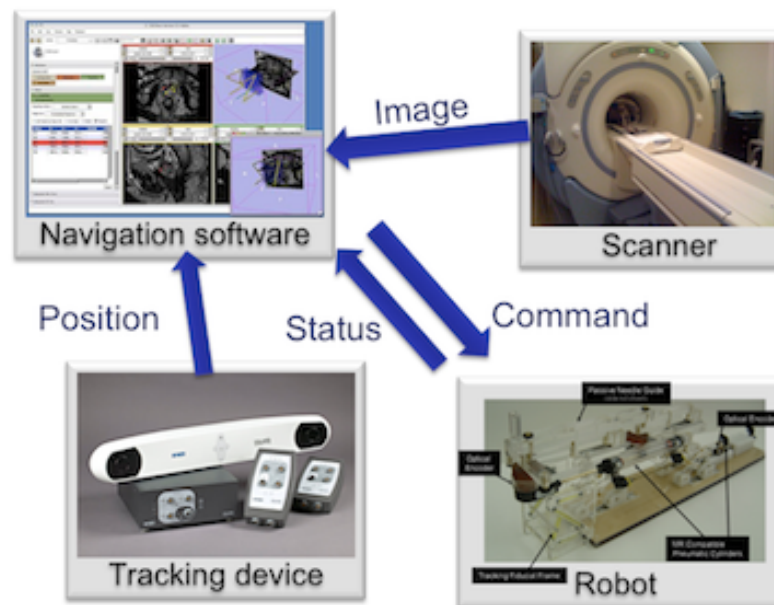


Connecting IGT Device with OpenIGTLink



Junichi Tokuda, PhD



Material

This course requires the following installation:

- 3DSlicer version 3.6 Software (Slicer3.3.6-2010-12-03), which can be installed from:

<http://www.slicer.org/pages/Special:SlicerDownloads>

- Tracker Simulator (archived in .zip file for each platform)

<http://www.slicer.org/slicerWiki/index.php/Modules:OpenIGTLinkIF-3.6-Simulators>

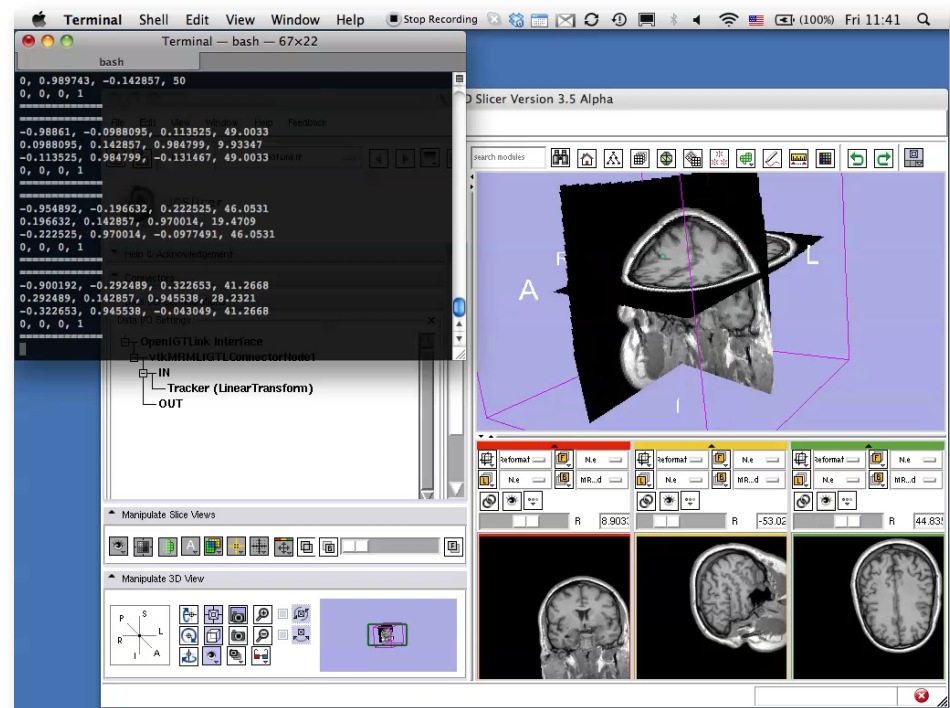
Disclaimer

It is the responsibility of the user of 3DSlicer to comply with both the terms of the license and with the applicable laws, regulations and rules.



Learning objective

Following this tutorial, you'll be able to import tracking data from external devices (e.g. tracking system) through the network.



