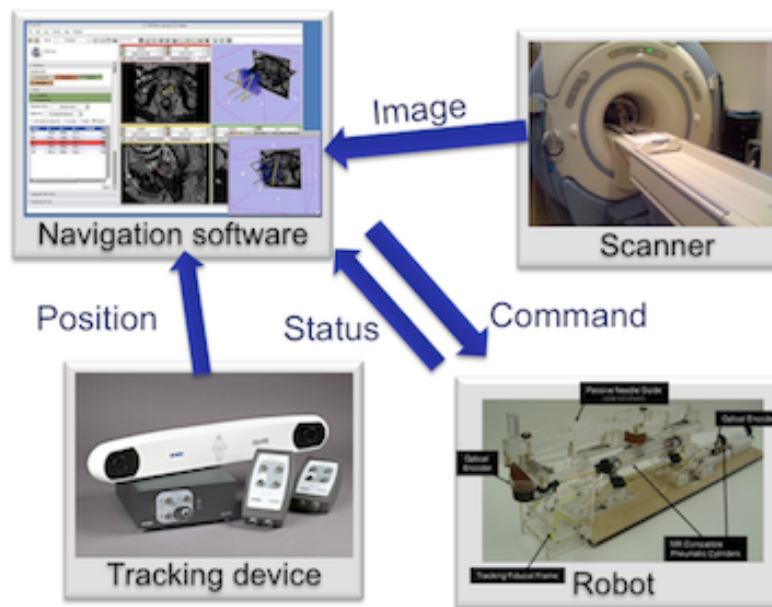


# Connecting IGT Device with OpenIGTLink



Junichi Tokuda, PhD



# Material

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This course requires the following installation:

- 3DSlicer version 4.1 Software (Slicer 4.1.0 r19886), which can be installed from:

<http://download.slicer.org/>

- Tracker Simulator:

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

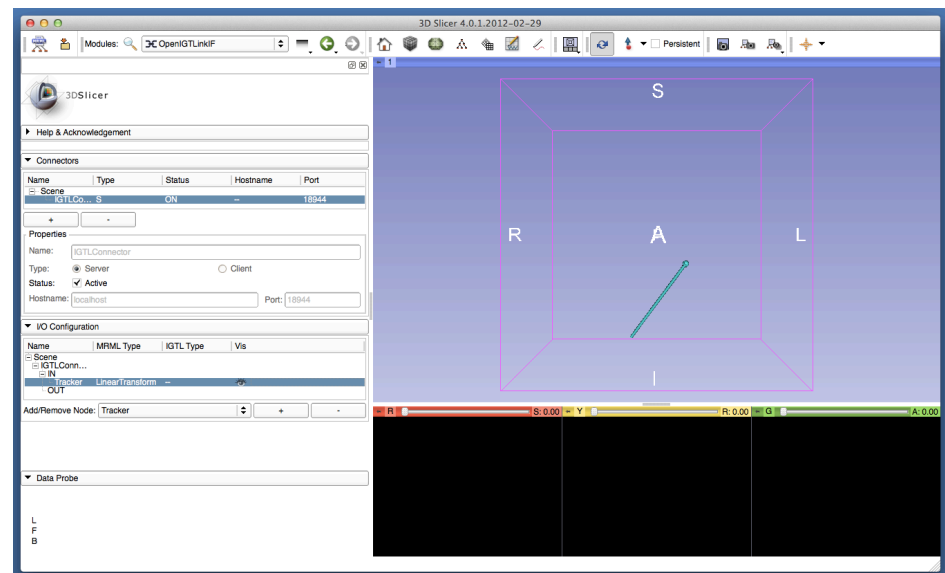
## **Disclaimer**

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.





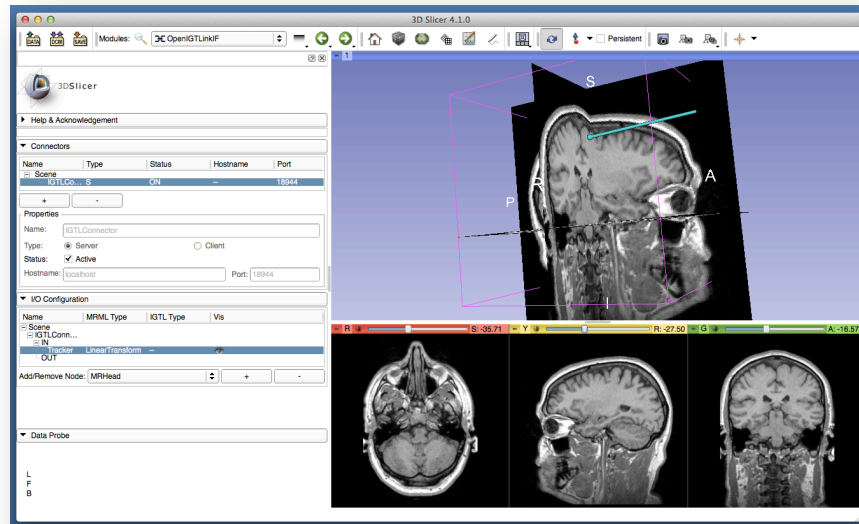
# Overview

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- Configuring OpenIGTLink IF module
- Setting up Test Server
- Visualizing Tracking Data



3DSlicer



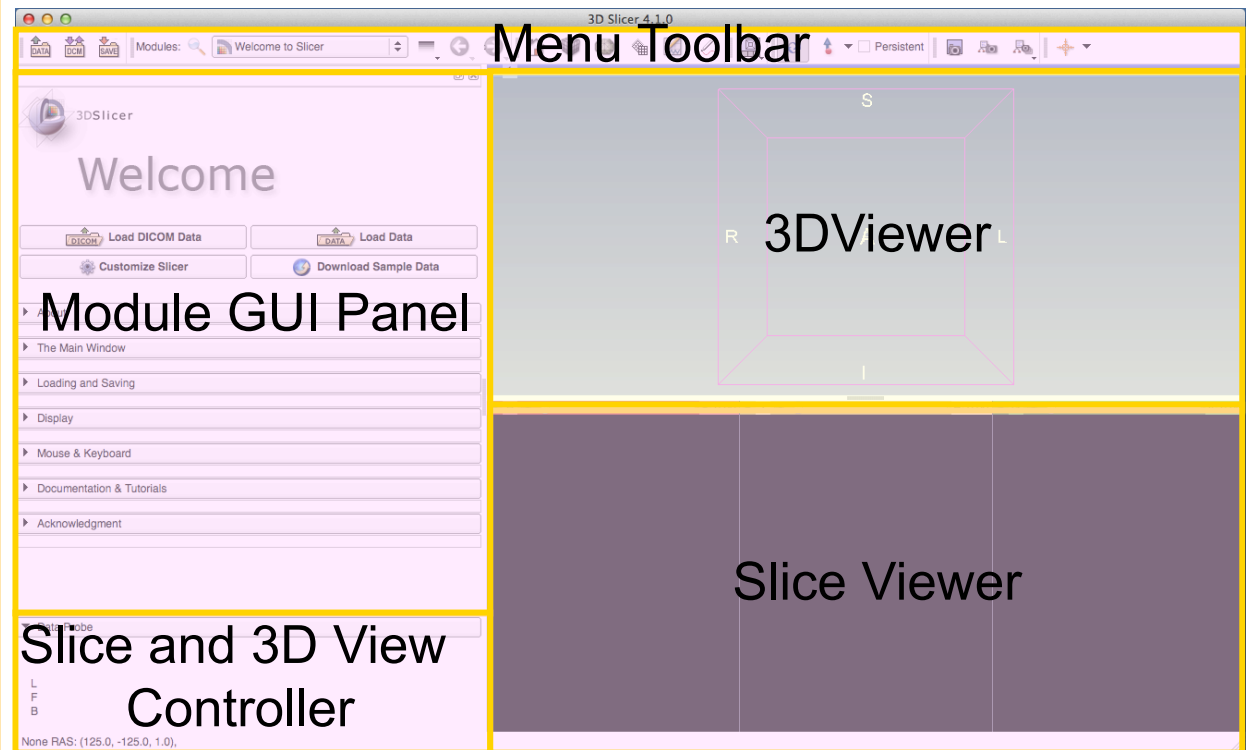
# Part 1: Configuring OpenIGTLinkIF module



