Python SDK 说明

文档信息：

当前版本测试环境：

Python 3.10.5

CMAvatar 1.1.0.1744

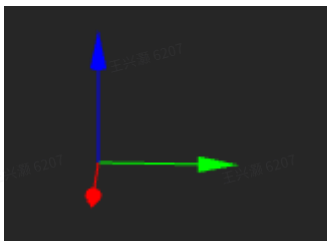
Windows 10

最后测试时间

2022-12-13

坐标系说明

chingmu 发送 vrpn 的的坐标系是按照 chingmu 坐标系，如下图坐标系显示，红色为 x 轴，绿色为 y 轴，蓝色为 z 轴。其中位置是按照 x,y,z 的顺序，旋转信息发送的是四元数，按照 x,y,z,r 的顺序。



Vrpn数据说明

根据按照动捕服务器可分为两种类型。

CMAvatar:

vrpn 的地址为 MCAvatar@动捕服务器地址，默认的端口采用3883。其中，刚体数据的范围为 0~300，和动捕服务器中的刚体 id 一一对应。骨骼数据从 300开始，间隔为 150，即第一个人的第一个关节为 300，第二个人的第一个关节为 450，依此类推。重定向骨骼数据和非重定向的骨骼数据的定义一致，根据重定向发送的层级信息来确定骨骼 id与模型关节的对应关系。

VRPN 数据流模块主要有 VRPN 服务器名称显示，控制数据流和传输数据类型的“启用/禁用”，通过右侧的复选框勾选来进行“禁用/启用”操作。若有客户端主机通过 VRPN 数据流连接上系统接收数据的话，则下方“已连接客户端”窗口会显示已连接上的客户端主机的 IP 地址。（注：Avatar 中重定向包含重定向骨骼和重定向刚体。勾选重定向和骨骼时，会发送重定向的骨骼数据，而不是都发送）

CMTracker:

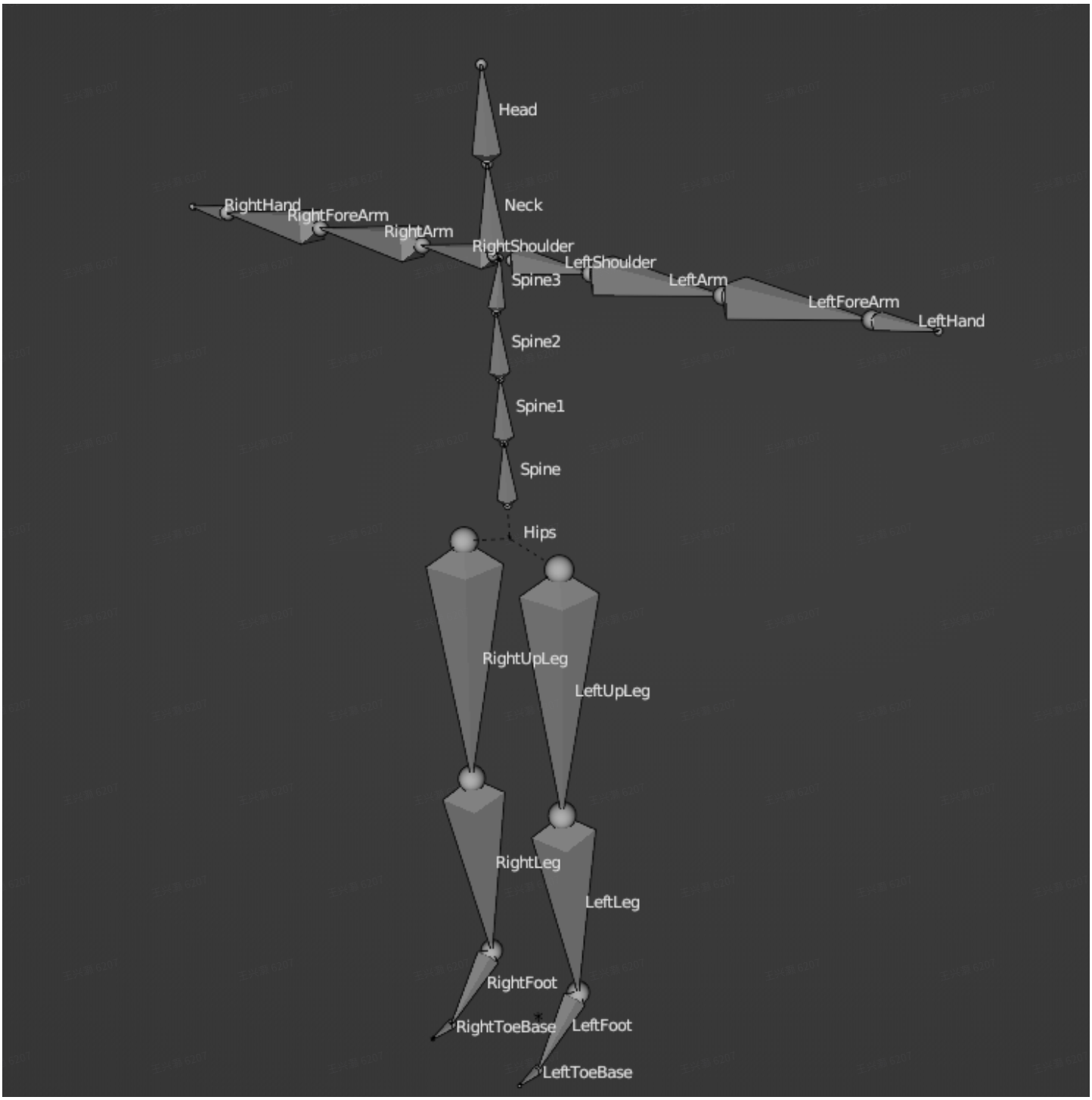
tracker server 和 tracker client 均有 vrpn server 存在。MCServer@动捕服务器地址为 tracker server，而 MCServer@动捕服务器地址:3884 为 tracker client。其中，刚体数据的范围为 0~100，和动捕服务器中的刚体 id 一一对应。骨骼的数据为 100 开始，3883端口下，间隔为 23，3884 端口下，间隔为 150。3883 端口仅支持发送非重定向数据。3884 端口可以通过界面勾选来发送非重定向数据或者非重定向数据。

