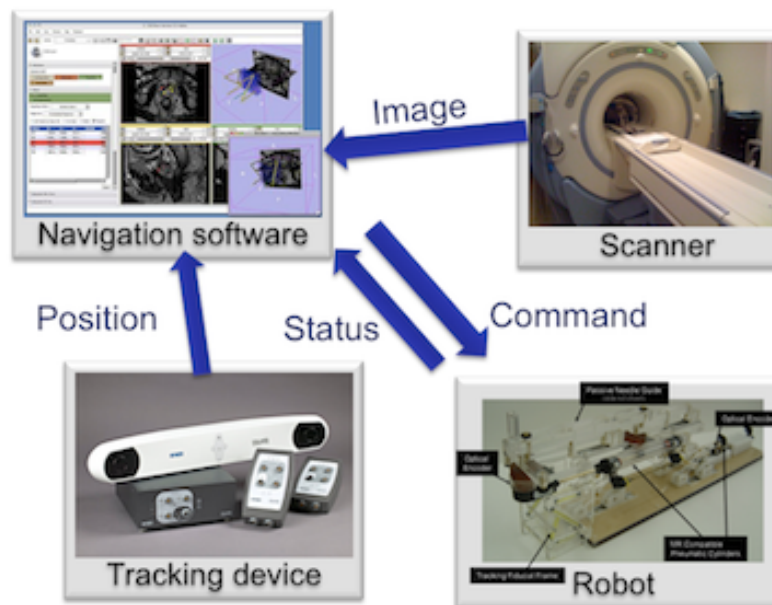


Connecting IGT Device with OpenIGTLink



Junichi Tokuda, PhD



Material

This course requires the following installation:

- 3DSlicer version 3.6 Software (Slicer3.3.6-2011-XX-XX), which can be installed from:

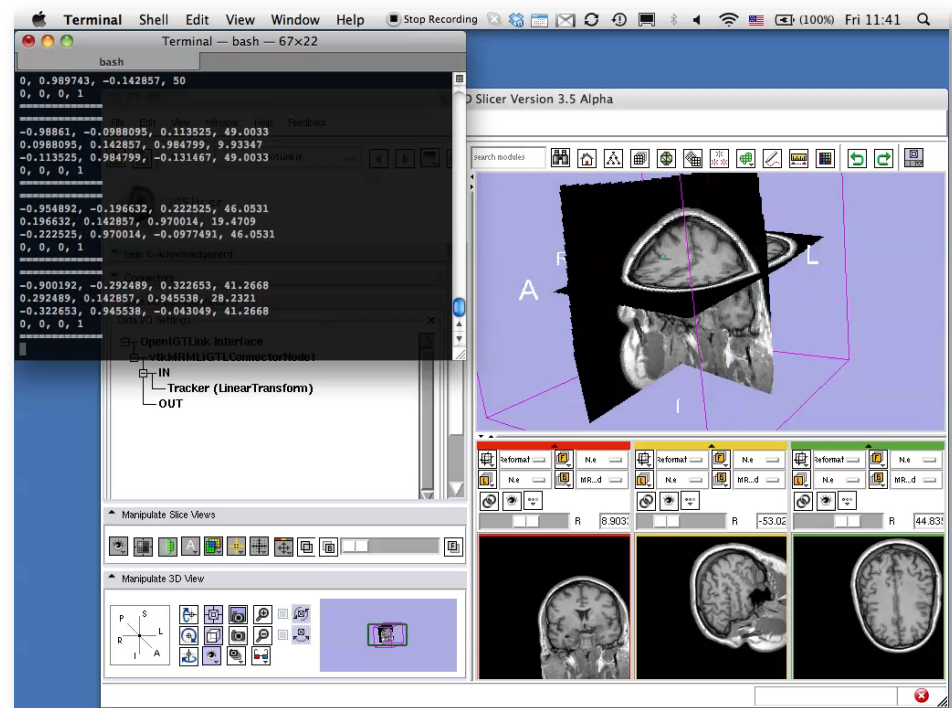
<http://www.slicer.org/pages/Special:SlicerDownloads>

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.