# Slicer3 GUI

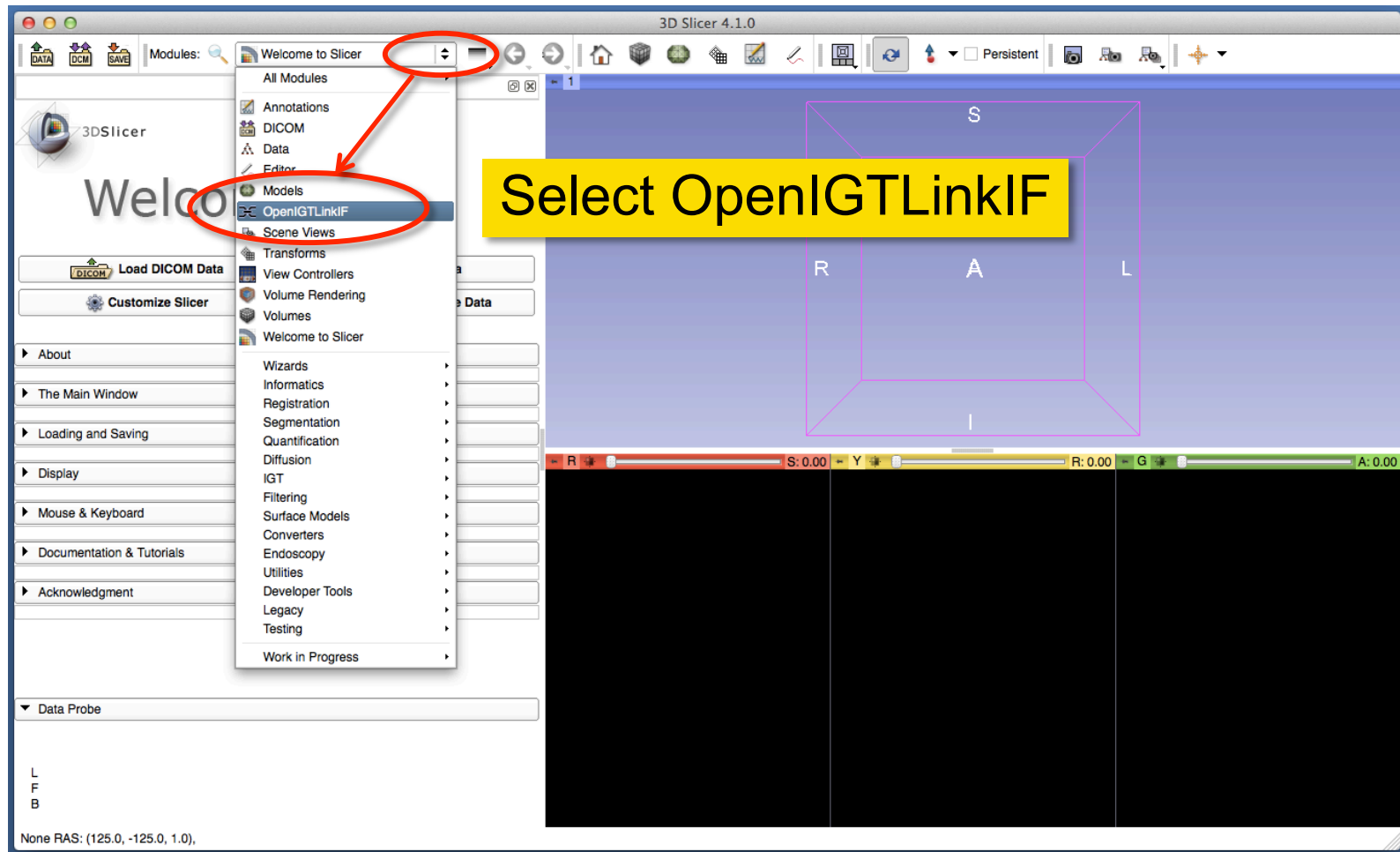
The Graphical User Interface (GUI) of Slicer3 integrates five components:

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

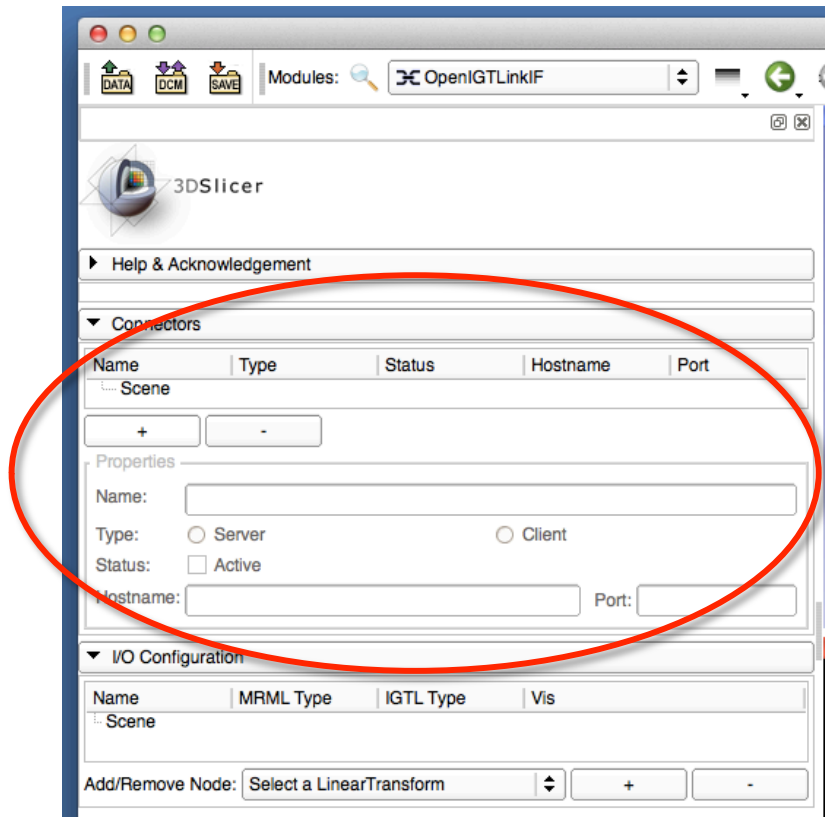




# Starting OpenIGTLinkIF



# Adding Connector

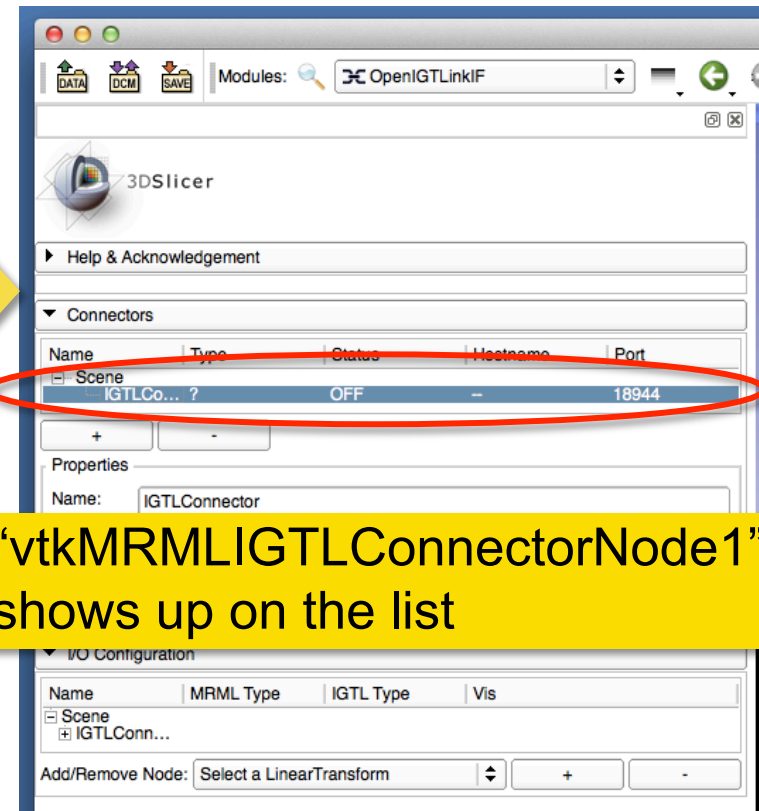
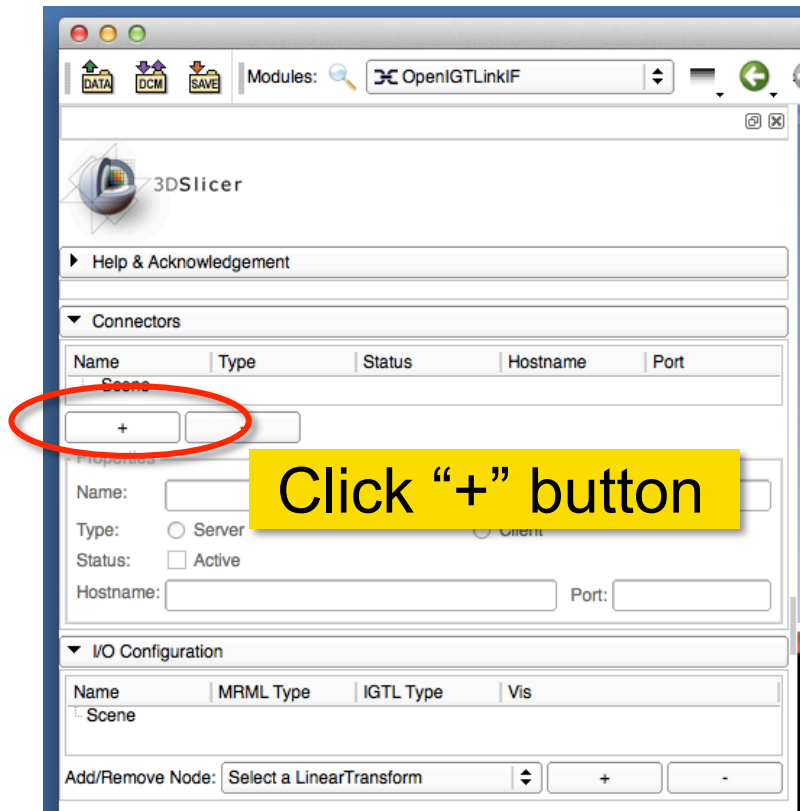


To connect 3D Slicer to external device/software using OpenIGTLink IF, a “connector” has to be created for each connection.

Connectors can be configured in “Connectors” Tab in OpenIGTLink IF module.

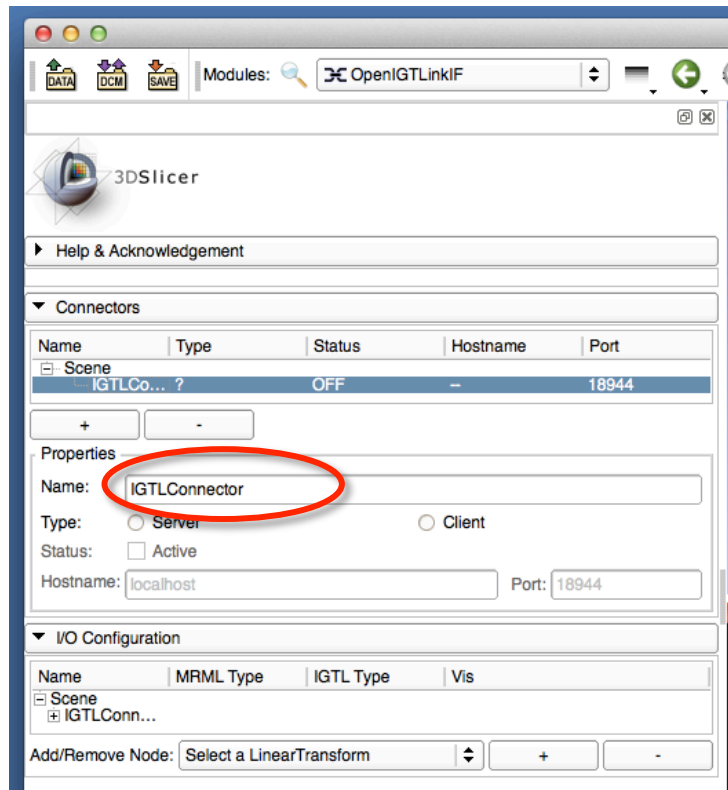


# Adding Connector





# Changing Connector Name

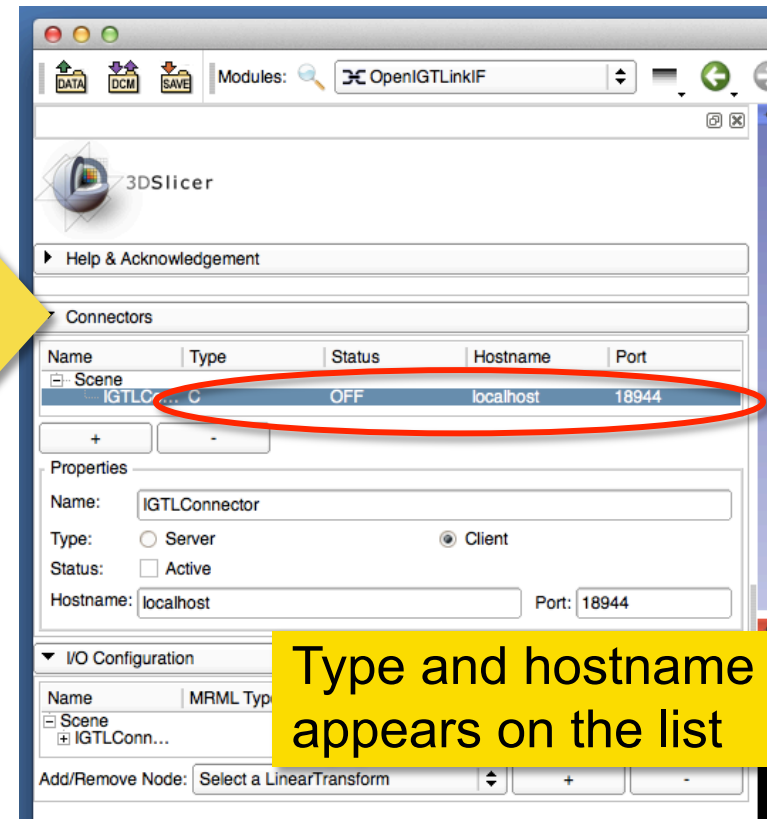
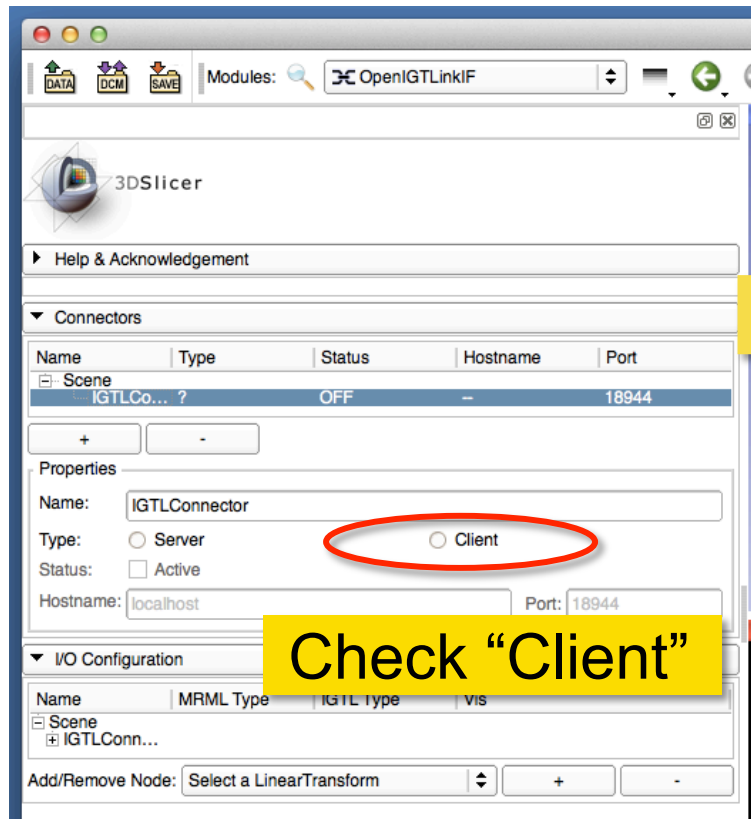


You may change the name of the connector by type in a new name and hit Return key.