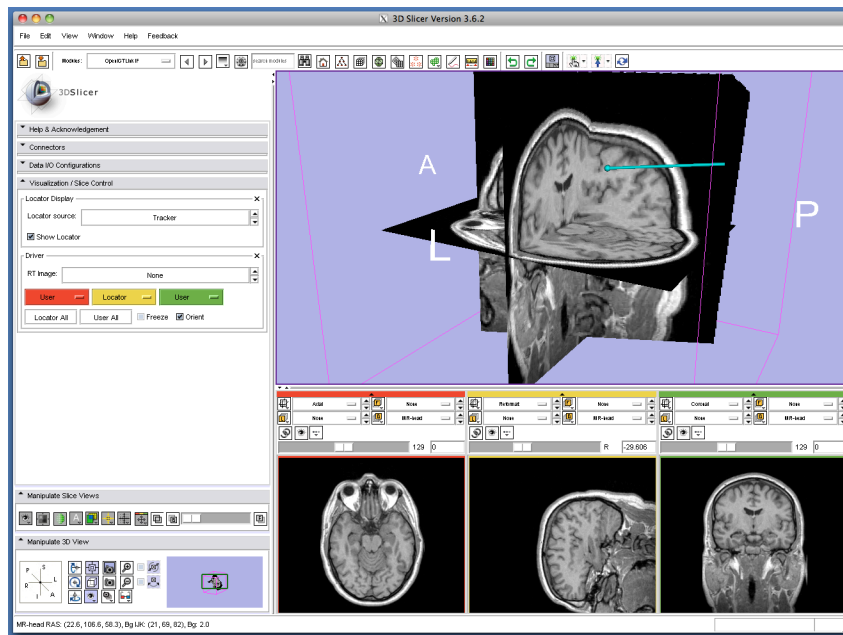


Overview

- Configuring OpenIGTLink IF module
- Setting up Tracker Simulator
- Visualizing Tracking Data