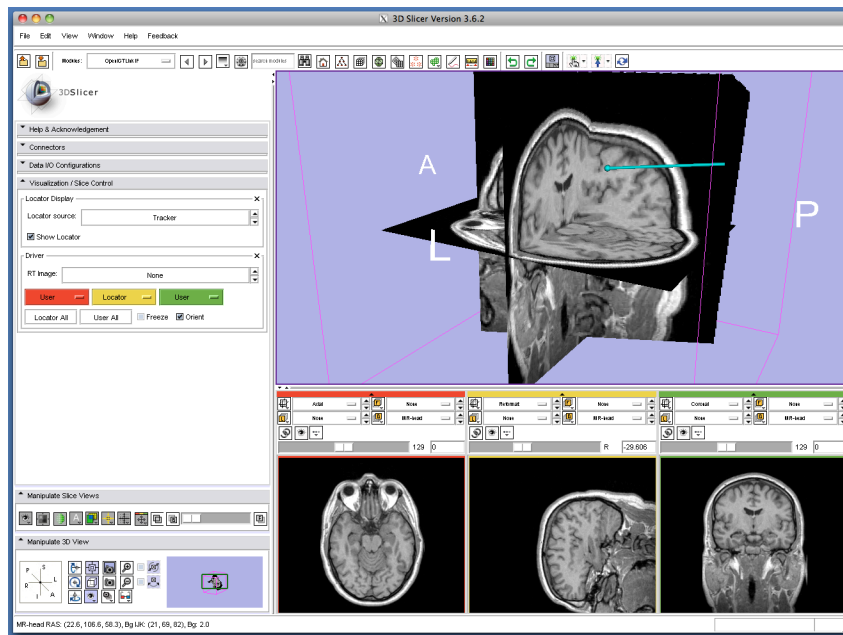


Overview

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



3DSlicer



Part 1: Configuring OpenIGTLinkIF module

Tokuda, J

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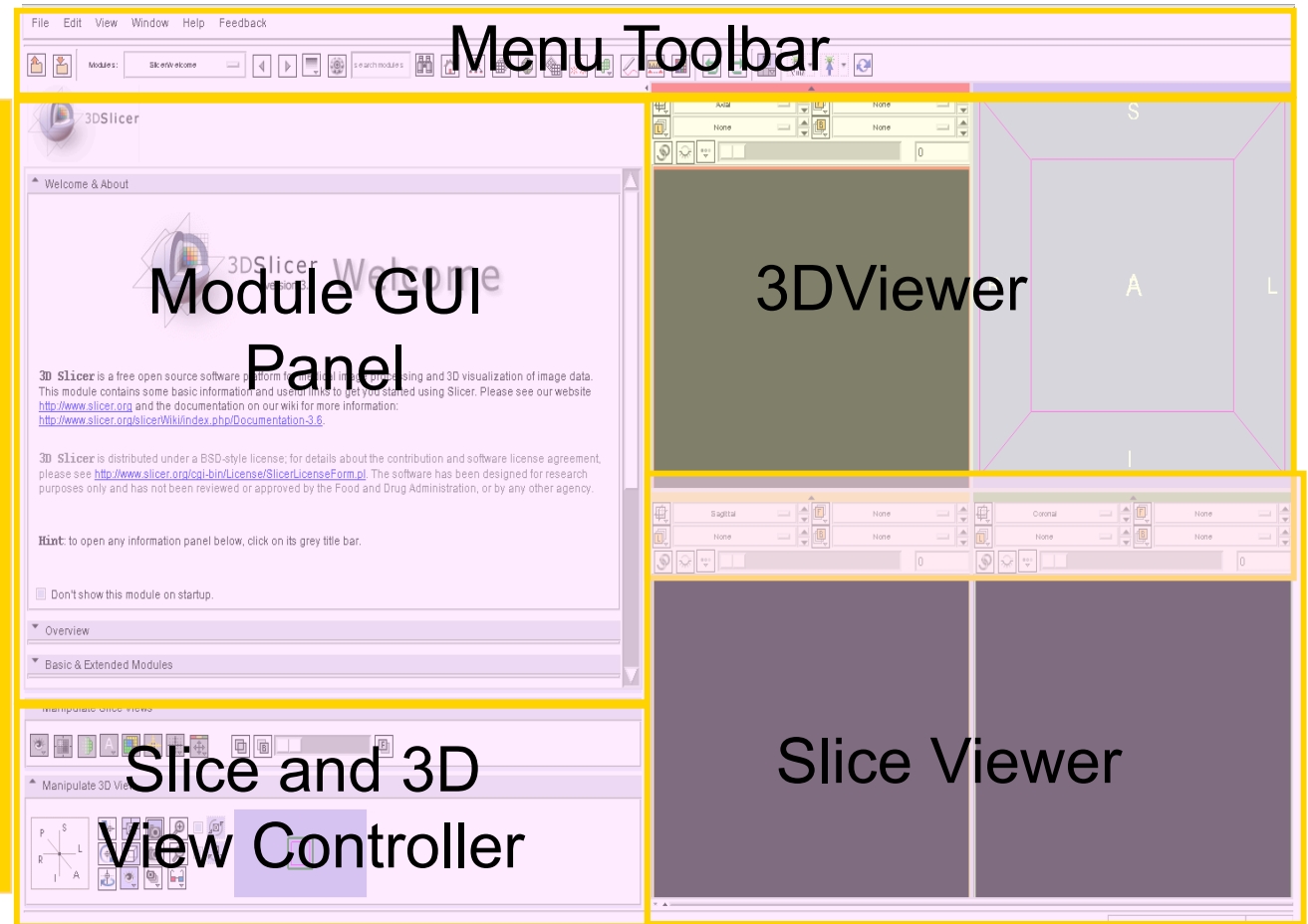
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Slicer3 GUI