This is an optional step. It is a good idea to name connectors, especially if you have multiple connections.



# Setting Connector Type



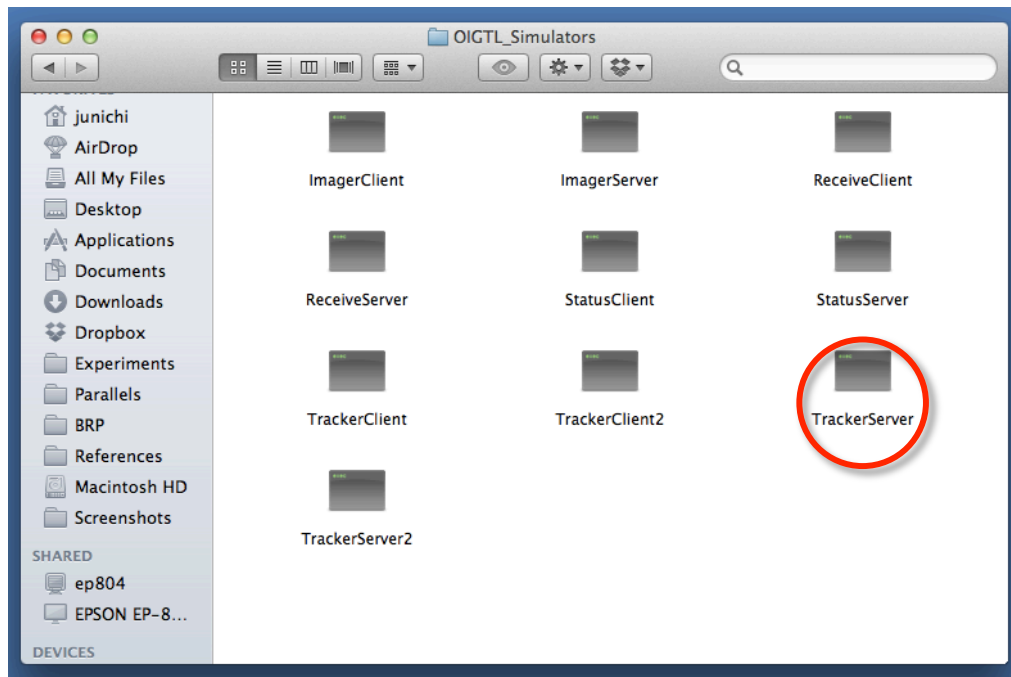


3DSlicer

```
bin — bash — 80x24
-0.452844, 0.142857, -0.88007, 40.6838
-0.464957, -0.88007, 0.096389, 29.066
0, 0, 0, 1
=====
^C
artemis:bin junichi$ ./TrackerServer 18944 10
=====
-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 TrackerServer

# Extract Server Program



Uncompress the archived simulator files downloaded from the simulator page. Find TrackerServer binary file.



# Open Terminal

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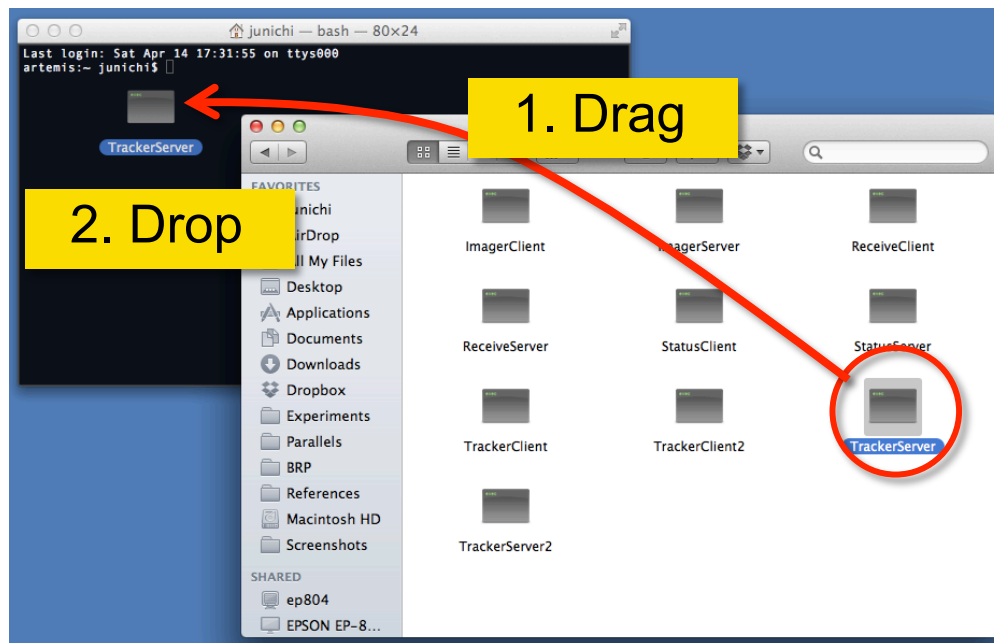
Open a terminal window.

