通信

ROS 与 Nokov 动作捕捉系统

目录

一、 Nokov 动作捕捉系统软件 XING1.0.x 的安装

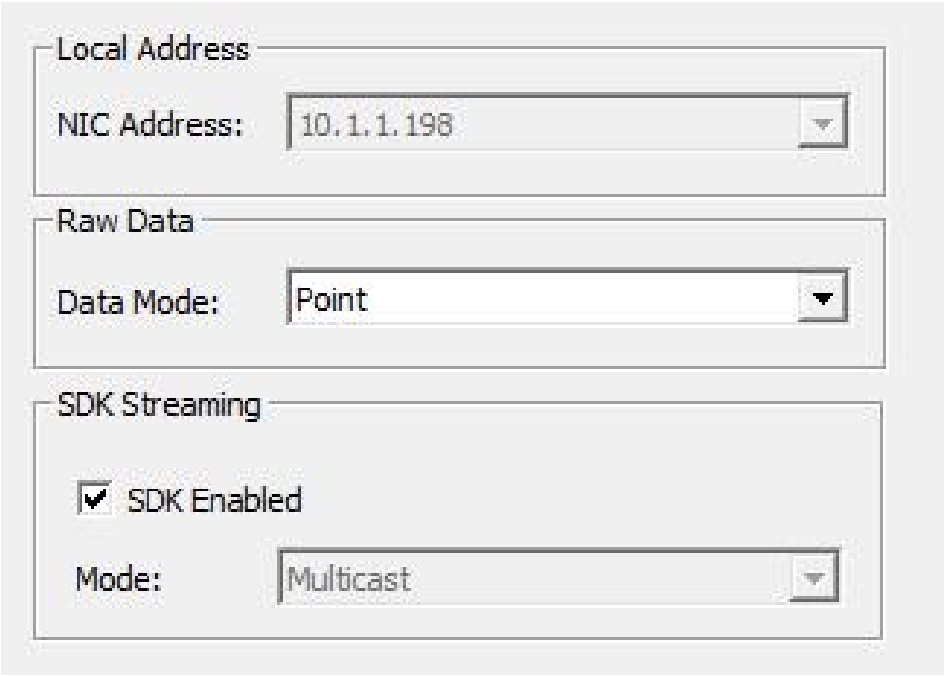
关于动捕软件的安装过程说明，可以跟厂家咨询软件安装说明文档。

二、 动作捕捉系统软件 XING1.0.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 XING1.0.x 的网络设置