CMTracker Client 界面如上图所示。界面上可以查看到连接到 server 的 vrpn 客户端和连接到 client 的 vrpn 客户端。下方 vrpn 设置可以勾选源数据和重定向数据来设置 CMTracker Client 来发送非重定向数据还是重定向数据。

骨骼间层级关系

青瞳视觉单个人物模型的数据构成由23段骨骼和40段手指信息组成。

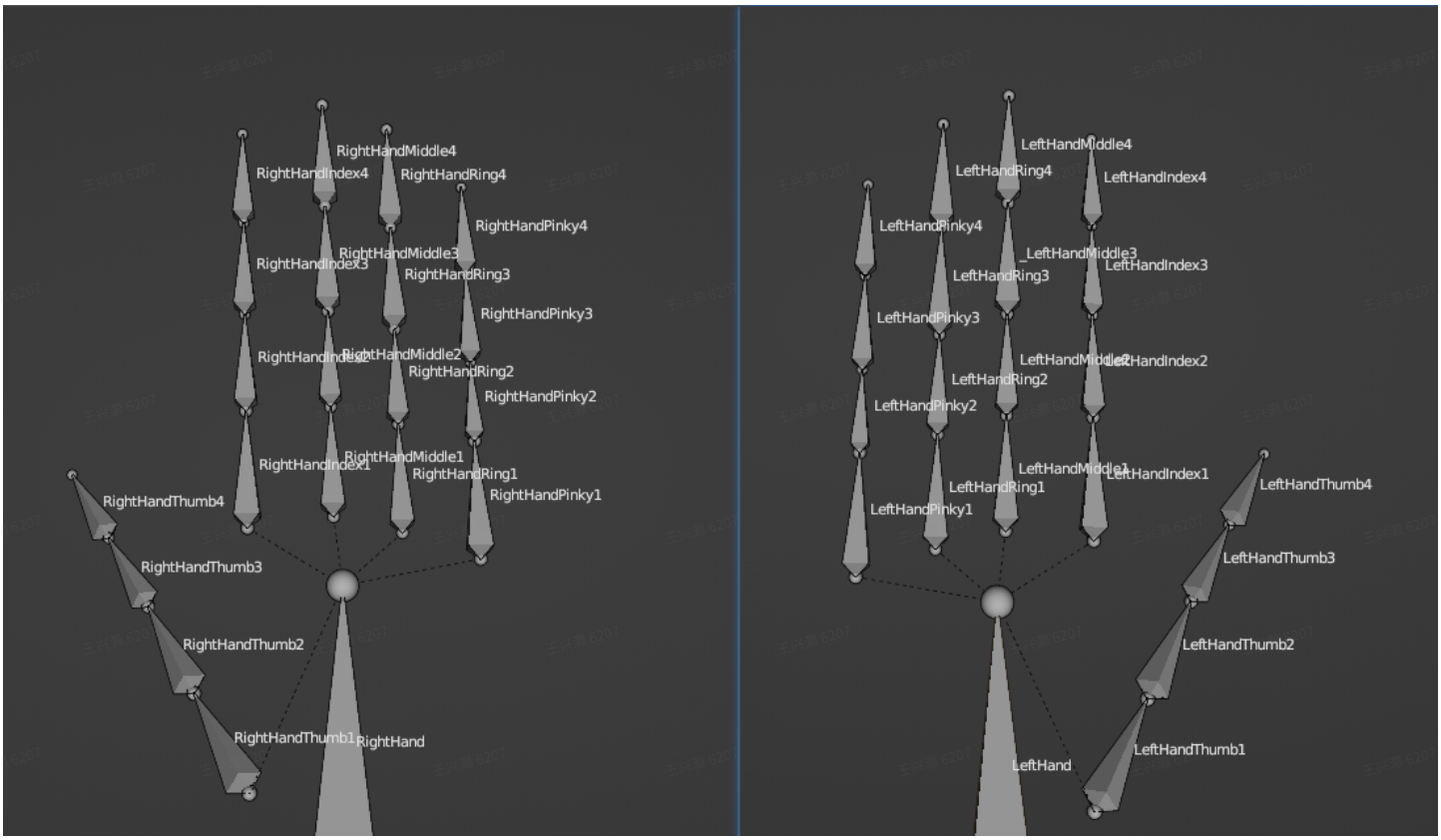
23段骨骼组成



index	name	index	name	index	name
0	Hips	7	LeftShoulder	15	LeftUpLeg
1	Spine	8	LeftArm	16	LeftLeg
2	Spine1	9	LeftForeArm	17	LeftFoot
3	Spine2	10	LeftHand	18	LeftToeBase
4	Spine3	11	RightShoulder	19	RightUpLeg

5	Neck	12	RightArm	20	RightLeg
6	Head	13	RightForeArm	21	RightFoot
		14	RightHand	22	RightToeBase

40段手指组成



index	name	index	name
23	LeftHandThumb1	43	RightHandThumb1
24	LeftHandThumb2	44	RightHandThumb2
25	LeftHandThumb3	45	RightHandThumb3
26	LeftHandThumb4	46	RightHandThumb4
27	LeftHandIndex1	47	RightHandIndex1
28	LeftHandIndex2	48	RightHandIndex2
29	LeftHandIndex3	49	RightHandIndex3
30	LeftHandIndex4	50	RightHandIndex4
31	LeftHandMiddle1	51	RightHandMiddle1

32	LeftHandMiddle2	52	RightHandMiddle2
33	_LeftHandMiddle3	53	RightHandMiddle3
34	LeftHandMiddle4	54	RightHandMiddle4
35	LeftHandRing1	55	RightHandRing1
36	LeftHandRing2	56	RightHandRing2
37	LeftHandRing3	57	RightHandRing3
38	LeftHandRing4	58	RightHandRing4
39	LeftHandPinky1	59	RightHandPinky1
40	LeftHandPinky2	60	RightHandPinky2
41	LeftHandPinky3	61	RightHandPinky3
42	LeftHandPinky4	62	RightHandPinky4