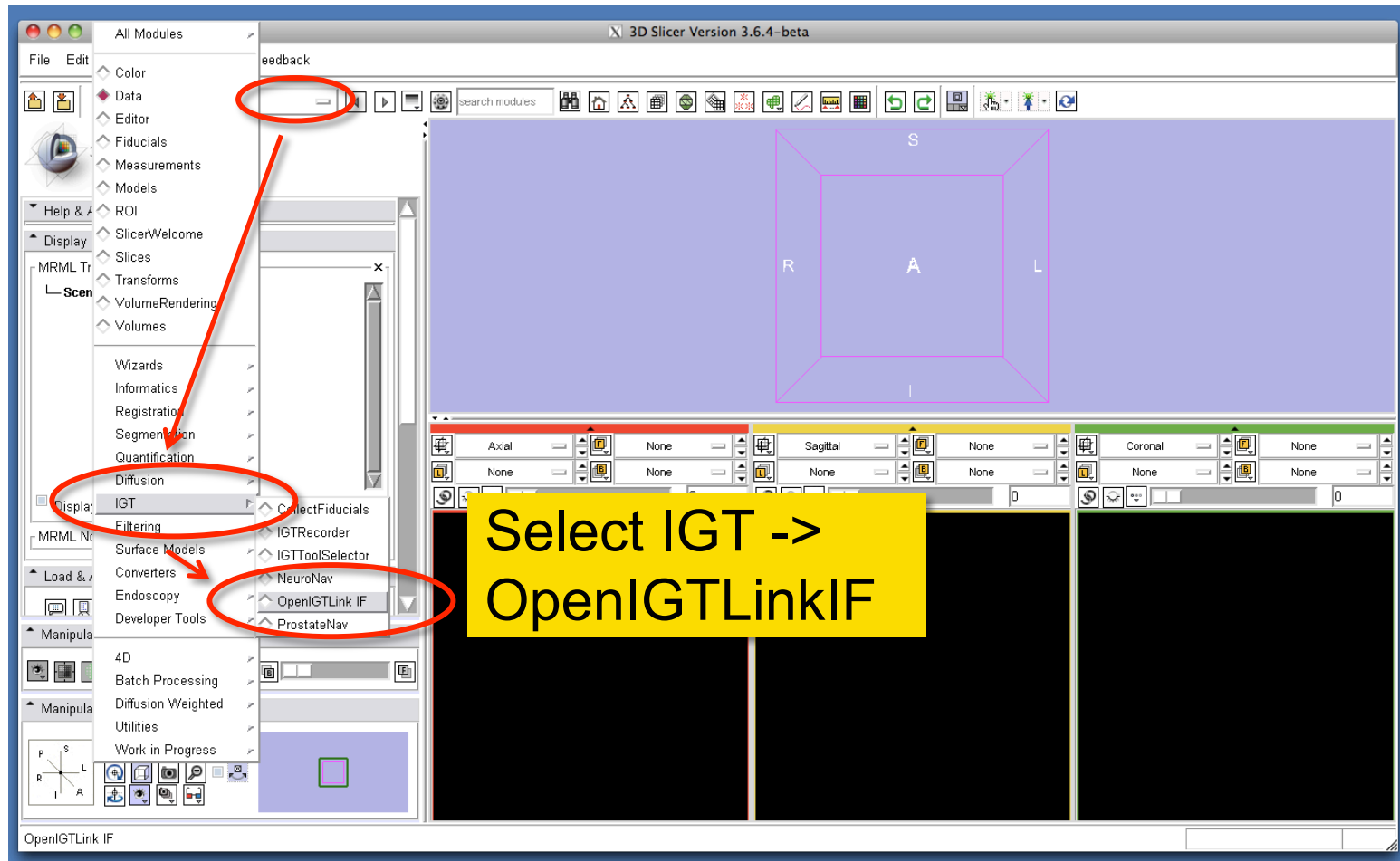
The Graphical User Interface (GUI) of Slicer3 integrates five components:

