sensor49 = Index_02_R
SapphiArt -> Sensor50 = Middle_01_R
SapphiArt -> Sensor51 = Middle_02_R
SapphiArt -> Sensor52 = Ring_01_R
SapphiArt -> Sensor53 = Ring_02_R
SapphiArt -> Sensor54 = Pinky_01_R
SapphiArt -> Sensor55 = Pinky_02_R
SapphiArt -> Sensor56 = Thumb_01_R
SapphiArt -> Sensor57 = Thumb_02_R
Created VRPN server.
zyx = 0
zxy = 1
xyz = 2
xzy = 3
yxz = 4
yzx = 5
Please enter the numer corresponding to the rotation order:

```

选择跟 Seeker 软件中定义的数据一样的坐标系



```

E:\vrpn_nokov_release\NokovVrpnServer.exe
SapphiArt -> Sensor40 = Thumb_01_L
SapphiArt -> Sensor41 = Thumb_02_L
SapphiArt -> Sensor42 = Breast_L
SapphiArt -> Sensor43 = Breast_R
SapphiArt -> Sensor44 = Shoulder_R
SapphiArt -> Sensor45 = UpperArm_R
SapphiArt -> Sensor46 = Forearm_R
SapphiArt -> Sensor47 = Hand_R
SapphiArt -> Sensor48 = Index_01_R
SapphiArt -> Sensor49 = Index_02_R
SapphiArt -> Sensor50 = Middle_01_R
SapphiArt -> Sensor51 = Middle_02_R
SapphiArt -> Sensor52 = Ring_01_R
SapphiArt -> Sensor53 = Ring_02_R
SapphiArt -> Sensor54 = Pinky_01_R
SapphiArt -> Sensor55 = Pinky_02_R
SapphiArt -> Sensor56 = Thumb_01_R
SapphiArt -> Sensor57 = Thumb_02_R
Created VRPN server.
zyx = 0
zxy = 1
xyz = 2
xzy = 3
yxz = 4
yzx = 5
Please enter the numer corresponding to the rotation order:
0
Current Rotation Order is zyx
    
```

经过上述操作后，Seeker 软件的 VRPN 服务器就启动了。

后面就是等待 vrpn 的客户端的连接（比如等待 ros-kinetic-vrpn 的连接）

五、 ROS 下与 Seeker1.6.x 软件的通信测试步骤

ROS: kinetic

Ubuntu: 虚拟机 16.04

目的：通过 Seeker 软件和 VRPN 获取 markerset 或者刚体等的信息，并传给 ROS。

（一） vrpn 的下载和安装及网络配置

```
cd ~/catkin_ws/src
```

```
git clone https://github.com/clearpathrobotics/vrpn_client_ros.git
```

```
sudo apt-get install ros-kinetic-vrpn
```

```

/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
nk@nk-virtual-machine:~/catkin_ws/src$ git clone -b kinetic-devel https://github
.com/ros-drivers/vrpn_client_ros.git
正克隆到 'vrpn_client_ros'...
remote: Enumerating objects: 191, done.
remote: Total 191 (delta 0), reused 0 (delta 0), pack-reused 191
接收对象中: 100% (191/191), 35.00 KiB | 0 bytes/s, 完成.
处理 delta 中: 100% (97/97), 完成.
检查连接... 完成.

```

```

/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
nk@nk-virtual-machine:~/catkin_ws$ sudo apt-get install ros-kinetic-vrpn-client-
ros -y
[sudo] nk 的密码:
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
将会同时安装下列软件:
  ros-kinetic-vrpn
下列【新】软件包将被安装:
  ros-kinetic-vrpn ros-kinetic-vrpn-client-ros
升级了 0 个软件包, 新安装了 2 个软件包, 要卸载 0 个软件包, 有 95 个软件包未被升
级。
需要下载 1,198 kB 的归档。
解压缩后会消耗 8,560 kB 的额外空间。
获取:1 http://packages.ros.org/ros/ubuntu xenial/main i386 ros-kinetic-vrpn i386
_7.33.1-1xenial-20190607-180745-0800 [1,091 kB]
获取:2 http://packages.ros.org/ros/ubuntu xenial/main i386 ros-kinetic-vrpn-clie
nt-ros i386 0.2.2-0xenial-20190608-005923-0800 [107 kB]
已下载 1,198 kB, 耗时 5秒 (209 kB/s)
正在选中未选择的软件包 ros-kinetic-vrpn。
(正在读取数据库 ... 系统当前共安装有 325853 个文件和目录。)
正准备解包 .../ros-kinetic-vrpn_7.33.1-1xenial-20190607-180745-0800_i386.deb ..
.
正在解包 ros-kinetic-vrpn (7.33.1-1xenial-20190607-180745-0800) ...

```