3DSlicer



Part 1: Configuring OpenIGTLinkIF module

Tokuda, J

National Alliance for Medical Image Computing

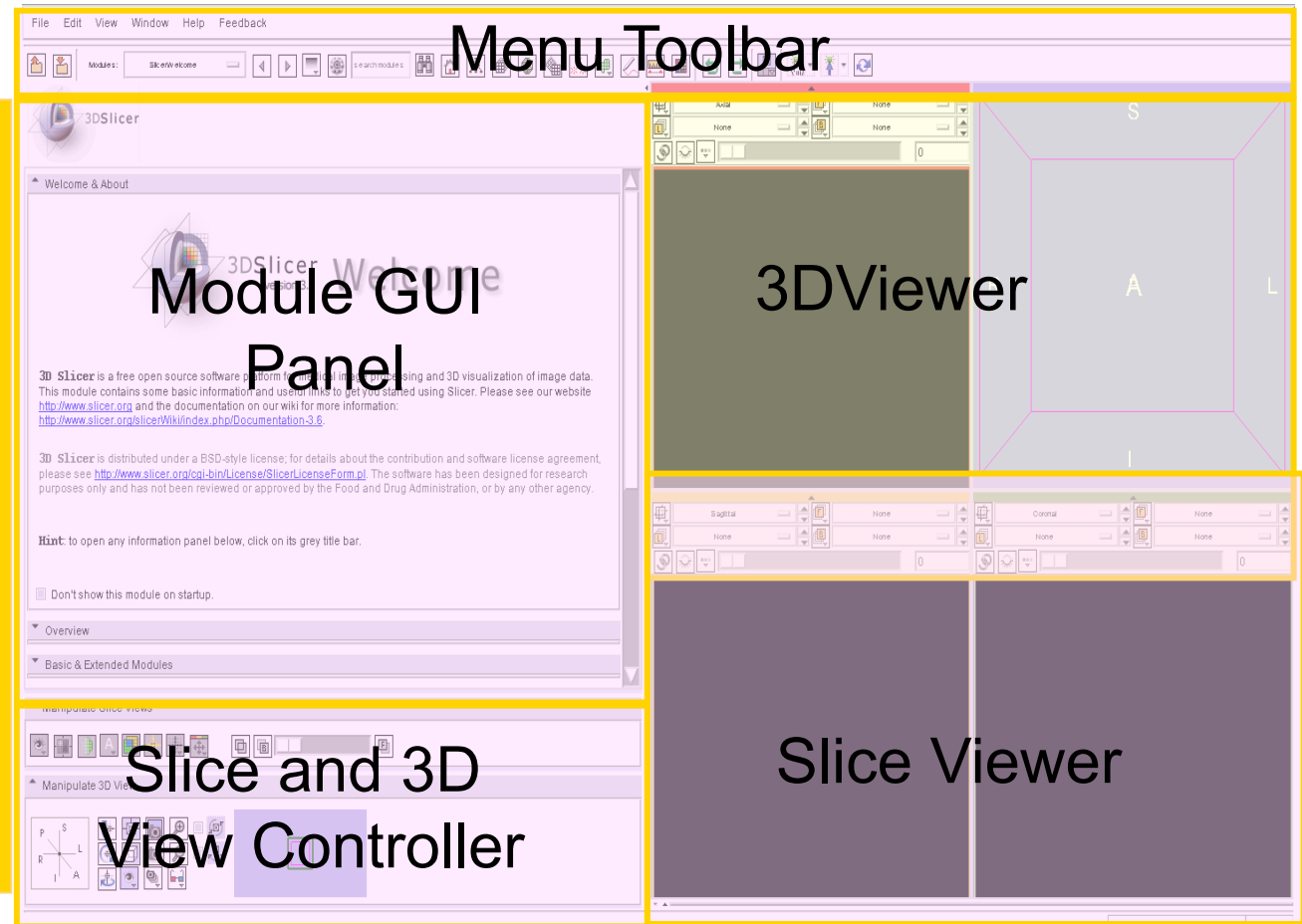
NA-MIC© 2010, ARR



Slicer3 GUI

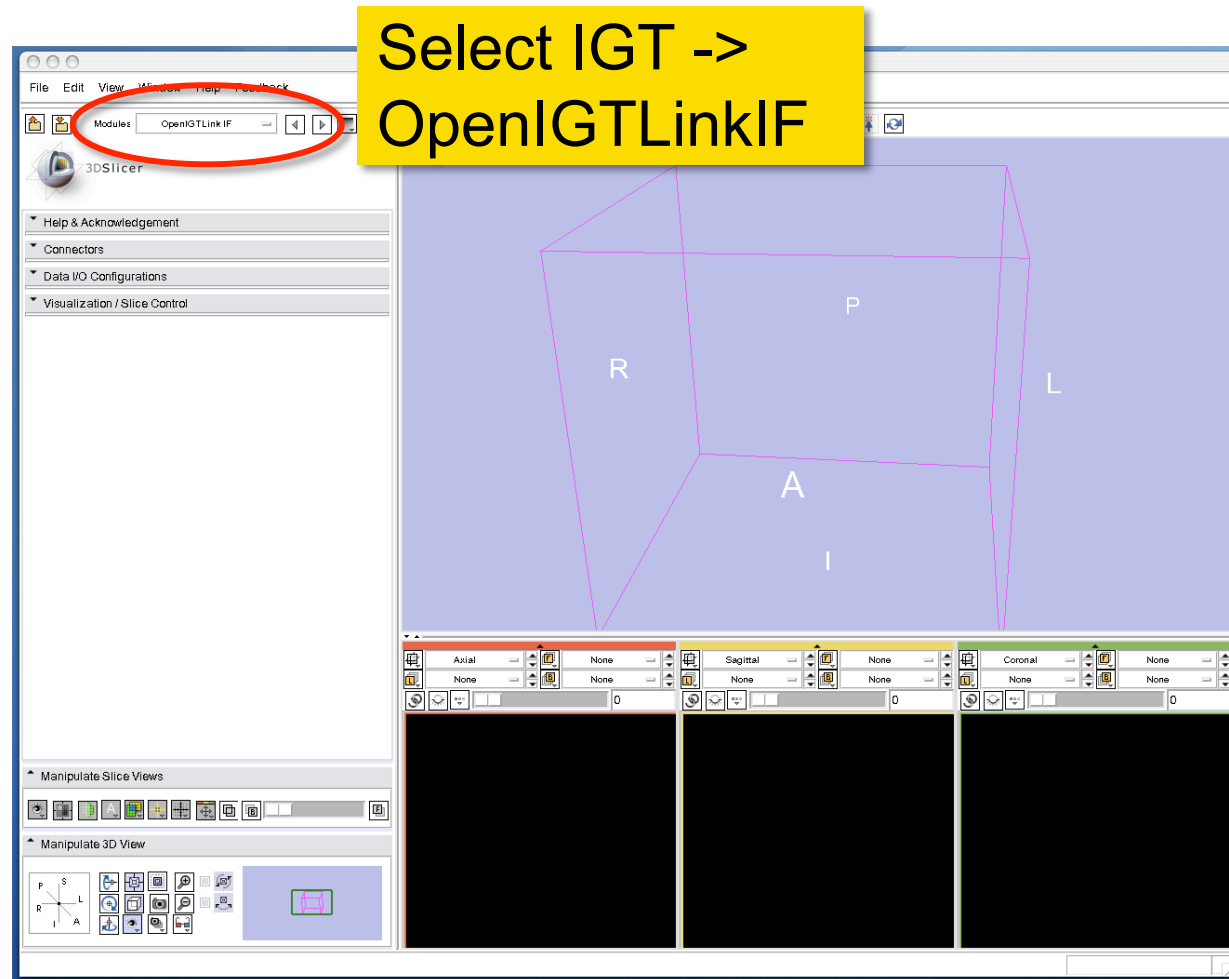
The Graphical User Interface (GUI) of Slicer3 integrates five components:

- the Menu Toolbar
- the Module GUI Panel
- the 3D Viewer
- the Slice Viewer
- the Slice and 3D View Controller