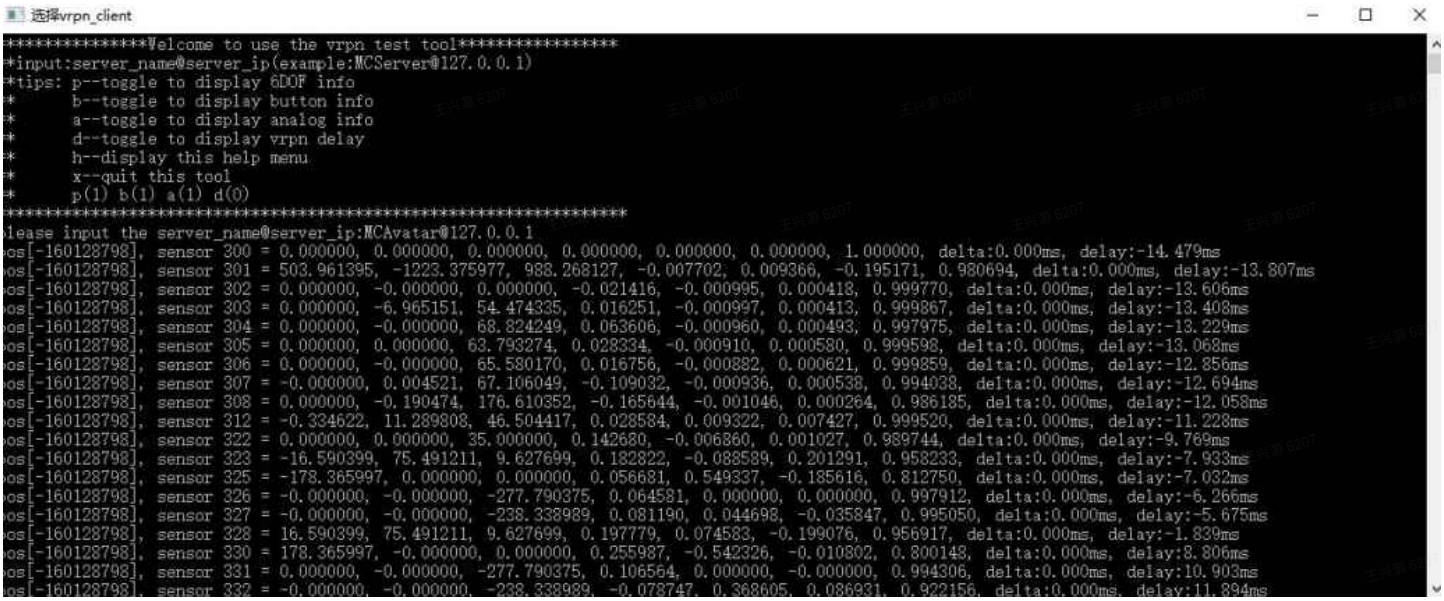
重定向说明

接收 vrpn 重定向的数据，需要先注册回调函数来获取当前模型的层级信息。层级信息 中包含模型骨骼名称，模型骨骼的 id，以及模型骨骼的 parent id，下图为某个模型的层级示例。在动捕软件中，模型所有被指认的关节的数据都会通过 vrpn 发送层级信息并发送重定向数据。

```
segment name:Dongguixue_Cloth_01Rig_all_root segment parent id:-1 segment id:300
segment name:Hips segment parent id:300 segment id:301
segment name:Spine segment parent id:301 segment id:302
segment name:Spine1 segment parent id:302 segment id:303
segment name:Spine2 segment parent id:303 segment id:304
segment name:Spine3 segment parent id:304 segment id:305
segment name:Spine4 segment parent id:305 segment id:306
segment name:Chest segment parent id:306 segment id:307
segment name:ChestMid segment parent id:307 segment id:308
segment name:Neck segment parent id:308 segment id:312
segment name:Head segment parent id:312 segment id:322
segment name:LeftShoulder segment parent id:308 segment id:323
segment name:LeftArm segment parent id:323 segment id:325
segment name:LeftForeArm segment parent id:325 segment id:326
segment name:LeftHand segment parent id:326 segment id:327
segment name:RightShoulder segment parent id:308 segment id:328
segment name:RightArm segment parent id:328 segment id:330
segment name:RightForeArm segment parent id:330 segment id:331
segment name:RightHand segment parent id:331 segment id:332
```

测试工具vrpn_client

下图为 vrpn_client 的界面图。可以通过输入对应的 server_name@server_ip 来打印 vrpn 数据，判断连接状态。数据的顺序为位置 xyz，旋转 xyzr。



API说明

CMVrpnStartExtern

开启Vrpn接口

C++:

```
void CMVrpnStartExtern()
```

参数：

无

返回值：

无

说明：

用于开启Vrpn模块，程序开始时调用一次。

CMVrpnQuitExtern

关闭Vrpn接口

C++:

```
void CMVrpnQuitExtern()
```

参数：

无

返回值：

无

说明：

用于关闭Vrpn模块，退出程序时调用一次。

CMVrpnEnableLog

启用/禁用日志

C++:

void CMVrpnEnableLog(bool enable)

参数：

enable为true表示启用，false表示禁用

返回值：

无

说明：

用于禁用启用日志文件记录，如果启用日志文件，则会在项目的根目录下生成动捕追踪日志文件tracker_log.txt。

CMTrackerExtern

获取刚体信息（带预测）

C++:

double CMTrackerExtern(char* _address, int channel, int component, int frameCount, bool lockUpRotation = false)

参数：

char* _address: server端的地址

int channel: 刚体ID

int component：获取的类型0表示X,1表示Y，2表示Z，3表示Qx，4表示Qy，5表示Qz，6表示Qw，7表示delay

int frameCount：当前帧序号

bool lockUpRotation：是否锁定旋转轴

返回值：

返回对应component的值

说明：

获取带预测的刚体数据信息

CMTrackerExternTC

获取刚体信息（非预测）

C++:

bool CMTrackerExternTC(char* _address, int channel, VrpnTimeCode *timecode, double T[3], double R_Quat[4]);

参数：

char* _address: server端的地址

int channel: 刚体ID

VrpnTimeCode *timecode：当前时码

double T[3]：刚体XYZ位置

double R_Quat[4]：刚体旋转四元数XYZR

返回值：

刚体是否检测到

说明：

获取不带预测的刚体数据信息

CMHumanExtern

获取Human信息(hips全局位置+所有骨骼的局部旋转)

C++:

bool CMHumanExtern(char* _address, int channel, int frameCount, double* attitude, int* segmentIsDetected);

参数：

char* _address：server端的地址

int channel：human ID

int frameCount：帧序号

double* attribute：获取到的human的3+骨骼数*3属性，包含hips的全局位置XYZ和骨骼的局部旋转的四元数XYZR

int* segmentIsDetected：每段骨骼检测状态

返回值：

bool return: 人物检测到返回true,否则为false.