Windows: Open the start menu, type “cmd” in the search box area and then press Enter key.

Mac: Open “Utilities” in “Application” folder and double-click the “Terminal.app” icon.

Linux: Open terminal window.

# Start TrackerServer (1)



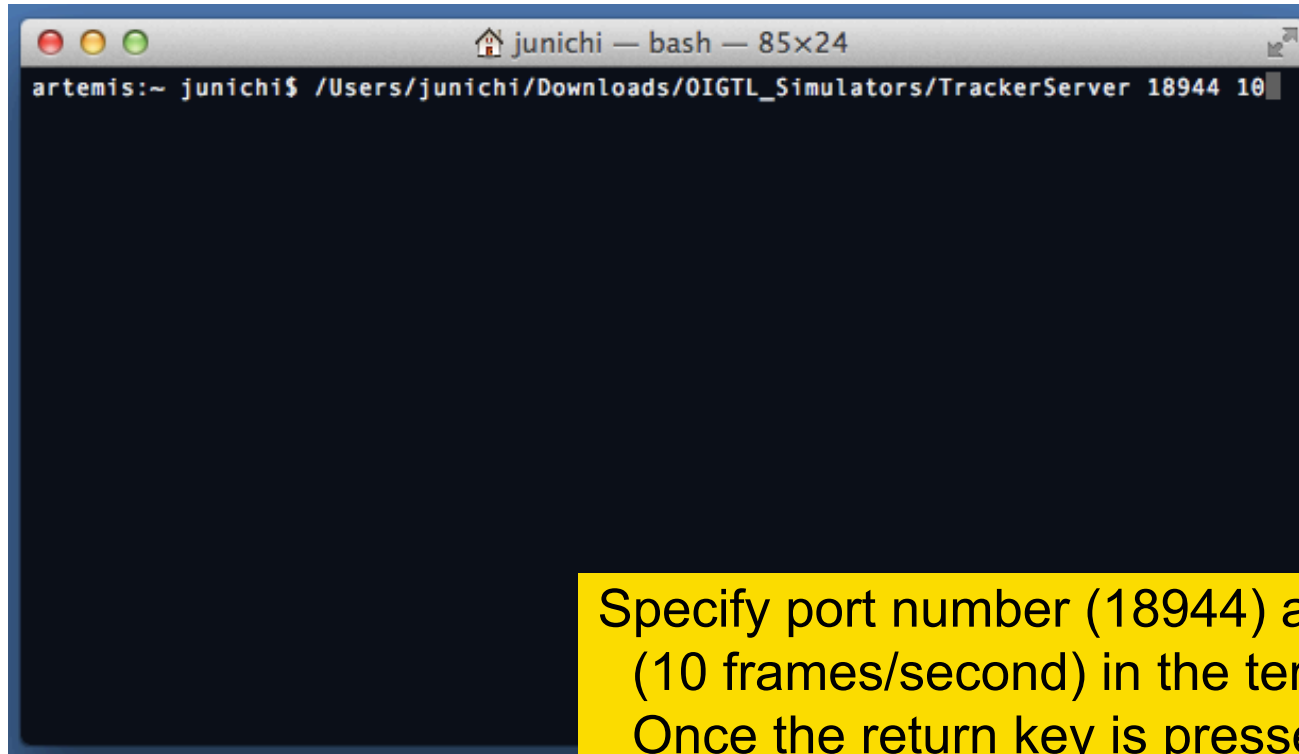
Windows/Mac: Drag “TrackerServer” icon from Explorer (Win) or Finder (Mac) and drop into the command window.

Linux: Type the path to the binary file of “TrackerServer”.



# Start TrackerServer (2)

---

A screenshot of a terminal window. The title bar shows a home icon, the name "junichi", the shell "bash", and the window size "85x24". The terminal content shows the prompt "artemis:~ junichi\$" followed by the command "/Users/junichi/Downloads/OIGTL\_Simulators/TrackerServer 18944 10" and a cursor at the end of the line.