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





Starting OpenIGTLinkIF



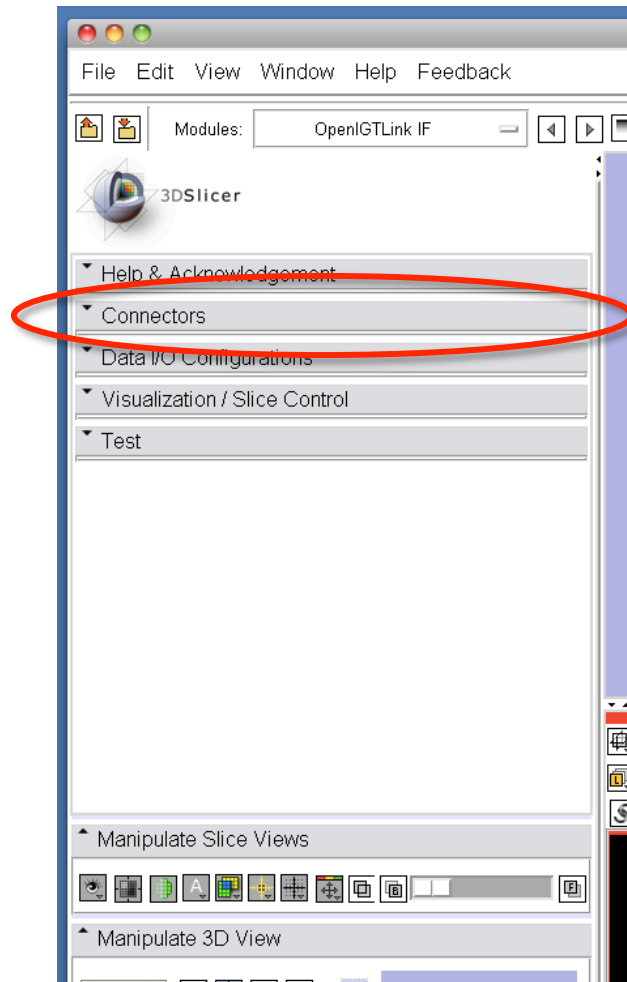
Tokuda, J

National Alliance for Medical Image Computing

NA-MIC© 2010, ARR