说明：

获取human的实时姿态信息。

CMHumanGlobalTLocalRTC

获取Human信息（所有骨骼的全局位置+局部旋转）

C++:

bool CMHumanGlobalTLocalRTC(char* _address, int channel, VrpnTimeCode *timecode, double* T, double* R, int* segmentIsDetected)

参数：

char* _address：server端的地址

int channel：human ID

VrpnTimeCode* timecode :当前时码

double* T: 获取到的human的3+骨骼数*3属性，包含hips的全局位置XYZ和骨骼的局部旋转的四元数XYZR

double* R: 获取到的骨骼数*3的局部旋转四元数XYZR

int* segmentIsDetected：各个关节是否检测到

返回值：

bool return: 人物检测到返回true,否则为false.

说明：

获取Human信息（所有骨骼的全局位置+局部旋转）

CMRetargetHumanExternTC

获取重定向Human信息（所有模型骨骼的全局位置+局部旋转）

c++:

bool CMRetargetHumanExternTC(char* _address, int channel, int frameCount,VrpnTimeCode *timecode, double *position, double *quaternion, int* segmentIsDetected)

参数：

char* _address：server端的地址

int channel：human ID

int frameCount: 当前帧序号

VrpnTimeCode* timecode :当前时码

double *position: 获取到的骨骼数*3的全局位置信息XYZ

double *quaternion: 获取到的骨骼数*3的局部旋转四元数XYZR

int* segmentIsDetected：各个关节是否检测到

返回值：

重定向human是否检测到

说明：

获取重定向human的信息。需要先进行重定向骨骼层级的注册，具体见第12条。

CMPluginRegisterUpdateHierarchy

获取重定向骨骼层级信息

c++:

bool CMPluginRegisterUpdateHierarchy(char* _address, void* userdata, UpdateHierarchyCallback func)

说明：更新骨骼层级信息时，会连续回调。每次调用只发送一个层级信息，一个模型通常会调用多次。

CMPluginRegisterResetHierarchy

重置重定向骨骼层级信息

c++:

bool CMPluginRegisterResetHierarchy(char* _address, void* userdata, ResetHierarchyCallback func)

说明：程序重新加载模型时会触发回调

CMPluginRegisterEndHierarchy

c++:

bool CMPluginRegisterEndHierarchy(char* _address, void* userdata, EndHierarchyCallback func)