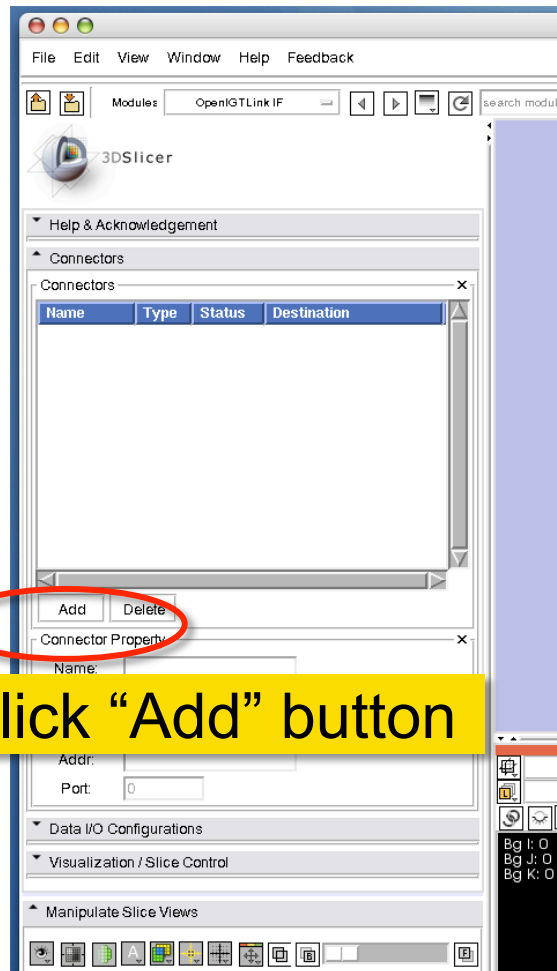




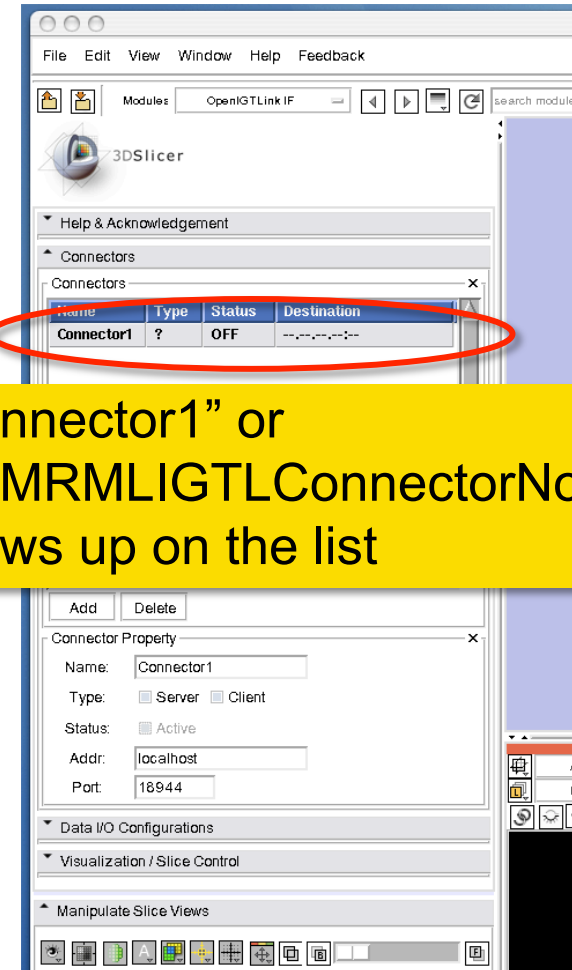
Starting OpenIGTLinkIF



Adding Connector

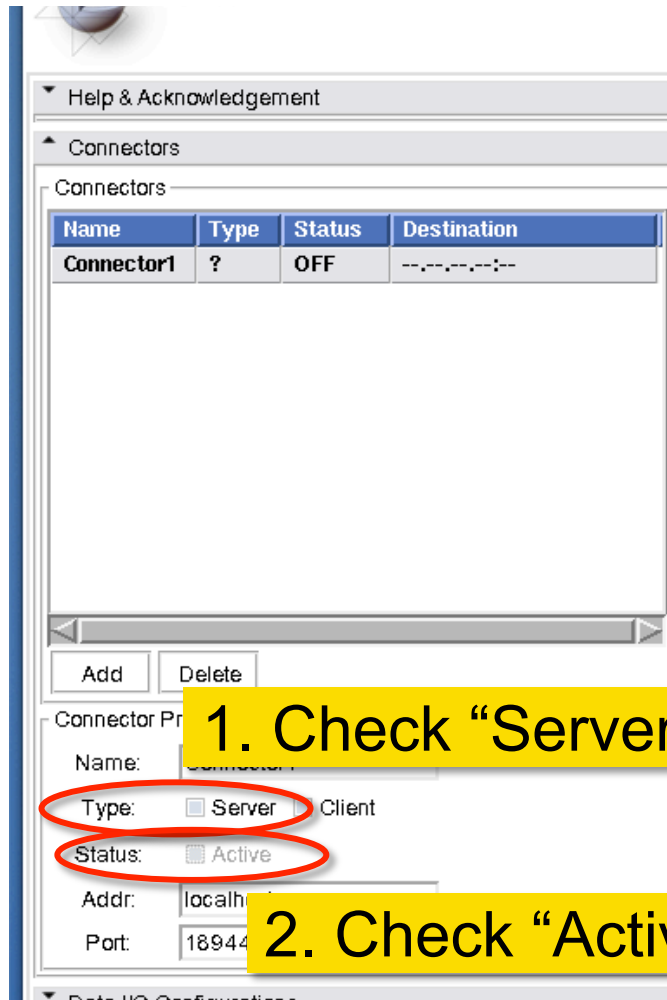


Click "Add" button



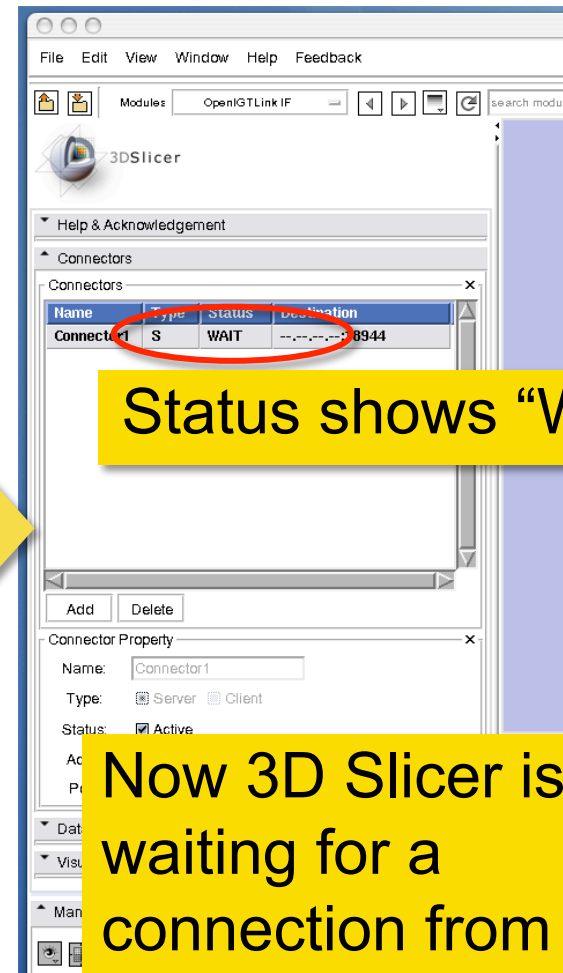
"Connector1" or
"vtkMRMLIGTLConnectorNode1"
shows up on the list

Setting Connector Type



1. Check "Server"

2. Check "Active"



Status shows "WAIT."

Now 3D Slicer is waiting for a connection from the Tracking Simulator



```
Terminal — TrackerClient — 80x24
artemis:OIGTL_Simulators junichi$ ./TrackerClient localhost 18944 5
=====
-1, 0, 0, 50
0, 0.142857, 0.989743, 0