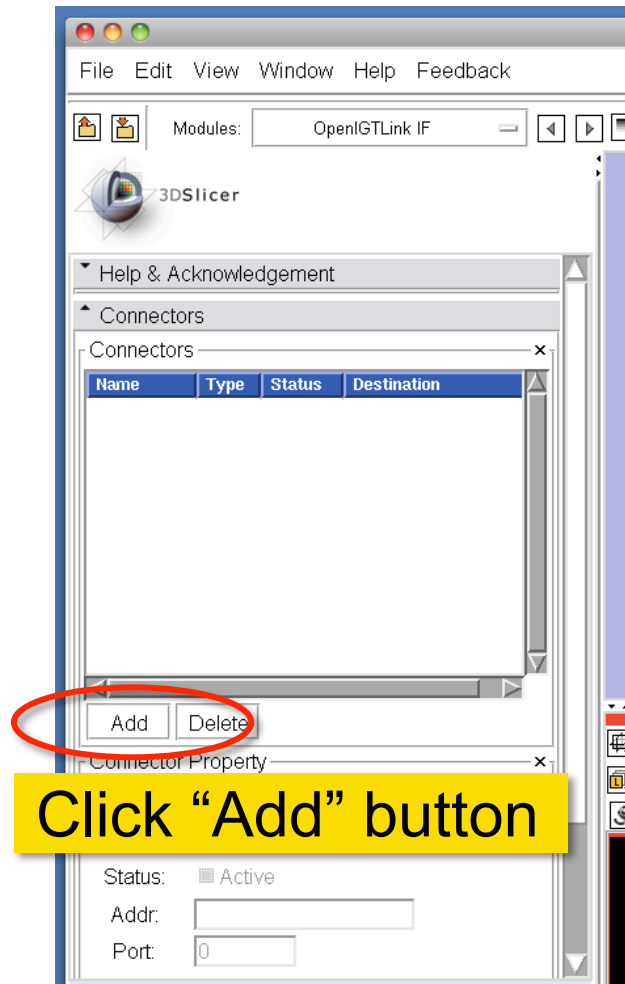
Adding Connector



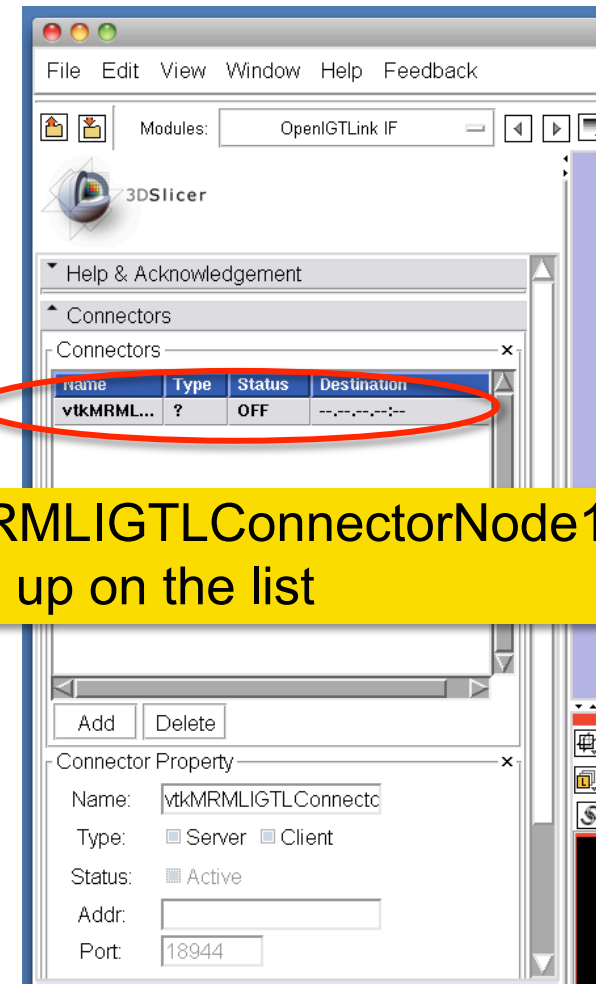
To connect 3D Slicer to external device/software using OpenIGTLink IF, a “connector” has to be created for each connection.