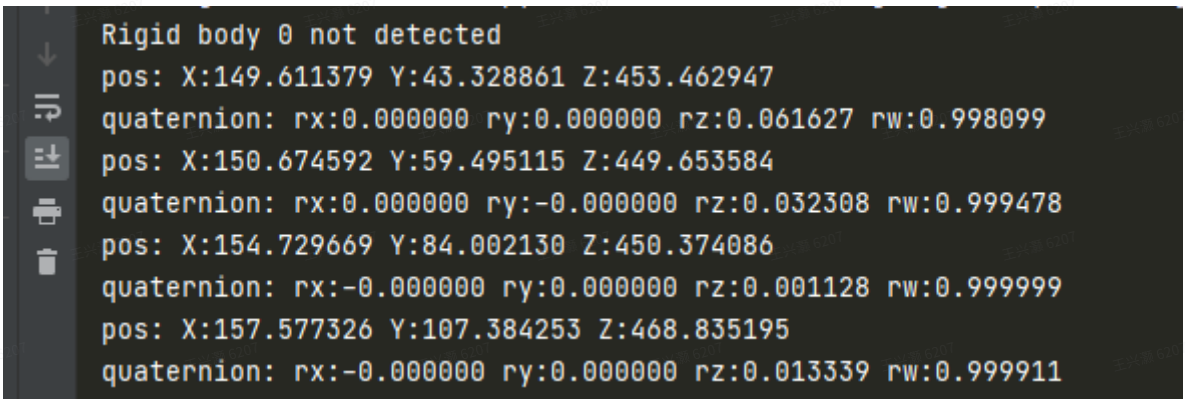
说明：当层级信息发送完成后，会触发回调函数。

Demo程序说明

刚体数据演示

示例一：CMTrackerExtern

> 获取刚体的预测位姿信息



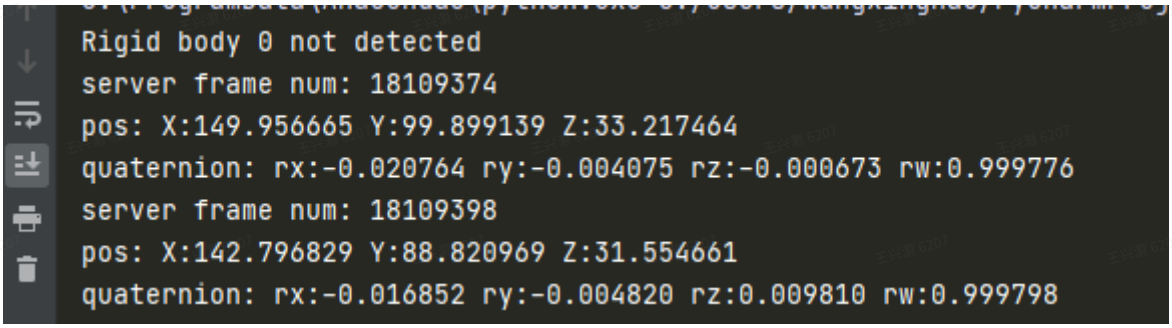

```python
import os
import sys
import time
from ctypes import *

# Load dynamic Library
def LoadDll(dllPath):
    if(os.path.exists(dllPath)):
        return CDLL(dllPath)
    else:
        print("Chingmu's dynamic Library  does not exist \n")
        sys.exit()

# get body(id:0) component 0:x,1:y,2:z,3:rx,4:ry,5:rz,6:rw with time predict
# warning : When using this function, the 'frameCount' must increase with the number of calls
def CMTrackerExtern(host,bodyID,frameCount):
    bodyPos = (c_double * 3)()
    bodyRot = (c_double * 4)()
    trackerExtern = cmVrpn.CMTrackerExtern
    trackerExtern.restype = c_double
```

```
21
22      bodyPos[0] = cmVrpn.CMTrackerExtern(host, bodyID, 0, frameCount)
23      bodyPos[1] = cmVrpn.CMTrackerExtern(host, bodyID, 1, frameCount)
24      bodyPos[2] = cmVrpn.CMTrackerExtern(host, bodyID, 2, frameCount)
25
26      bodyRot[0] = cmVrpn.CMTrackerExtern(host, bodyID, 3, frameCount)
27      bodyRot[1] = cmVrpn.CMTrackerExtern(host, bodyID, 4, frameCount)
28      bodyRot[2] = cmVrpn.CMTrackerExtern(host, bodyID, 5, frameCount)
29      bodyRot[3] = cmVrpn.CMTrackerExtern(host, bodyID, 6, frameCount)
30
31      # check body detected, must call after CMTrackerExtern
32      isBodyDetected = cmVrpn.CMTrackerExternIsDetected(host, bodyID, frameCount)
33      if (isBodyDetected):
34          print("pos: X:%f Y:%f Z:%f"%(bodyPos[0], bodyPos[1], bodyPos[2]))
35          print("quaternion: rx:%f ry:%f rz:%f rw:%f"%(bodyRot[0], bodyRot[1], bo
    dyRot[2], bodyRot[3]))
36      else:
37          print("Rigid body %d not detected"%(bodyID))
38      return isBodyDetected
39
40  if __name__ == '__main__':
41      # Set dynamic Library path
42      dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrp
    n.dll"
43
44      # Load dynamic Library
45      cmVrpn = LoadDll(dllPath)
46
47      # set server address
48      host = bytes("MCAvatar@127.0.0.1", "gbk")
49
50      # start vrpn thread
51      cmVrpn.CMVrpnStartExtern()
52
53      # enable write trace_log.txt
54      cmVrpn.CMVrpnEnableLog(True)
55
56      # Person ID displayed on the server
57      bodyID = 0
58
59      frameCount = 0
60
61      getfailed = 0
62      loopState = True
63      while(loopState):
64          if(frameCount > 100):
65              loopState = False
```

```
66
67          # Control acquisition frequency.parameters can be customized.
68          time.sleep(0.2)
69
70          isDataDetected = CMTrackerExtern(host, bodyID, frameCount)
71          if(isDataDetected):
72              getfailed = 0
73          else:
74              getfailed += 1
75
76          if(getfailed > 10):
77              print("Continuous acquisition failed, exit the program.")
78              loopState = False
79
80          frameCount += 1
81
82      # quit vrpn thread
83      cmVrpn.CMVrpnQuitExtern()
```

示例二：CMTrackerExternTC

> 演示，获取刚体位姿信息




```
1  import os
2  import sys
3  import time
4  from ctypes import *
5
6  # Load dynamic Library
7  def LoadDll(dllPath):
8      if(os.path.exists(dllPath)):
9          return CDLL(dllPath)
10     else:
11         print("Chingmu's dynamic Library  does not exist \n")
12         sys.exit()
13
14 def PrintTimecode(timecode):
15     standard = ((timecode & 0x60000000) >> 29)
```

```
    hours = ((timecode & 0x1f000000) >> 24)
    minutes = ((timecode & 0x00fc0000) >> 18)
    seconds = ((timecode & 0x0003f000) >> 12)
    frames = ((timecode & 0x00000fe0) >> 5)
    subframes = (timecode & 0x0000001f)
    print("Time code: %d:%d:%d:%d" % (hours, minutes, seconds, frames))

# get body(id:0) T(XYZ 3), body Quaternion(XYZR 4), timecode without time predi
ct
def CMTrackerExternTC(host,bodyID,frameCount):
    bodyPos = (c_double * 3)()
    bodyRot = (c_double * 4)()
    timecodeData = (c_int * 1)()
    isBodyDetected = cmVrpn.CMTrackerExternTC(host, bodyID, timecodeData, bodyP
os, bodyRot)

    if (isBodyDetected):
        timecode = timecodeData[0]
        valid = ((timecode & 0x80000000) >> 31)
        if (True == valid):
            PrintTimecode(timecode)
        else:
            print("server frame num: %d" % (timecode))

        print("pos: X:%f Y:%f Z:%f"%(bodyPos[0], bodyPos[1], bodyPos[2]))
        print("quaternion: rx:%f ry:%f rz:%f rw:%f"%(bodyRot[0], bodyRot[1], bo
dyRot[2], bodyRot[3]))
    else:
        print("Rigid body %d not detected" % (bodyID))
    return isBodyDetected

if __name__ == '__main__':
    # Set dynamic Library path
    dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrp
n.dll"

    # Load dynamic Library
    cmVrpn = LoadDll(dllPath)

    # set server address
    host = bytes("MCAvatar@127.0.0.1", "gbk")

    # start vrpn thread
    cmVrpn.CMVrpnStartExtern()

    # enable write trace_log.txt
    cmVrpn.CMVrpnEnableLog(True)
```

```
59
60      # Person ID displayed on the server
61      bodyID = 0
62
63      frameCount = 0
64
65      getfailed = 0
66      loopState = True
67      while(loopState):
68          if(frameCount > 100):
69              loopState = False
70
71          # Control acquisition frequency.parameters can be customized.
72          time.sleep(0.2)
73
74          isDataDetected = CMTrackerExternTC(host, bodyID, frameCount)
75          if(isDataDetected):
76              getfailed = 0
77          else:
78              getfailed += 1
79
80          if(getfailed > 10):
81              print("Continuous acquisition failed, exit the program.")
82              loopState = False
83
84          frameCount += 1
85
86      # quit vrpn thread
87      cmVrpn.CMVrpnQuitExtern()
```

人物数据演示

示例三：CMHumanExtern

> 获取Human信息(hips全局位置+所有骨骼的局部旋转)

```
Human 0 not detected
pos: X:902.871704 Y:-2031.988281 Z:915.726074
quaternion: rx:0.033834 ry:-0.003111 rz:-0.457686 rw:0.888464
pos: X:1003.315796 Y:-1945.988647 Z:912.664673
quaternion: rx:0.025472 ry:0.013526 rz:-0.349599 rw:0.936456
pos: X:1136.766357 Y:-1849.657104 Z:906.059143
quaternion: rx:0.023703 ry:-0.002822 rz:-0.201595 rw:0.979178
```