0, 0.989743, -0.142857, 50
0, 0, 0, 1
=====
-0.98861, -0.0988095, 0.113525, 49.0033
0.0988095, 0.142857, 0.984799, 9.93347
-0.113525, 0.984799, -0.131467, 49.0033
0, 0, 0, 1
=====
-0.954892, -0.196632, 0.222525, 46.0531
0.196632, 0.142857, 0.970014, 19.4709
-0.222525, 0.970014, -0.0977491, 46.0531
0, 0, 0, 1
=====
```

Part 2: Setting up Tracker Simulator



Extracting Simulator Files

In the .zip archive of Tracking Simulator contains the following command line programs:

ImagerClient

ImagerServer

ReceiverClient

StatusClient

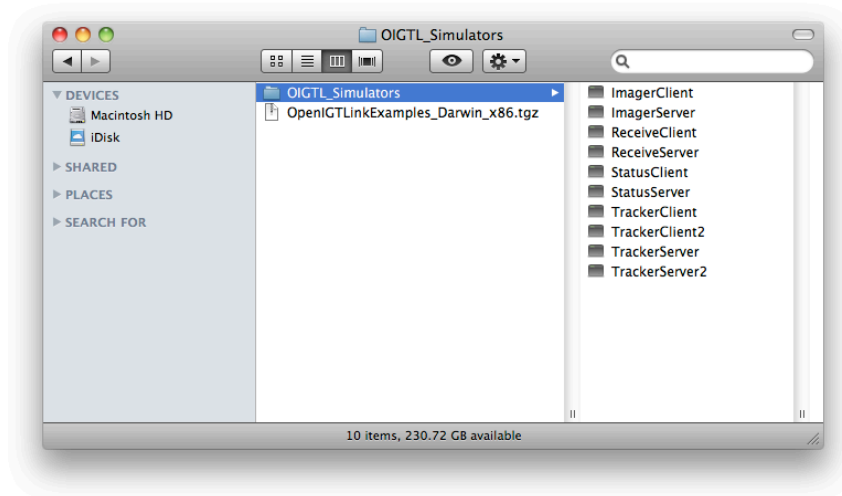
StatusServer

TrackerClient (used in this Tutorial)