```

/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
将会同时安装下列软件:
  ros-kinetic-vrpn
下列【新】软件包将被安装:
  ros-kinetic-vrpn ros-kinetic-vrpn-client-ros
升级了 0 个软件包, 新安装了 2 个软件包, 要卸载 0 个软件包, 有 95 个软件包未被升
级。
需要下载 1,198 kB 的归档。
解压缩后会消耗 8,560 kB 的额外空间。
获取:1 http://packages.ros.org/ros/ubuntu xenial/main i386 ros-kinetic-vrpn i386
_7.33.1-1xenial-20190607-180745-0800 [1,091 kB]
获取:2 http://packages.ros.org/ros/ubuntu xenial/main i386 ros-kinetic-vrpn-clie
nt-ros i386 0.2.2-0xenial-20190608-005923-0800 [107 kB]
已下载 1,198 kB, 耗时 5秒 (209 kB/s)
正在选中未选择的软件包 ros-kinetic-vrpn。
(正在读取数据库 ... 系统当前共安装有 325853 个文件和目录。)
正准备解包 .../ros-kinetic-vrpn_7.33.1-1xenial-20190607-180745-0800_i386.deb ..
.
正在解包 ros-kinetic-vrpn (7.33.1-1xenial-20190607-180745-0800) ...
正在选中未选择的软件包 ros-kinetic-vrpn-client-ros。
正准备解包 .../ros-kinetic-vrpn-client-ros_0.2.2-0xenial-20190608-005923-0800_i3
86.deb ...
正在解包 ros-kinetic-vrpn-client-ros (0.2.2-0xenial-20190608-005923-0800) ...
正在设置 ros-kinetic-vrpn (7.33.1-1xenial-20190607-180745-0800) ...
正在设置 ros-kinetic-vrpn-client-ros (0.2.2-0xenial-20190608-005923-0800) ...

```


(二) catkin_make 操作

```
cd ~/catkin_ws
```

```
catkin_make
```

```

/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
nk@nk-virtual-machine:~/catkin_ws$ catkin_make
Base path: /home/nk/catkin_ws
Source space: /home/nk/catkin_ws/src
Build space: /home/nk/catkin_ws/build
Devel space: /home/nk/catkin_ws/devel
Install space: /home/nk/catkin_ws/install
####
#### Running command: "cmake /home/nk/catkin_ws/src -DCATKIN_DEVEL_PREFIX=/home/
nk/catkin_ws/devel -DCMAKE_INSTALL_PREFIX=/home/nk/catkin_ws/install -G Unix Mak
efiles" in "/home/nk/catkin_ws/build"
####
-- Using CATKIN_DEVEL_PREFIX: /home/nk/catkin_ws/devel
-- Using CMAKE_PREFIX_PATH: /opt/ros/kinetic
-- This workspace overlays: /opt/ros/kinetic
-- Using PYTHON_EXECUTABLE: /usr/bin/python
-- Using Debian Python package layout
-- Using empy: /usr/bin/empy
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
-- Using CATKIN_TEST_RESULTS_DIR: /home/nk/catkin_ws/build/test_results
-- Found gmock sources under '/usr/src/gmock': gmock will be built
-- Found gtest sources under '/usr/src/gmock': gtests will be built
-- Using Python nosetests: /usr/bin/nosetests-2.7
-- catkin 0.7.18