注意在 XING 软件的设置中，切换组合框选择 NIC Address,然后打开 SDK Streaming 的 SDK Enabled，如图：

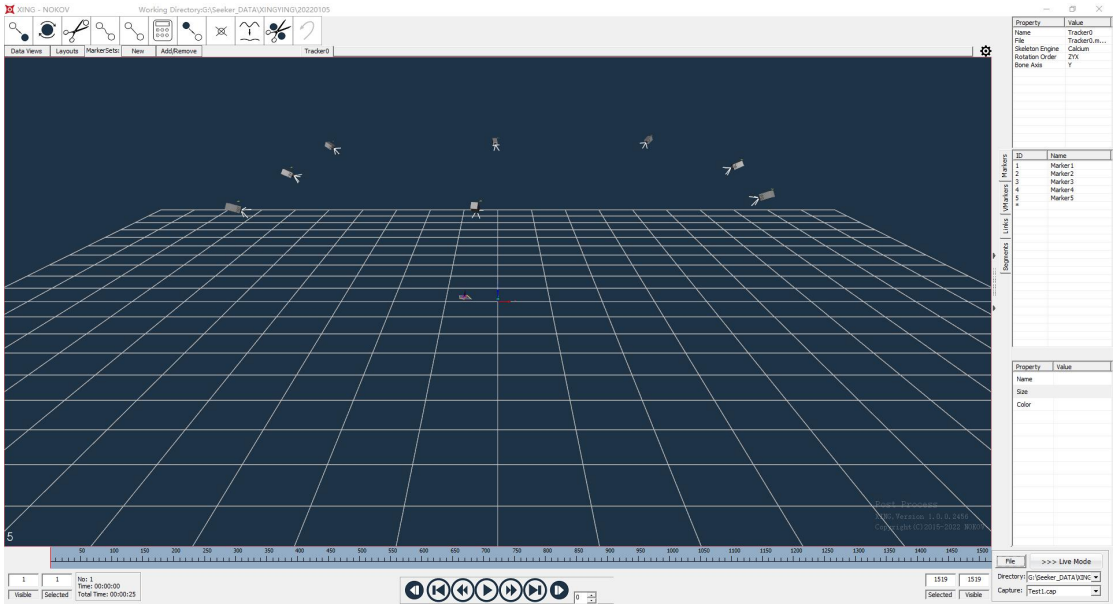


四、 动作捕捉系统软件 XING1.0.x 配套的 VRPN 服务器设置

(一) 启动 XING 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 XING 软件所在电脑中启动 NokovVrpnServer_MultiVersion.exe

(进入目录后先编辑配置文件 config.ini(参数配置请参考 readme.txt),然后双击即可)，软件会自动检查并连接 XING 软件，Tracker0->Tracker0（追踪目标），如下图所示:

config.ini - 记事本

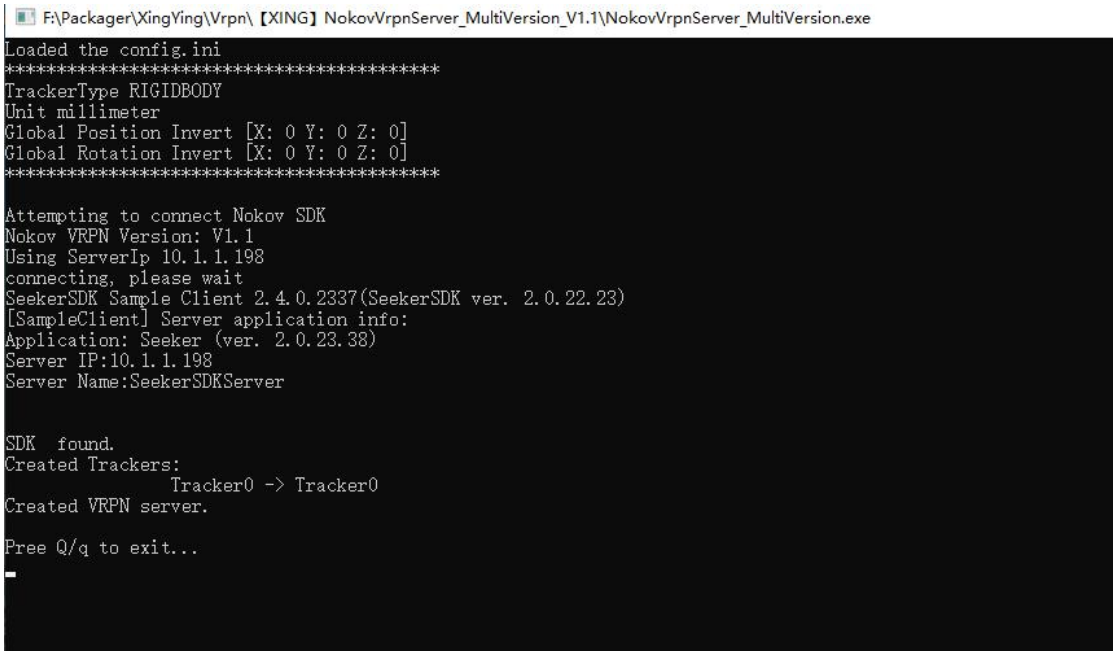
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

```
#注释
;author = LiKa.Ji

[Core]
; NAMED_MARKER = 0, UNNAMED_MARKER = 1, RigidBody = 2
Type=2
; mm = 0, cm = 1, m = 2
Unit = 0

[Network]
ServerIPAddress = 10.1.1.198

#追踪对象全局反转轴设定 0: 不反转 1: 反转
;[InvertAxisPosition] # 坐标轴
;X=0
;Y=0
;Z=0
;[InvertAxisRotation] # 坐标轴
;X=0
;Y=0
;Z=0
;[Segment1] # 名称Nokov的对象的特定反转设定
;PX=1
;PY=1
;PZ=1
;RX=1
;RY=1
;RZ=1
```