TrackerClient2

TracerServer

TrackerServer2





Starting Tracking Simulator

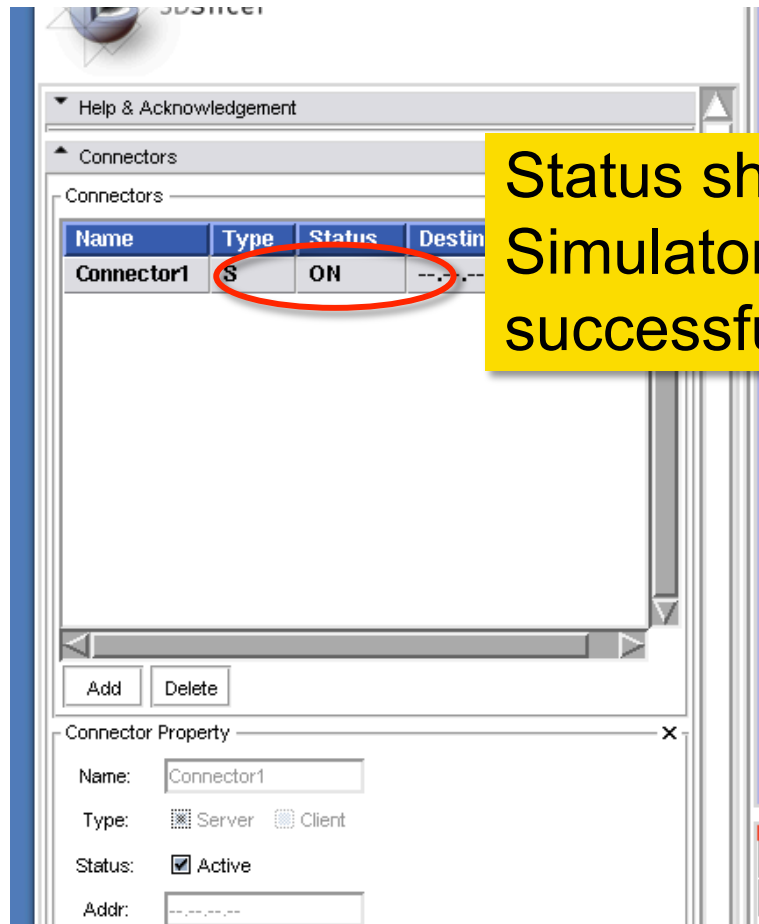
1. Unzip the downloaded file in the working directory.
2. From a terminal (or command prompt in Windows), go to the working directory and type in the following commands to start the simulator. (Please replace `<directory>` with the path to your actual working directory.)

```
Terminal — bash — 80x24
Last login: Fri Dec 3 14:54:48 on ttys002
artemis:~ junichi$
artemis:~ junichi$
artemis:~ junichi$ cd Downloads/
artemis:Downloads junichi$ cd OIGTL_Simulators/
artemis:OIGTL_Simulators junichi$ ls
ImagerClient  ReceiveClient  StatusClient  TrackerClient  TrackerServer
ImagerServer  ReceiveServer  StatusServer  TrackerClient2 TrackerServer2
artemis:OIGTL_Simulators junichi$
```

```
cd <directory>/OIGTL_Simulators
./TrackerClient localhost 18944 5
```