/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
-- Generating done
-- Build files have been written to: /home/nk/catkin_ws/build
####
#### Running command: "make -j1 -l1" in "/home/nk/catkin_ws/build"
####
Scanning dependencies of target vrpn_client_ros
[ 16%] Building CXX object vrpn_client_ros/CMakeFiles/vrpn_client_ros.dir/src/vr
pn_client_ros.cpp.o
[ 33%] Linking CXX shared library /home/nk/catkin_ws/devel/lib/libvrpn_client_ro
s.so
[ 33%] Built target vrpn_client_ros
Scanning dependencies of target vrpn_tracker_node
[ 50%] Building CXX object vrpn_client_ros/CMakeFiles/vrpn_tracker_node.dir/src/
vrpn_tracker_node.cpp.o
[ 66%] Linking CXX executable /home/nk/catkin_ws/devel/lib/vrpn_client_ros/vrpn_
tracker_node
[ 66%] Built target vrpn_tracker_node
Scanning dependencies of target vrpn_client_node
[ 83%] Building CXX object vrpn_client_ros/CMakeFiles/vrpn_client_node.dir/src/v
rpn_client_node.cpp.o
[100%] Linking CXX executable /home/nk/catkin_ws/devel/lib/vrpn_client_ros/vrpn_
client_node
[100%] Built target vrpn_client_node
nk@nk-virtual-machine:~/catkin_ws$
    
```

(三) 测试网络

PING 一下跟 Seeker 软件所在的主机的网络是否连通（虚拟机的 IP 可以设置为 10.1.1.194）

```
ping 10.1.1.198
```


(四) 启动 vrpn_client_ros

输入以下命令：

```
roslaunch vrpn_client_ros sample.launch server:=10.1.1.198
```

```
/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
nk@nk-virtual-machine:~/catkin_ws$
nk@nk-virtual-machine:~/catkin_ws$ roslaunch vrpn_client_ros sample.launch server:=10.1.1.198
... logging to /home/nk/.ros/log/bcc928e6-18e8-11ea-9eff-000c2988ccd7/roslaunch-nk-virtual-machine-10048.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://nk-virtual-machine:40647/

SUMMARY
=====

PARAMETERS
* /rostdistro: kinetic
* /rosversion: 1.12.14
* /vrpn_client_node/broadcast_tf: True
* /vrpn_client_node/frame_id: world
* /vrpn_client_node/port: 3883
* /vrpn_client_node/refresh_tracker_frequency: 1.0
* /vrpn_client_node/server: 10.1.1.198
* /vrpn_client_node/update_frequency: 100.0
* /vrpn_client_node/use_server_time: False
```

```
/opt/ros/kinetic/share/vrpn_client_ros/launch/sample.launch http://localhost:11311
* /rosversion: 1.12.14
* /vrpn_client_node/broadcast_tf: True
* /vrpn_client_node/frame_id: world
* /vrpn_client_node/port: 3883
* /vrpn_client_node/refresh_tracker_frequency: 1.0
* /vrpn_client_node/server: 10.1.1.198
* /vrpn_client_node/update_frequency: 100.0
* /vrpn_client_node/use_server_time: False

NODES
/
  vrpn_client_node (vrpn_client_ros/vrpn_client_node)

ROS_MASTER_URI=http://localhost:11311

process[vrpn_client_node-1]: started with pid [11004]
[ INFO] [1575863718.523118732]: Connecting to VRPN server at 10.1.1.198:3883
check_vrpn_cookie(): VRPN Note: minor version number doesn't match: (prefer 'vrpn: ver. 07.34', got 'vrpn: ver. 07.29 0'). This is not normally a problem.
[ INFO] [1575863718.527753150]: Connection established
[ INFO] [1575863719.531658785]: Found new sender: SapphiArt
[ INFO] [1575863719.532300993]: Creating new tracker SapphiArt
```

从上图可以看出，打印出后面三行，说明是成功连接了。


```
nk@nk-virtual-machine: ~/catkin_ws
nk@nk-virtual-machine:~/catkin_ws$
nk@nk-virtual-machine:~/catkin_ws$
nk@nk-virtual-machine:~/catkin_ws$ rostopic echo /vrpn_client_node/SapphiArt/pose
header:
  seq: 304088
  stamp:
    secs: 1577610953
    nsecs: 863049625
  frame_id: "world"
pose:
  position:
    x: 71.392403
    y: 873.096191
    z: 67.880806
  orientation:
    x: 0.0120145443837
    y: -0.0271592023468
    z: -0.00166500491602
    w: 0.999557530215
---
header:
  seq: 304089
  stamp:
```

世界顶级的中国动作捕捉



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