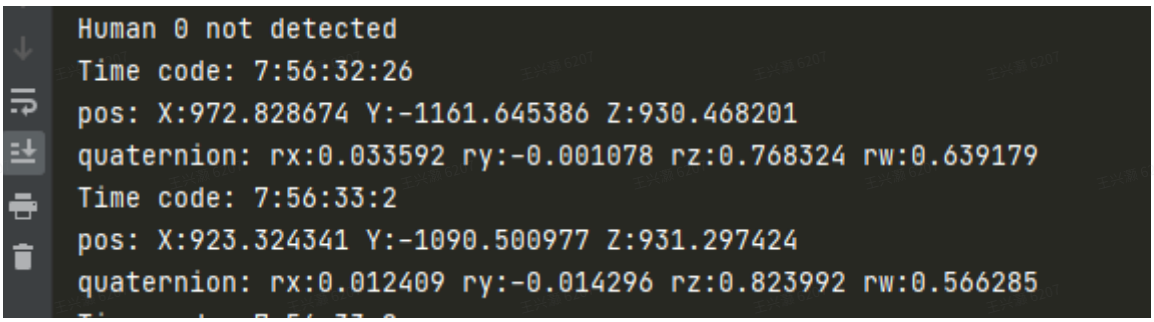
```
1  import os
2  import sys
```

```python
import time
from ctypes import *

MAX_SEGMENT_NUM = 150

# Load dynamic Library
def LoadDll(dllPath):
    if(os.path.exists(dllPath)):
        return CDLL(dllPath)
    else:
        print("Chingmu's dynamic Library  does not exist \n")
        sys.exit()

# get human(id:0) attitude(hips pos XYZ(3) + segments quaternion XYZW(segmentNum * 4)), segmentIsDetected(segmentNum)
def CMHumanExtern(host,humanID,frameCount):
    attitude = (c_double * (3 + MAX_SEGMENT_NUM * 4))()
    isDetected = (c_int * MAX_SEGMENT_NUM)()
    isHumanDetected = cmVrpn.CMHumanExtern(host, humanID, frameCount, attitude, isDetected)
    if(True == isHumanDetected):
        print("pos: X:%f Y:%f Z:%f"%(attitude[0], attitude[1], attitude[2]))
        print("quaternion: rx:%f ry:%f rz:%f rw:%f"%(attitude[3], attitude[4], attitude[5], attitude[6]))
    else:
        print("Human %d not detected" % (humanID))
    return isHumanDetected

if __name__ == '__main__':
    # Set dynamic Library path
    dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrpn.dll"

    # Load dynamic Library
    cmVrpn = LoadDll(dllPath)

    # set server address
    host = bytes("MCAvatar@127.0.0.1", "gbk")

    # start vrpn thread
    cmVrpn.CMVrpnStartExtern()

    # enable write trace_log.txt
    cmVrpn.CMVrpnEnableLog(True)

    # Person ID displayed on the server
    humanID = 0
```

```
46
47      frameCount = 0
48      getfailed = 0
49      loopState = True
50      while(loopState):
51          # Control acquisition frequency.parameters can be customized.
52          time.sleep(0.2)
53
54          if(frameCount > 100):
55              loopState = False
56
57          isDataDetected = CMHumanExtern(host, humanID, frameCount)
58
59          if(isDataDetected):
60              getfailed = 0
61              frameCount += 1
62          else:
63              getfailed += 1
64
65          if(getfailed > 10):
66              print("Continuous acquisition failed, exit the program.")
67              loopState = False
68
69      # quit vrpn thread
70      cmVrpn.CMVrpnQuitExtern()
```

示例四：CMHumanGlobalTLocalRTC

> 获取Human信息（所有骨骼的全局位置+局部旋转）




```
1  import os
2  import sys
3  import time
4  from ctypes import *
5
6  MAX_SEGMENT_NUM = 150
7
8  # Load dynamic Library
```

```python
def LoadDll(dllPath):
    if(os.path.exists(dllPath)):
        return CDLL(dllPath)
    else:
        print("Chingmu's dynamic Library  does not exist \n")
        sys.exit()

def PrintTimecode(timecode):
    standard = ((timecode & 0x60000000) >> 29)
    hours = ((timecode & 0x1f000000) >> 24)
    minutes = ((timecode & 0x00fc0000) >> 18)
    seconds = ((timecode & 0x0003f000) >> 12)
    frames = ((timecode & 0x00000fe0) >> 5)
    subframes = (timecode & 0x0000001f)
    print("Time code: %d:%d:%d:%d" % (hours, minutes, seconds, frames))

# get human(id: 0) T(segmentNum * 3), localR(segmentNum * 4), segmentIsDetected(segmentNum), timecode
def CMHumanGlobalTLocalRTC(host,humanID,frameCount):
    humanT = (c_double * (MAX_SEGMENT_NUM * 3))()
    humanLocalR = (c_double * (MAX_SEGMENT_NUM * 4))()
    segmentIsDetected = (c_int * MAX_SEGMENT_NUM)()
    timecodeData = (c_int * 1)()
    isHumanDetected = cmVrpn.CMHumanGlobalTLocalRTC(host, humanID, timecodeData, humanT, humanLocalR, segmentIsDetected)

    if (True == isHumanDetected):
        timecode = timecodeData[0]
        valid = ((timecode & 0x80000000) >> 31)
        if(True == valid):
            PrintTimecode(timecode)
        else:
            print("server frame num: %d"%(timecode))

        print("pos: X:%f Y:%f Z:%f" % (humanT[0], humanT[1], humanT[2]))
        print("quaternion: rx:%f ry:%f rz:%f rw:%f" % (humanLocalR[0], humanLocalR[1], humanLocalR[2], humanLocalR[3]))
    else:
        print("Human %d not detected" % (humanID))
    return isHumanDetected

if __name__ == '__main__':
    # Set dynamic Library path
    dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrpn.dll"

    # Load dynamic Library
```

```
    cmVrpn = LoadDll(dllPath)

    # set server address
    host = bytes("MCAvatar@127.0.0.1", "gbk")

    # start vrpn thread
    cmVrpn.CMVrpnStartExtern()

    # enable write trace_log.txt
    cmVrpn.CMVrpnEnableLog(True)

    # Person ID displayed on the server
    humanID = 0

    frameCount = 0
    getfailed = 0
    loopState = True
    while(loopState):
        # Control acquisition frequency.parameters can be customized.
        time.sleep(0.2)

        if(frameCount > 100):
            loopState = False

        isDataDetected = CMHumanGlobalTLocalRTC(host,humanID,frameCount)

        if(isDataDetected):
            getfailed = 0
            frameCount += 1
        else:
            getfailed += 1

        if(getfailed > 10):
            print("Continuous acquisition failed, exit the program.")
            loopState = False

    # quit vrpn thread
    cmVrpn.CMVrpnQuitExtern()
```