经过上述操作后，XING 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-melodic-vrpn 的连接）

五、 ROS 下与 XING1.0.x 软件的通信测试步骤

ROS：melodic

Ubuntu：虚拟机 18.04

目的：通过 XING 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

a) 软件源安装

```
sudo apt-get install ros-melodic-vrpn-client-ros
```

```
nokov@nokov-virtual-machine:~/catkin_ws$ sudo apt-get install ros-melodic-vrpn-client-ros
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
下列软件包是自动安装的并且现在不需要了：
  cython fltk1.3-doc fluid fonts-lato fonts-liberation2 fonts-opensymbol
  freeglut3 freeglut3-dev gazebo9 gazebo9-common gazebo9-plugin-base
  gdal-data gir1.2-gst-plugins-base-1.0 gir1.2-gstreamer-1.0 gir1.2-gtk-2.0
  gir1.2-gudev-1.0 gir1.2-udisks-2.0 grilo-plugins-0.3-base gstreamer1.0-gtk3
  hddtemp hdf5-helpers i965-va-driver javascript-common libaacs0 libaec-dev
  libaec0 libarmadillo-dev libarmadillo8 libarpack2 libarpack2-dev libass9
  libassimp-dev libassimp4 libatk1.0-dev libavcodec-dev libavcodec57
  libavdevice-dev libavdevice57 libavfilter-dev libavfilter6 libavformat-dev
  libavformat57 libavresample-dev libavresample3 libavutil-dev libavutil55
  libbdplus0 libblas-dev libbluray2 libbs2b0 libbullet-dev libbullet2.87
  libcairo-script-interpreter2 libcairo2-dev libccd-dev libccd2 libcdr-0.1-1
  libcharls1 libchromaprint1 libclucene-contribs1v5 libclucene-core1v5
```

```
  vdpau-driver-all vtk6 x11proto-composite-dev x11proto-core-dev
  x11proto-damage-dev x11proto-dev x11proto-fixes-dev x11proto-input-dev
  x11proto-randr-dev x11proto-scrnsaver-dev x11proto-xext-dev
  x11proto-xf86vidmode-dev x11proto-xinerama-dev xorg-sgml-doctools
  xtrans-dev
使用'sudo apt autoremove'来卸载它(它们)。
将会同时安装下列软件:
  python-rosdep-modules ros-melodic-actionlib ros-melodic-pluginlib
  ros-melodic-rosbag ros-melodic-rosbag-storage ros-melodic-roslaunch
  ros-melodic-roslib ros-melodic-rospack ros-melodic-rospy
  ros-melodic-rostest ros-melodic-rostopic ros-melodic-rosunit
  ros-melodic-tf2-py ros-melodic-tf2-ros ros-melodic-vrpn
下列软件包将被【卸载】:
  python-rosdep2
下列【新】软件包将被安装:
  python-rosdep-modules ros-melodic-actionlib ros-melodic-pluginlib
  ros-melodic-rosbag ros-melodic-rosbag-storage ros-melodic-roslaunch
  ros-melodic-roslib ros-melodic-rospack ros-melodic-rospy
  ros-melodic-rostest ros-melodic-rostopic ros-melodic-rosunit
  ros-melodic-tf2-py ros-melodic-tf2-ros ros-melodic-vrpn
  ros-melodic-vrpn-client-ros
升级了 0 个软件包，新安装了 16 个软件包，要卸载 1 个软件包，有 287 个软件包未被
升级。
需要下载 1,150 kB/2,716 kB 的归档。
解压缩后会消耗 18.1 MB 的额外空间。
您希望继续执行吗？ [Y/n]
```