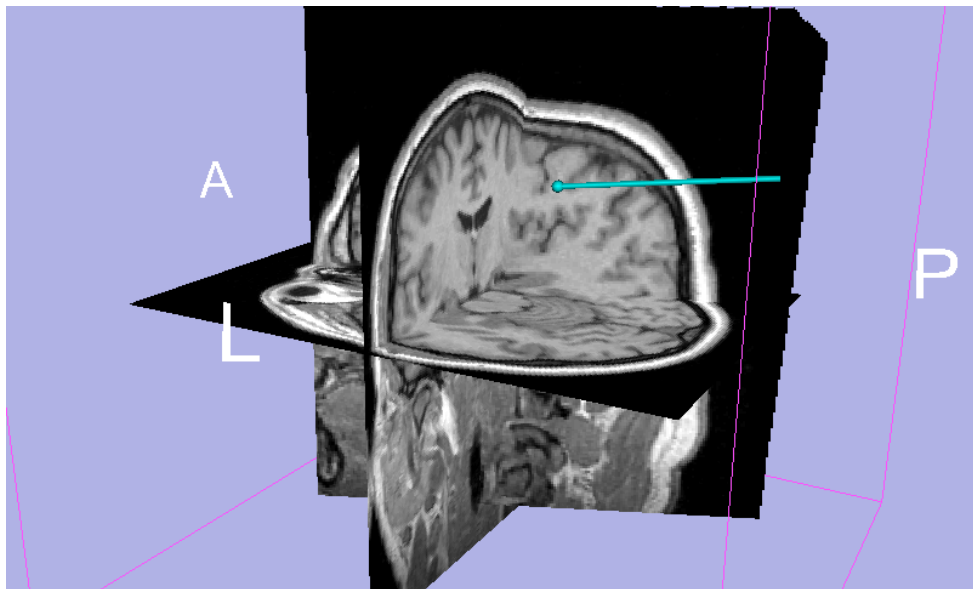
The Tracking Simulator will connect to 3D Slicer at port 18944 and send tracking data with frame rate of 5 fps.

Checking Connection



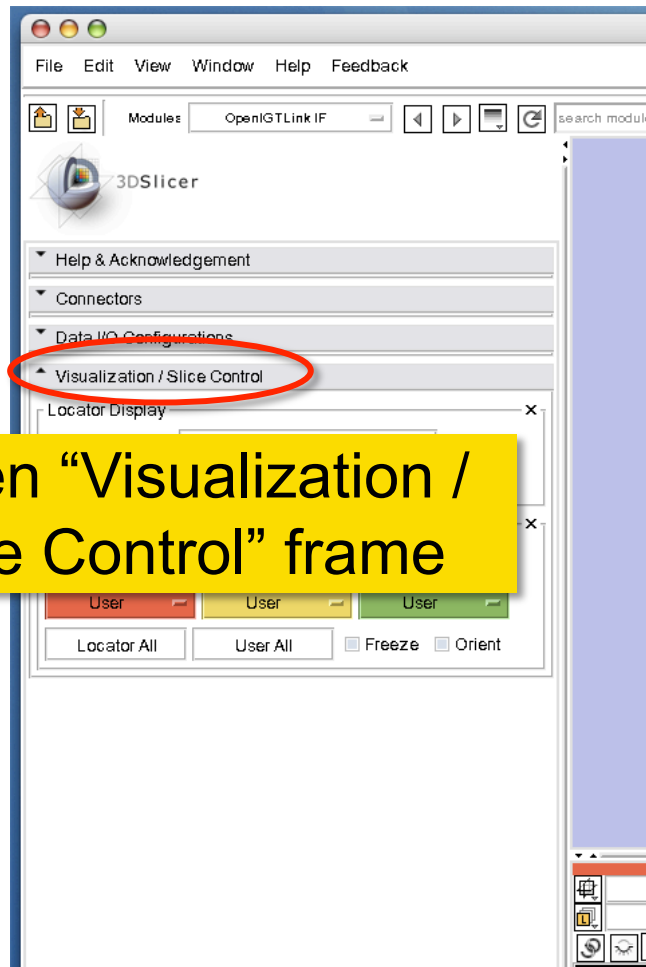
Status shows “ON,” if Tracker Simulator is connected successfully.

NOTE: Tracker Simulator stops after sending 100 transforms to 3D Slicer. If Status becomes “WAIT,” repeat the steps in Part 2.