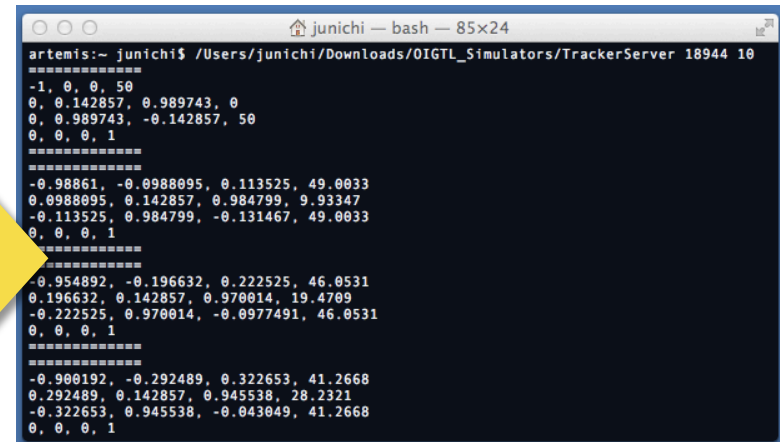
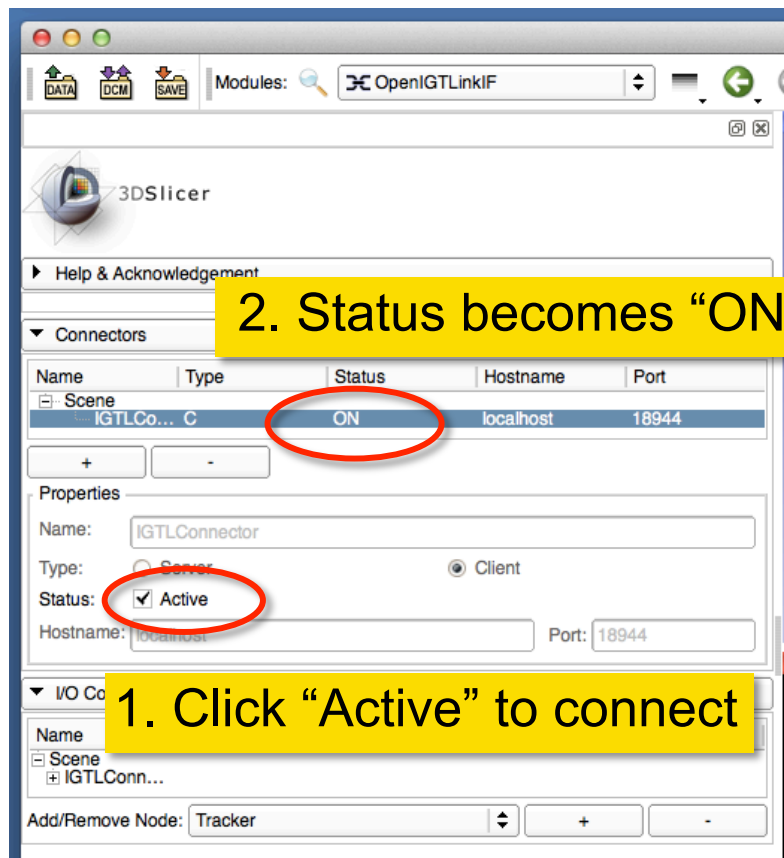
```
artemis:~ junichi$ /Users/junichi/Downloads/OIGTL_Simulators/TrackerServer 18944 10
```

Specify port number (18944) and frame rate (10 frames/second) in the terminal window. Once the return key is pressed, the TrackerServer starts waiting for a client.



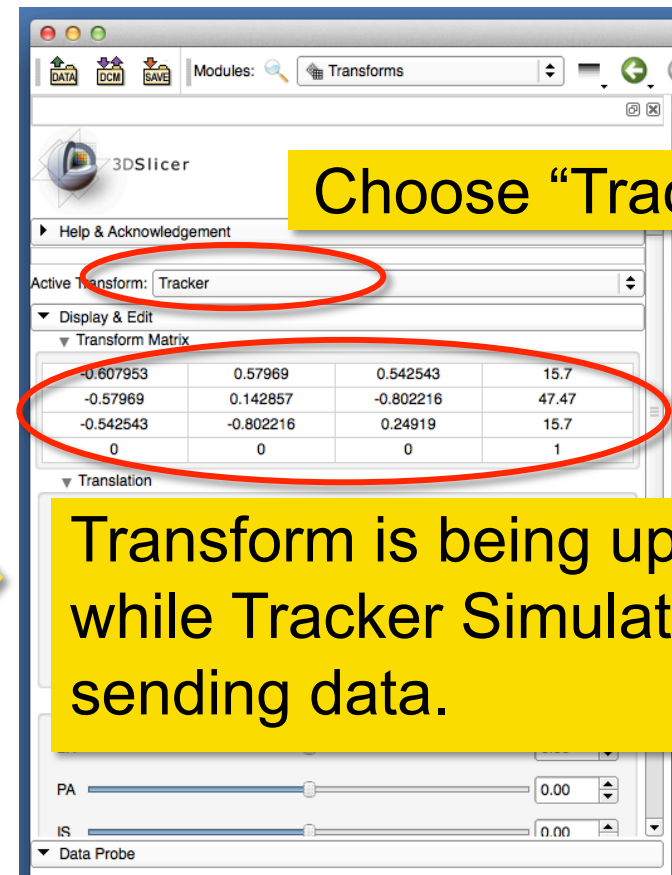
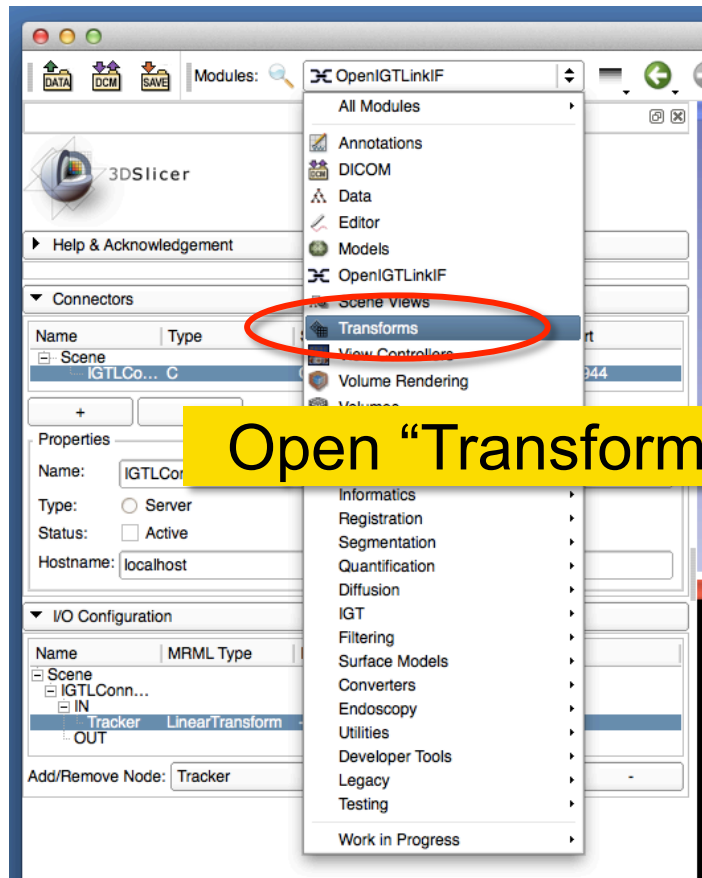


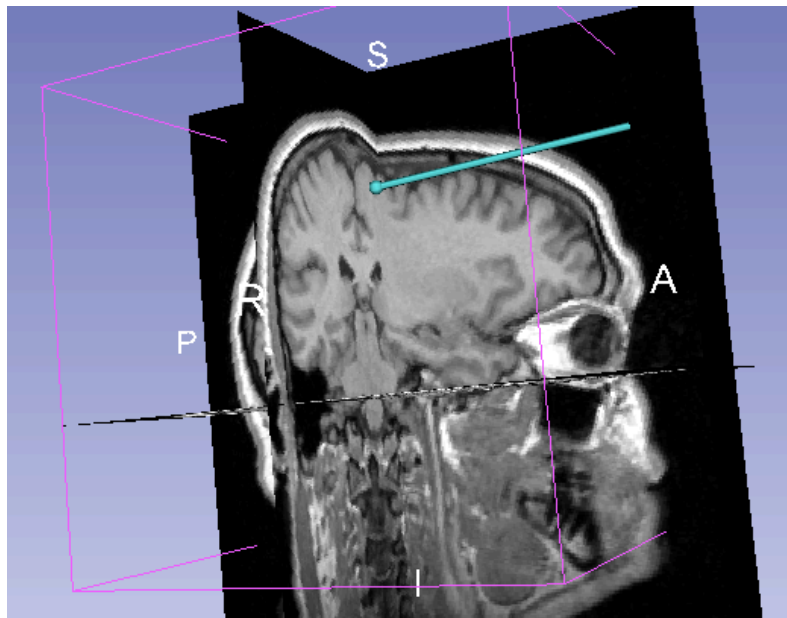
# Connect to Test Server



3. Simulator starts printing random transform matrix values in the terminal window.