示例五：CMRetargetHumanExternTC

> 获取重定向Human信息（所有模型骨骼的全局位置+局部旋转）

```
Human 0 not detected
Time code: 7:56:32:7
pos: X:1258.805542 Y:-1339.968262 Z:994.510010
quaternion: rx:-0.017994 ry:0.009228 rz:0.007112 rw:0.999770
Time code: 7:56:32:13
pos: X:1158.502686 Y:-1296.250122 Z:990.395203
quaternion: rx:-0.026228 ry:-0.007229 rz:0.079801 rw:0.996439
```

```python
import os
import sys
import time
from ctypes import *

MAX_SEGMENT_NUM = 150

# Load dynamic Library
def LoadDll(dllPath):
    if(os.path.exists(dllPath)):
        return CDLL(dllPath)
    else:
        print("Chingmu's dynamic Library  does not exist \n")
        sys.exit()

def PrintTimecode(timecode):
    standard = ((timecode & 0x60000000) >> 29)
    hours = ((timecode & 0x1f000000) >> 24)
    minutes = ((timecode & 0x00fc0000) >> 18)
    seconds = ((timecode & 0x0003f000) >> 12)
    frames = ((timecode & 0x00000fe0) >> 5)
    subframes = (timecode & 0x0000001f)
    print("Time code: %d:%d:%d:%d" % (hours, minutes, seconds, frames))

# get human(id:0) humanT XYZ(segmentNum * 3), humanLocalR XYZW(segmentNum * 4), segmentIsDetected(segmentNum), timecode
# humanT[0:3] is root node position, humanLocalR[0:4] is root node rotation.
def CMRetargetHumanExternTC(host,humanID,frameCount):
    humanT = (c_double * (MAX_SEGMENT_NUM * 3))()
    humanLocalR = (c_double * (MAX_SEGMENT_NUM * 4))()
    segmentIsDetected = (c_int * MAX_SEGMENT_NUM)()
    timecodeData = (c_int * 1)()
    isHumanDetected = cmVrpn.CMRetargetHumanExternTC(host, humanID, frameCount, timecodeData, humanT, humanLocalR,segmentIsDetected)

    if (True == isHumanDetected):
        timecode = timecodeData[0]
        valid = ((timecode & 0x80000000) >> 31)
```

```
        if (True == valid):
            PrintTimecode(timecode)
        else:
            print("server frame num: %d" % (timecode))

        print("pos: X:%f Y:%f Z:%f" % (humanT[3], humanT[4], humanT[5]))
        print("quaternion: rx:%f ry:%f rz:%f rw:%f" % (humanLocalR[4], humanLocalR[5], humanLocalR[6], humanLocalR[7]))
    else:
        print("Human %d not detected" % (humanID))
    return isHumanDetected

if __name__ == '__main__':
    # Set dynamic Library path
    dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrpn.dll"

    # Load dynamic Library
    cmVrpn = LoadDll(dllPath)

    # set server address
    host = bytes("MCAvatar@127.0.0.1", "gbk")

    # start vrpn thread
    cmVrpn.CMVrpnStartExtern()

    # enable write trace_log.txt
    cmVrpn.CMVrpnEnableLog(True)

    # Person ID displayed on the server
    humanID = 0

    frameCount = 0
    getfailed = 0
    loopState = True
    while(loopState):
        # Control acquisition frequency.parameters can be customized.
        time.sleep(0.2)

        if(frameCount > 100):
            loopState = False

        isDataDetected = CMRetargetHumanExternTC(host,humanID,frameCount)

        if(isDataDetected):
            getfailed = 0
            frameCount += 1
```

```
        else:
            getfailed += 1

        if(getfailed > 10):
            print("Continuous acquisition failed, exit the program.")
            loopState = False

    # quit vrpn thread
    cmVrpn.CMVrpnQuitExtern()
```

层级信息演示

示例六：CMPluginRegisterUpdateHierarchy

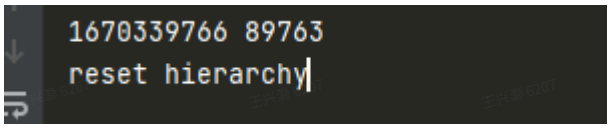
```
segment name:Skeleton0_Hips segment parent id:-1 segment id:300
segment name:Skeleton0_Spine segment parent id:300 segment id:301
segment name:Skeleton0_Spine1 segment parent id:301 segment id:302
segment name:Skeleton0_Spine2 segment parent id:302 segment id:303
segment name:Skeleton0_Spine3 segment parent id:303 segment id:304
segment name:Skeleton0_Neck segment parent id:304 segment id:305
segment name:Skeleton0_Head segment parent id:305 segment id:306
segment name:Skeleton0_LeftShoulder segment parent id:304 segment id:307
segment name:Skeleton0_LeftArm segment parent id:307 segment id:308
segment name:Skeleton0_LeftForeArm segment parent id:308 segment id:309
segment name:Skeleton0_LeftHand segment parent id:309 segment id:310
segment name:Skeleton0_RightShoulder segment parent id:304 segment id:311
segment name:Skeleton0_RightArm segment parent id:311 segment id:312
segment name:Skeleton0_RightForeArm segment parent id:312 segment id:313
segment name:Skeleton0_RightHand segment parent id:313 segment id:314
segment name:Skeleton0_LeftUpLeg segment parent id:300 segment id:315
segment name:Skeleton0_LeftLeg segment parent id:315 segment id:316
segment name:Skeleton0_LeftFoot segment parent id:316 segment id:317
segment name:Skeleton0_LeftToeBase segment parent id:317 segment id:318
segment name:Skeleton0_RightUpLeg segment parent id:300 segment id:319
segment name:Skeleton0_RightLeg segment parent id:319 segment id:320
segment name:Skeleton0_RightFoot segment parent id:320 segment id:321
segment name:Skeleton0_RightToeBase segment parent id:321 segment id:322
```

```
import os
import sys
import time
from ctypes import *

class timeval(Structure):
    _fields_ = [("tv_sec",c_long),
                ("tv_usec",c_long)]