b) 源码安装

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

```
git clone https://github.com/ros-drivers/vrpn_client_ros.git
```

```
cd ~/catkin_ws
```

```
catkin_make -DCATKIN_WHITELIST_PACKAGES="vrpn_client_ros"
```

```
source devel/setup.bash
```

```
nokov@nokov-virtual-machine:~/catkin_ws/src$ git clone -b kinetic-deve
l https://github.com/ros-drivers/vrpn_client_ros.git
正克隆到 'vrpn_client_ros'...
remote: Enumerating objects: 204, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (7/7), done.
remote: Total 204 (delta 3), reused 10 (delta 2), pack-reused 191
接收对象中: 100% (204/204), 37.46 KiB | 77.00 KiB/s, 完成.
处理 delta 中: 100% (100/100), 完成.
```

```
nokov@nokov-virtual-machine:~/catkin_ws$ catkin_make -DCATKIN_WHITELIS
T_PACKAGES="vrpn_client_ros"
Base path: /home/nokov/catkin_ws
Source space: /home/nokov/catkin_ws/src
Build space: /home/nokov/catkin_ws/build
Devel space: /home/nokov/catkin_ws/devel
Install space: /home/nokov/catkin_ws/install
####
#### Running command: "cmake /home/nokov/catkin_ws/src -DCATKIN_WHITEL
IST_PACKAGES=vrpn_client_ros -DCATKIN_DEVEL_PREFIX=/home/nokov/catkin_
ws/devel -DCMAKE_INSTALL_PREFIX=/home/nokov/catkin_ws/install -G Unix
Makefiles" in "/home/nokov/catkin_ws/build"
####
-- Using CATKIN_DEVEL_PREFIX: /home/nokov/catkin_ws/devel
-- Using CMAKE_PREFIX_PATH: /home/nokov/catkin_ws/devel;/opt/ros/melod
ic
-- This workspace overlays: /home/nokov/catkin_ws/devel;/opt/ros/melod
ic
-- Found PythonInterp: /usr/bin/python2 (found suitable version "2.7.1
7", minimum required is "2")
-- Using PYTHON_EXECUTABLE: /usr/bin/python2
-- Using Debian Python package layout
-- Using empy: /usr/bin/empy
```

```
-- Build files have been written to: /home/nokov/catkin_ws/build
####
#### Running command: "make -j2 -l2" in "/home/nokov/catkin_ws/build"
####
Scanning dependencies of target vrpn_client_ros
[ 16%] Building CXX object vrpn_client_ros-kinetic-devel/CMakeFiles/vr
pn_client_ros.dir/src/vrpn_client_ros.cpp.o
[ 33%] Linking CXX shared library /home/nokov/catkin_ws/devel/lib/libv
rpn_client_ros.so
[ 33%] Built target vrpn_client_ros
Scanning dependencies of target vrpn_client_node
Scanning dependencies of target vrpn_tracker_node
[ 66%] Building CXX object vrpn_client_ros-kinetic-devel/CMakeFiles/vr
pn_tracker_node.dir/src/vrpn_tracker_node.cpp.o
[ 66%] Building CXX object vrpn_client_ros-kinetic-devel/CMakeFiles/vr
pn_client_node.dir/src/vrpn_client_node.cpp.o
[ 83%] Linking CXX executable /home/nokov/catkin_ws/devel/lib/vrpn_cli
ent_ros/vrpn_tracker_node
[100%] Linking CXX executable /home/nokov/catkin_ws/devel/lib/vrpn_cli
ent_ros/vrpn_client_node
[100%] Built target vrpn_tracker_node
[100%] Built target vrpn_client_node
nokov@nokov-virtual-machine:~/catkin_ws$
```