# Checking Transform

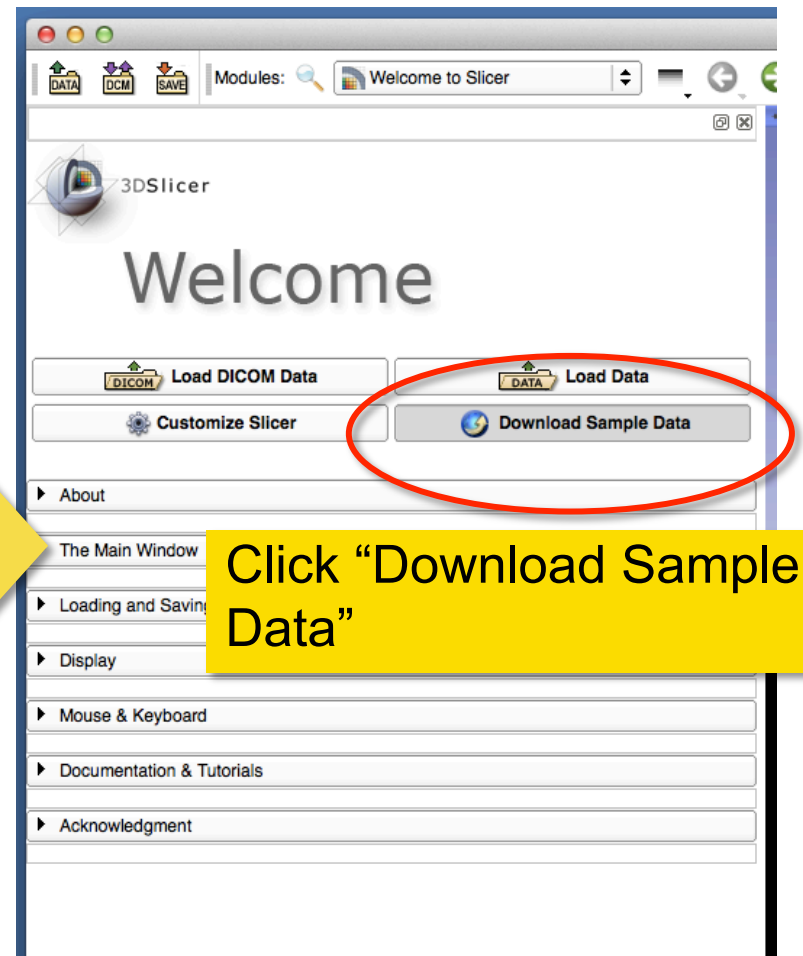
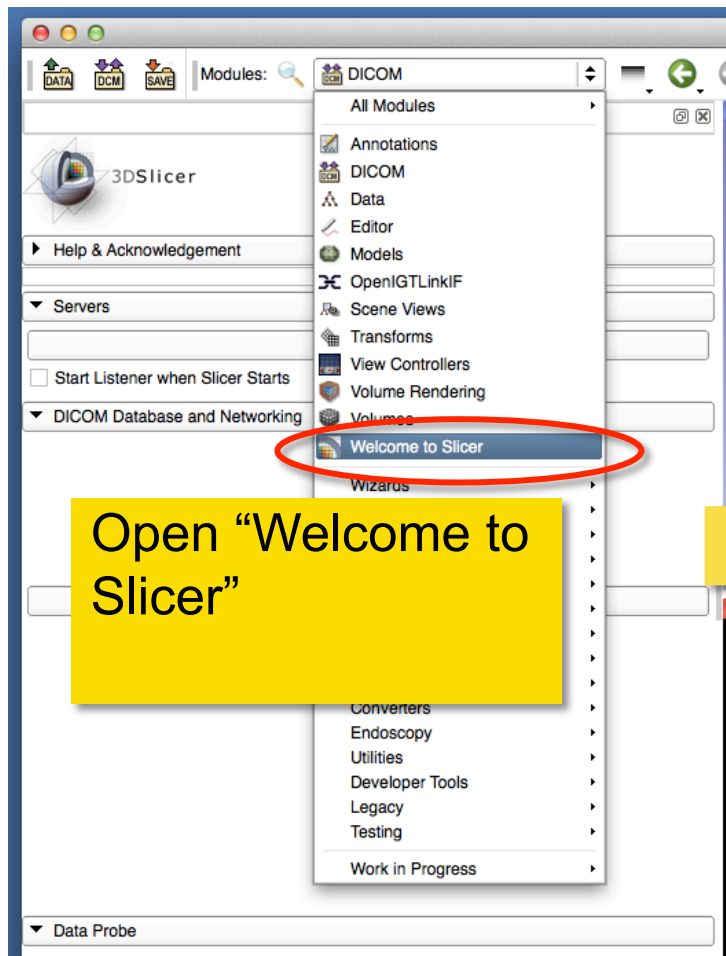




## Part 3: Visualizing Tracking Data



# Loading Sample MRI Data





# Loading Sample MRI Data

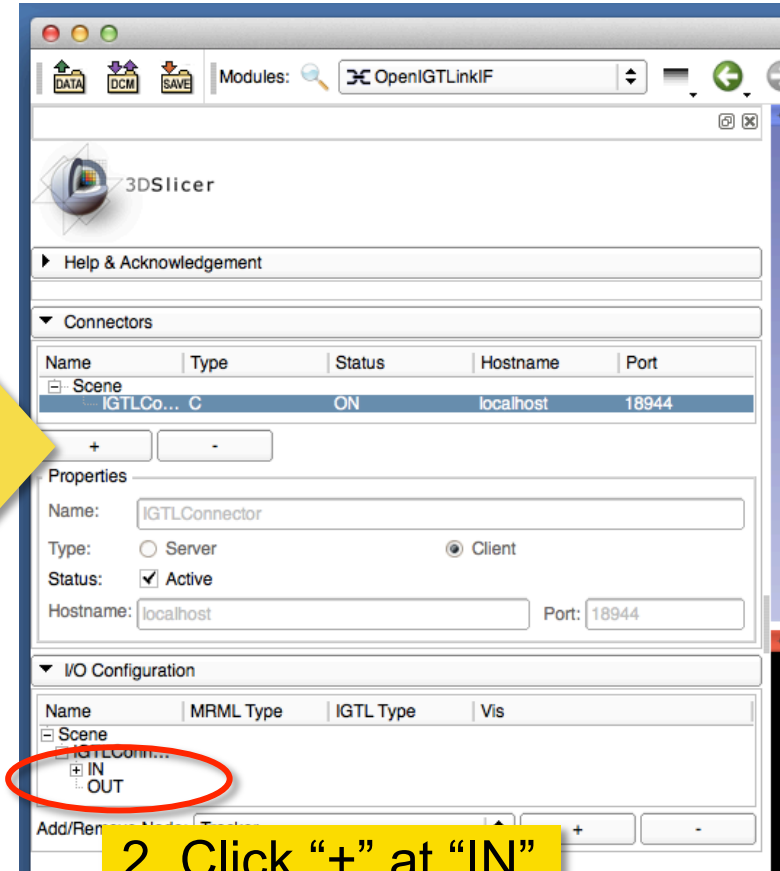
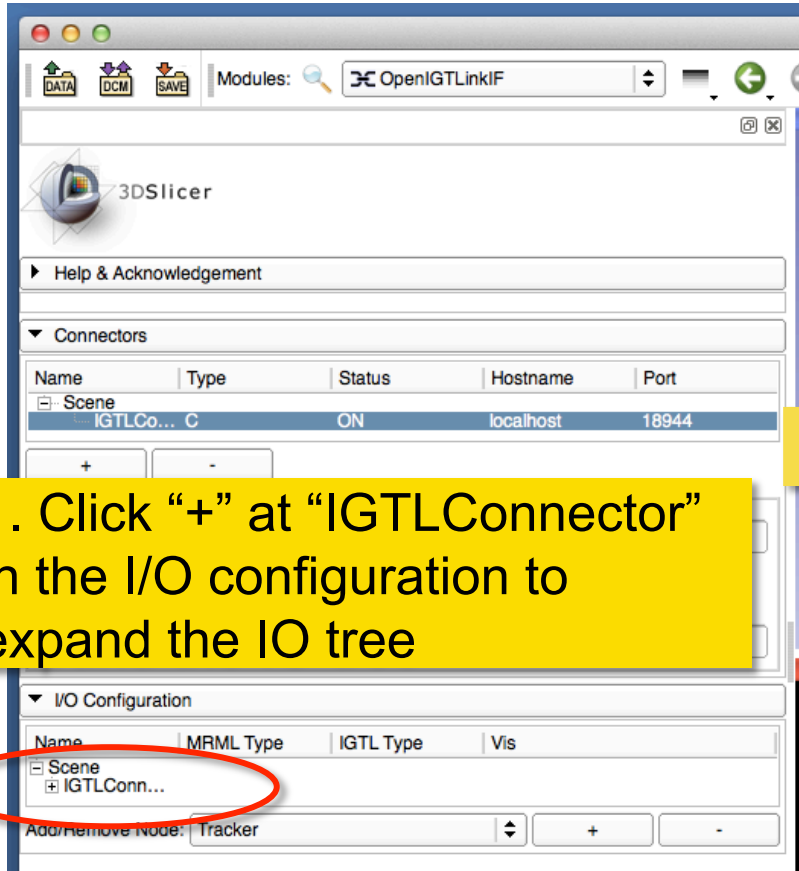
Click "Download MRHead"

Status window shows the progress

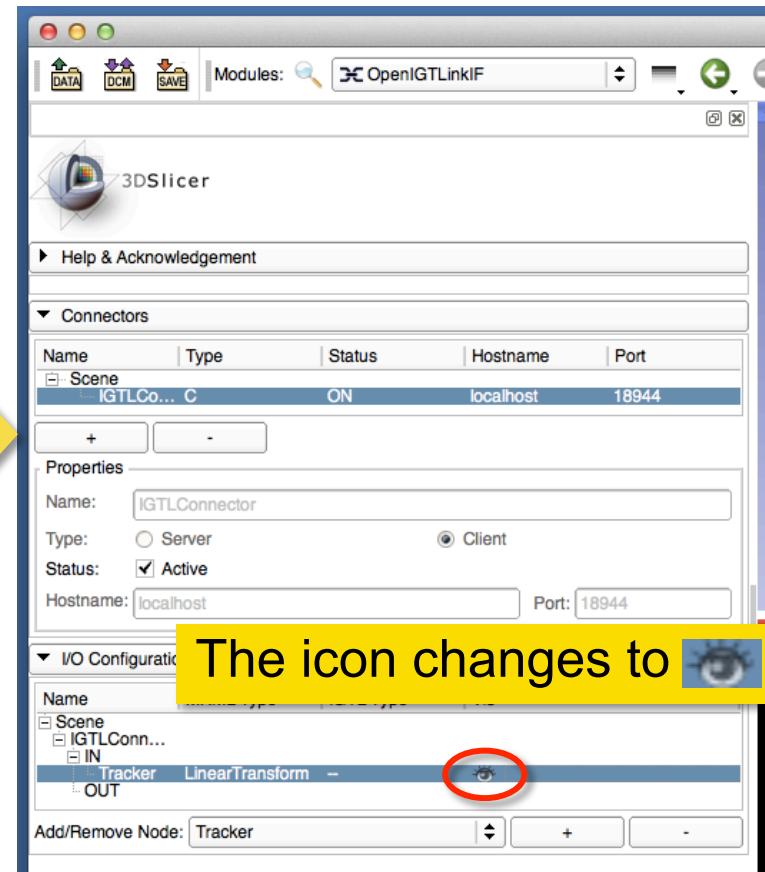
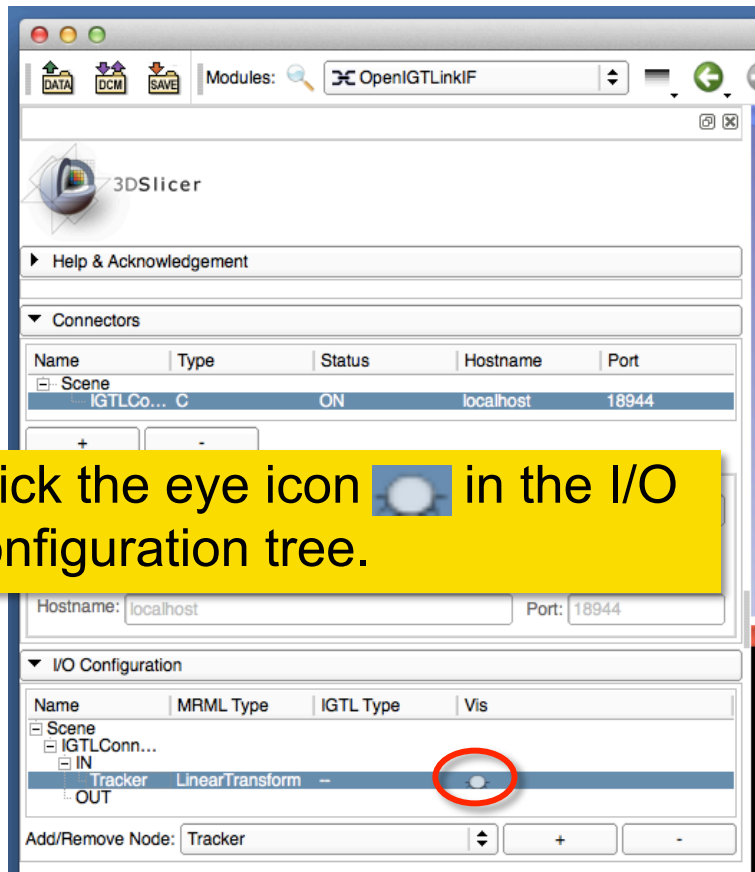
Sample image appears in the slice viewer



# Choosing Locator Source

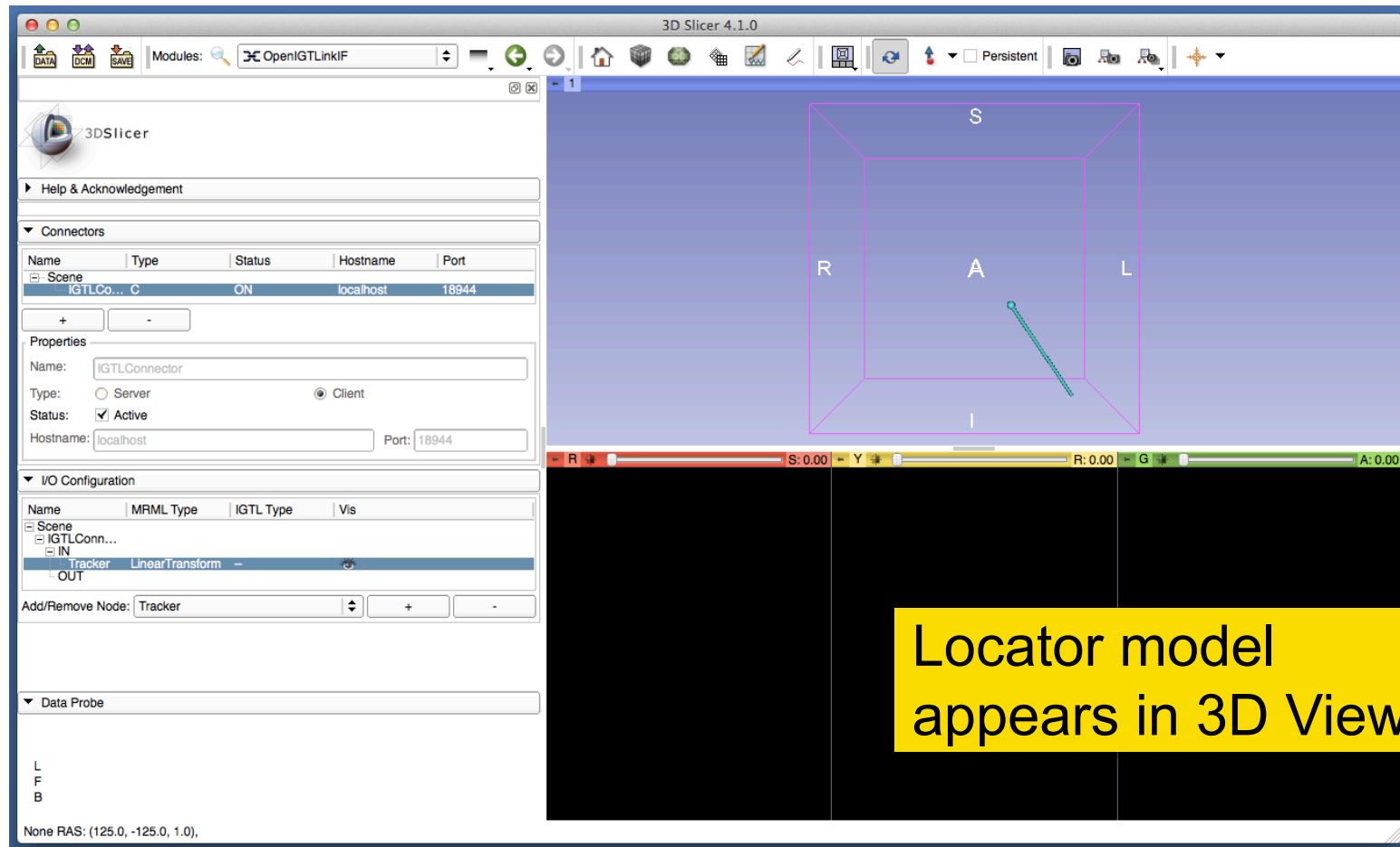


# Enable Locator





# Visualizing Locator



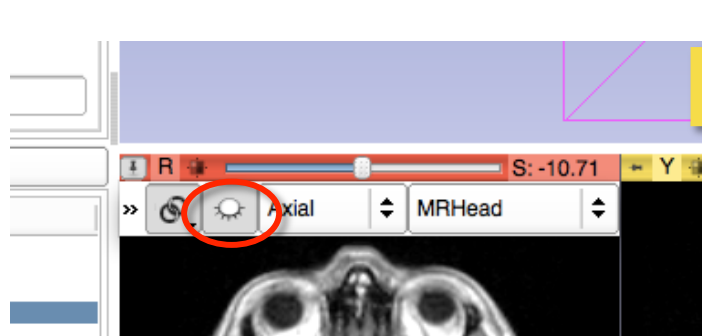
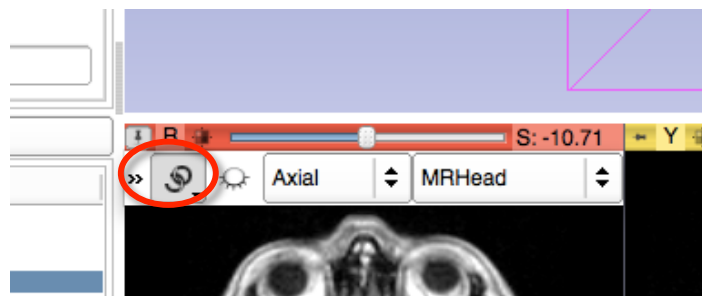
Tokuda, J

National Alliance for Medical Image Computing