```

```
10
11 class VrpnHierarchy(Structure):
12     _fields_ = [("msg_time", timeval),
13             ("sensor", c_int),
14             ("parent", c_int),
15             ("name", c_char*127)]
16
17 # Load dynamic Library
18 def LoadDll(dllPath):
19     if(os.path.exists(dllPath)):
20         return CDLL(dllPath)
21     else:
22
23         print("Chingmu's dynamic Library  does not exist \n")
24         sys.exit()
25
26 # get hierarchy info
27 def CallbackUpdateHierarchy(voidPtr,hierarchy):
28     print("segment name:%s segment parent id:%d segment id:%d"%(hierarchy.name.
   decode(),hierarchy.parent, hierarchy.sensor))
29
30 if __name__ == '__main__':
31     # Set dynamic Library path
32     dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrp
   n.dll"
33
34     # Load dynamic Library
35     cmVrpn = LoadDll(dllPath)
36
37     # set server address
38     host = bytes("MCAvatar@127.0.0.1", "gbk")
39
40     # start vrpn thread
41     cmVrpn.CMVrpnStartExtern()
42
43     # enable write trace_log.txt
44     cmVrpn.CMVrpnEnableLog(True)
45
46     userData = VrpnHierarchy(timeval(c_int(0),c_int(0)), c_int(0),c_int(0),b"0"
   *127)
47
48     callbackUpdata = CFUNCTYPE(None,c_char_p,VrpnHierarchy)(CallbackUpdateHiera
   rchy)
49
50     # register human model hierarchy
51     cmVrpn.CMPluginRegisterUpdateHierarchy(host, byref(userData), callbackUpdat
   a)
```

```
52
53      loopState = True
54      while(loopState):
55          time.sleep(0.2)
56
57      cmVrpn.CMPluginUnRegisterUpdateHierarchy(host, byref(userData), CallbackUpd
    ateHierarchy)
58
59      # quit vrpn thread
60      cmVrpn.CMVrpnQuitExtern()
```

示例七：CMPluginRegisterResetHierarchy




```
1  import os
2  import sys
3  import time
4  from ctypes import *
5
6  class timeval(Structure):
7      _fields_ = [("tv_sec",c_long),
8                  ("tv_usec",c_long)]
9
10
11 class VrpnHierarchy(Structure):
12     _fields_ = [("msg_time", timeval),
13             ("sensor", c_int),
14             ("parent", c_int),
15             ("name", c_char*123)]
16
17 initHierarchy = [timeval(c_int(0),c_int(0)), c_int(0),c_int(0),b"0"*123]
18
19 # Load dynamic Library
20 def LoadDll(dllPath):
21     if(os.path.exists(dllPath)):
22         return CDLL(dllPath)
23     else:
24         print("Chingmu's dynamic Library  does not exist \n")
25         sys.exit()
26
27 def CallbackResetHierarchy(voidPtr,msg):
28     print(msg.tv_sec,msg.tv_usec)
29     print("reset hierarchy\n")
```

```
30
31 if __name__ == '__main__':
32     # Set dynamic Library path
33     dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrp
   n.dll"
34
35     # Load dynamic Library
36     cmVrpn = LoadDll(dllPath)
37
38     # set server address
39     host = bytes("MCAvatar@127.0.0.1", "gbk")
40
41     # start vrpn thread
42     cmVrpn.CMVrpnStartExtern()
43
44     # enable write trace_log.txt
45     cmVrpn.CMVrpnEnableLog(True)
46
47     userData = VrpnHierarchy(*initHierarchy)
48
49     callbackReset = CFUNCTYPE(None,c_char_p,timeval)(CallbackResetHierarchy)
50
51     # register human model reset hierarchy
52     cmVrpn.CMPluginRegisterResetHierarchy(host, byref(userData), callbackReset)
53
54     loopState = True
55     while(loopState):
56         time.sleep(0.2)
57
58     cmVrpn.CMPluginUnRegisterResetHierarchy(host, byref(userData), CallbackRese
   tHierarchy)
59
60     # quit vrpn thread
61     cmVrpn.CMVrpnQuitExtern()
```

示例八： CMPluginRegisterEndHierarchy

```
sec:1670959510,usec306341
0 - source, 1 - retarget:1
```

```
1 import os
2 import sys
3 import time
4 from ctypes import *
5
```

```python
class timeval(Structure):
    _fields_ = [("tv_sec",c_long),
                ("tv_usec",c_long)]

class VrpnEndHierarchyMsg(Structure):
    _fields_ = [("msg_time",timeval),
                ("retarget_flag",c_int)] # 0 - source, 1 - retarget

# Load dynamic Library
def LoadDll(dllPath):
    if(os.path.exists(dllPath)):
        return CDLL(dllPath)
    else:
        print("Chingmu's dynamic Library  does not exist \n")
        sys.exit()

def CallbackVrpnEndHierarchy(voidPtr, endMsg):
    print("sec:%d,usec%d"%(endMsg.msg_time.tv_sec,endMsg.msg_time.tv_usec))
    print("0 - source, 1 - retarget:%d"%(endMsg.retarget_flag))

if __name__ == '__main__':
    # Set dynamic Library path
    dllPath = os.path.dirname(os.path.dirname(__file__)) + "\\ChingmuDLL\\CMVrpn.dll"

    # Load dynamic Library
    cmVrpn = LoadDll(dllPath)

    # set server address
    host = bytes("MCAvatar@127.0.0.1", "gbk")

    # start vrpn thread
    cmVrpn.CMVrpnStartExtern()

    # enable write trace_log.txt
    cmVrpn.CMVrpnEnableLog(True)

    userData = VrpnHierarchy(timeval(c_int(0),c_int(0)), c_int(0),c_int(0),b"0"*127)

    callbackFinishe = CFUNCTYPE(None, c_char_p, VrpnEndHierarchyMsg)(CallbackVrpnEndHierarchy)

    # Register the callback function of sending completion signal
    cmVrpn.CMPluginRegisterEndHierarchy(host, byref(userData), callbackFinishe)

    loopState = True
```

```
    while(loopState):
        time.sleep(0.2)

    cmVrpn.CMPLuginUnRegisterEndHierarchy(host, byref(userData), callbackFinish
e)
    # quit vrpn thread
    cmVrpn.CMVrpnQuitExtern()
```