（二） 测试网络

PING 一下跟 XING 软件所在的主机的网络是否连通（虚拟机的 IP 可以设置为 10.1.1.196)

```
ping 10.1.1.198
```

（三） 启动 vrpn_client_ros

输入以下命令：

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

```
nokov@nokov-virtual-machine:~$ roslaunch vrpn_client_ros sample.launch
 server:=10.1.1.198
... logging to /home/nokov/.ros/log/74968c16-1c52-11ec-94e4-000c29e182
e7/roslaunch-nokov-virtual-machine-3817.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://nokov-virtual-machine:46389/

SUMMARY
========

PARAMETERS
 * /rosdistro: melodic
 * /rosversion: 1.14.11
 * /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
```

```
check_vrpn_cookie(): VRPN Note: minor version number doesn't match: (prefer 'vrp
n: ver. 07.34', got 'vrpn: ver. 07.35  0').  This is not normally a problem.
[ INFO] [1641807484.089122945]: Found new sender: Tracker0
[ INFO] [1641807484.089290340]: Creating new tracker Tracker0
```

从上图可以看出，打印出后面三行，说明是成功连接了。

Connection established

Found new sender：Tracker0

Creating new tracker Tracker0

总结，这个过程最重要的有两个地方，IP 设置一定要对，位于同一网段，能 ping 通，防火墙一定要关，参照如下命令，网卡名称更换为本地网卡。

```
nokov@nokov-virtual-machine:~/catkin_ws$ ifconfig ens38
ens38: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.1.1.196  netmask 255.255.255.0  broadcast 10.1.1.255
        inet6 240e:369:15c7:7c00:7441:646a:eb29:e32a  prefixlen 64  sco
peid 0x0<global>
        inet6 240e:369:15c7:7c00:a563:a4b7:282c:d151  prefixlen 64  sco
peid 0x0<global>
        inet6 fe80::74bf:3252:12b2:e982  prefixlen 64  scopeid 0x20<lin
k>
        ether 00:0c:29:e1:82:f1  txqueuelen 1000  (以太网)
        RX packets 90330  bytes 108608205 (108.6 MB)
        RX errors 0  dropped 110  overruns 0  frame 0
        TX packets 1254  bytes 151886 (151.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

nokov@nokov-virtual-machine:~/catkin_ws$ sudo ufw disable
防火墙在系统启动时自动禁用
nokov@nokov-virtual-machine:~/catkin_ws$ ping -c 4 10.1.1.198
PING 10.1.1.198 (10.1.1.198) 56(84) bytes of data.
64 bytes from 10.1.1.198: icmp_seq=1 ttl=64 time=0.132 ms
64 bytes from 10.1.1.198: icmp_seq=2 ttl=64 time=0.153 ms
64 bytes from 10.1.1.198: icmp_seq=3 ttl=64 time=0.340 ms
64 bytes from 10.1.1.198: icmp_seq=4 ttl=64 time=0.205 ms

--- 10.1.1.198 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3076ms
rtt min/avg/max/mdev = 0.132/0.207/0.340/0.082 ms
nokov@nokov-virtual-machine:~/catkin_ws$
```

此时，重新开一个终端，可以查看 topic 话题。

输入下述命令：

```
rostopic list
```

可以看到话题/vrpn_client_node/Tracker0/pose

```
nokov@nokov-virtual-machine:~$ rostopic list
/rosout
/rosout_agg
/tf
/vrpn_client_node/Tracker0/pose
nokov@nokov-virtual-machine:~$
```

输入下述命令：

```
rostopic echo /vrpn_client_node/Tracker0/pose
```

可以看到接收到的数据

```
  orientation:
    x: 0.010166433252
    y: 0.00793378829926
    z: -0.113353409989
    w: 0.993471037868
---
header:
  seq: 952
  stamp:
    secs: 1641808252
    nsecs: 722531903
  frame_id: "world"
pose:
  position:
    x: -522.282714844
    y: -1189.30810547
    z: 927.570129395
  orientation:
    x: 0.00959028472154
    y: 0.00871185890724
    z: -0.118700804698
    w: 0.992845531247
---
```

世界顶级的中国动作捕捉

北京度量科技有限公司
010-64922321 info@nokov.com
北京总部：北京市朝阳区安慧里四区15号五矿大厦8层820室
武汉分公司：武汉市东湖高新区武大航域二区A2栋1010
深圳分公司：深圳市宝安区满京华艺峦大厦4座301-A-035