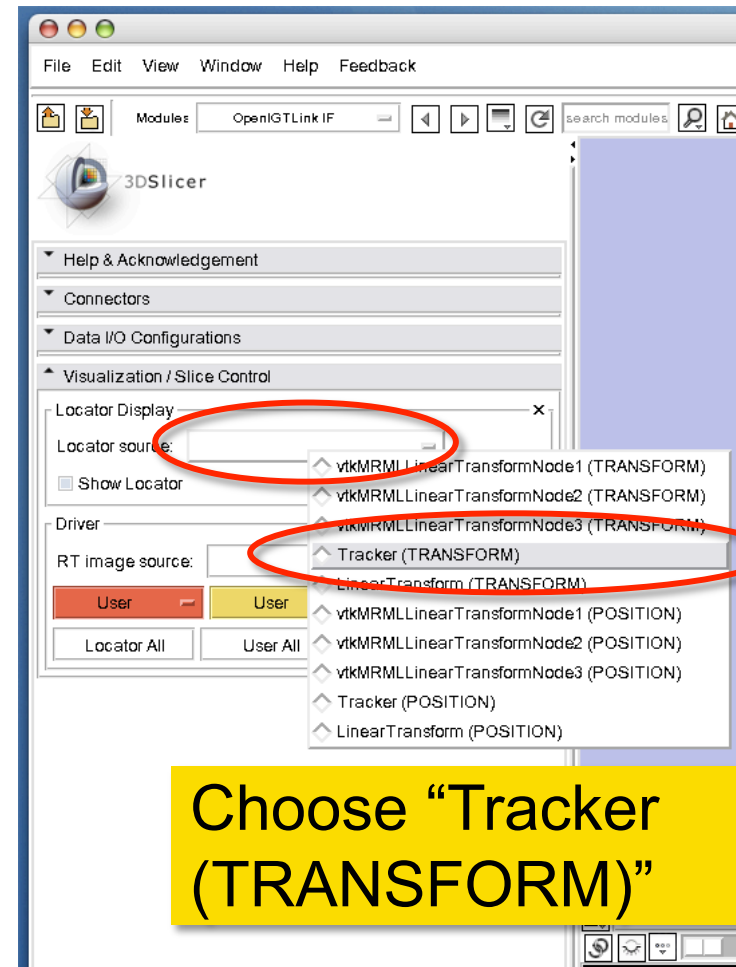


Part 3: Visualizing Tracking Data

Choosing Locator Source



Open "Visualization / Slice Control" frame



Choose "Tracker (TRANSFORM)"



Choosing Locator Source

3DSlicer

Modules: OpenIGTLink IF

3DSlicer

Help & Acknowledgement

Connectors

Data I/O Configurations

Visualization / Slice Control

Locator Display

Locator source: Tracker (TRANSFORM)

Show Locator

Driver

3D Slicer Version 3.3 Alpha

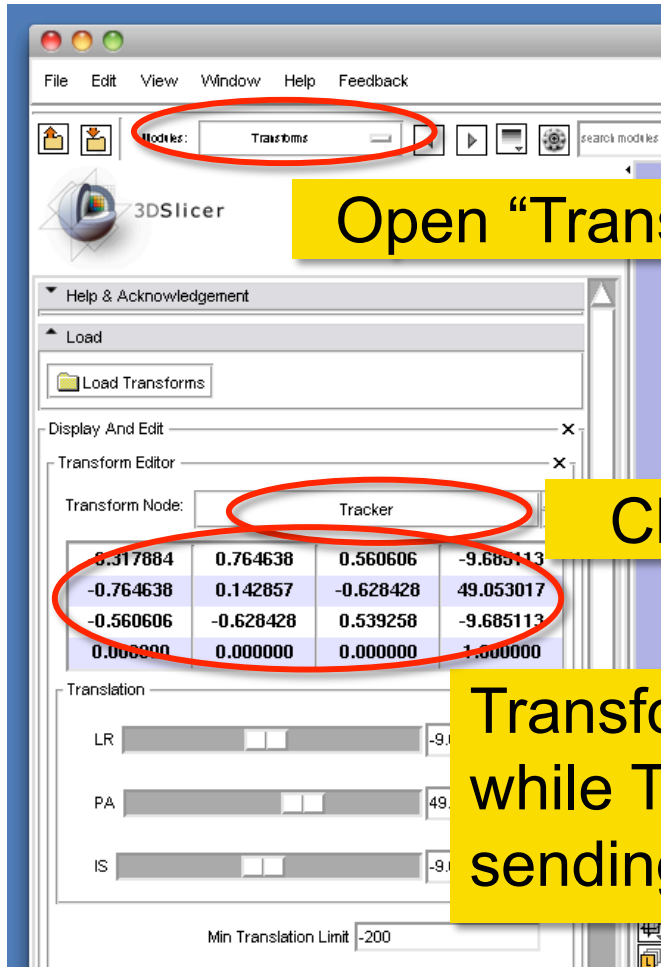
Locator model appears in 3D View

Check "Show Locator"

Manipulate Slice Views

Manipulate 3D View

Checking Transform



Open "Transforms"

Choose "Tracker"

Transform is being updated while Tracker Simulator is sending data.

0.317884	0.764638	0.560606	-9.685113
-0.764638	0.142857	-0.628428	49.053017
-0.560606	-0.628428	0.539258	-9.685113
0.000000	0.000000	0.000000	1.000000



References

- 3D Slicer OpenIGTLinkIF Documentation Page

[http://www.slicer.org/slicerWiki/index.php/
Modules:OpenIGTLinkIF-Documentation-3.6](http://www.slicer.org/slicerWiki/index.php/Modules:OpenIGTLinkIF-Documentation-3.6)

- OpenIGTLink Protocol Web Page:

<http://www.na-mic.org/Wiki/index.php/OpenIGTLink>

- Paper

Tokuda J., *et al.* OpenIGTLink: an open network protocol for image-guided therapy environment. Int J Med Robot. 2009 Dec;5(4):423-34. PMID: 19621334. PMCID: PMC2811069.



Acknowledgments



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Enabling Technologies for MRI-Guided
Prostate Intervention (NIH R01CA111288)



National Alliance for Medical Image Computing
(NIH U54EB005149)



Intelligent Surgical Instruments Project of METI
(Japan)