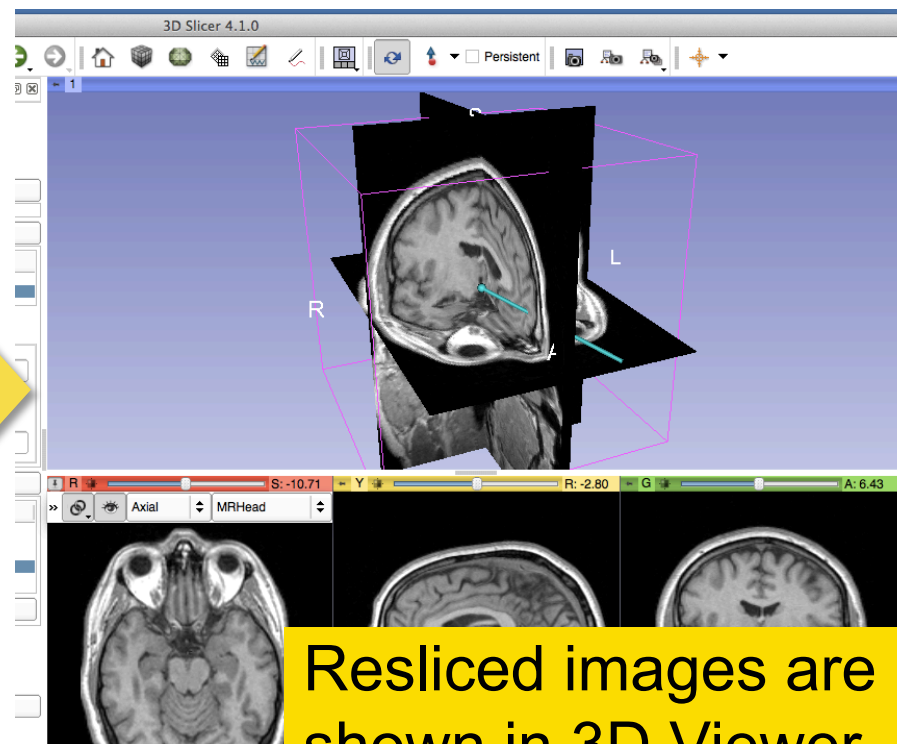
NA-MIC© 2010-2012



# Showing Resliced Images



Click  Link button  
and then  Eye button



Resliced images are  
shown in 3D Viewer



# References

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- 3D Slicer OpenIGTLinkIF Documentation Page

[http://www.slicer.org/slicerWiki/index.php/  
Modules:OpenIGTLinkIF-Documentation-4.1](http://www.slicer.org/slicerWiki/index.php/Modules:OpenIGTLinkIF-Documentation-4.1)

- 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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R01CA138586)



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(NIH U54EB005149)



Intelligent Surgical Instruments Project of METI  
(Japan)