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

Adding Connector

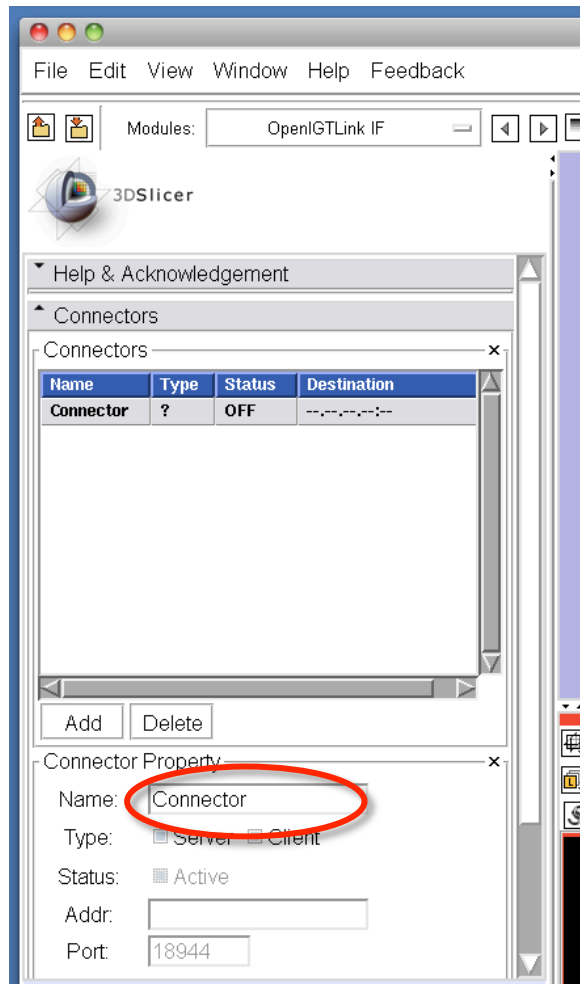


"vtkMRMLIGTLConnectorNode1" shows up on the list





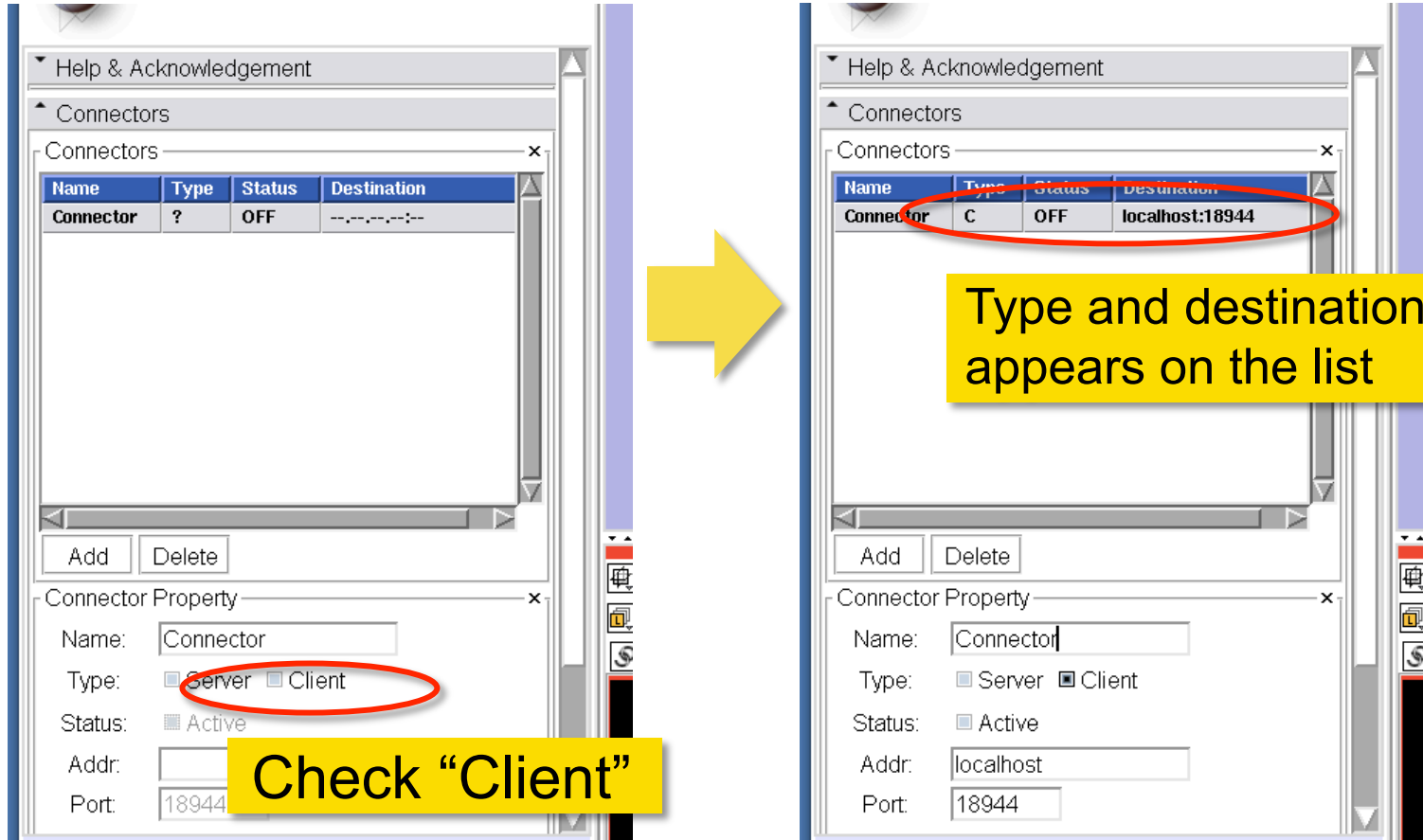
Changing Connector Name



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



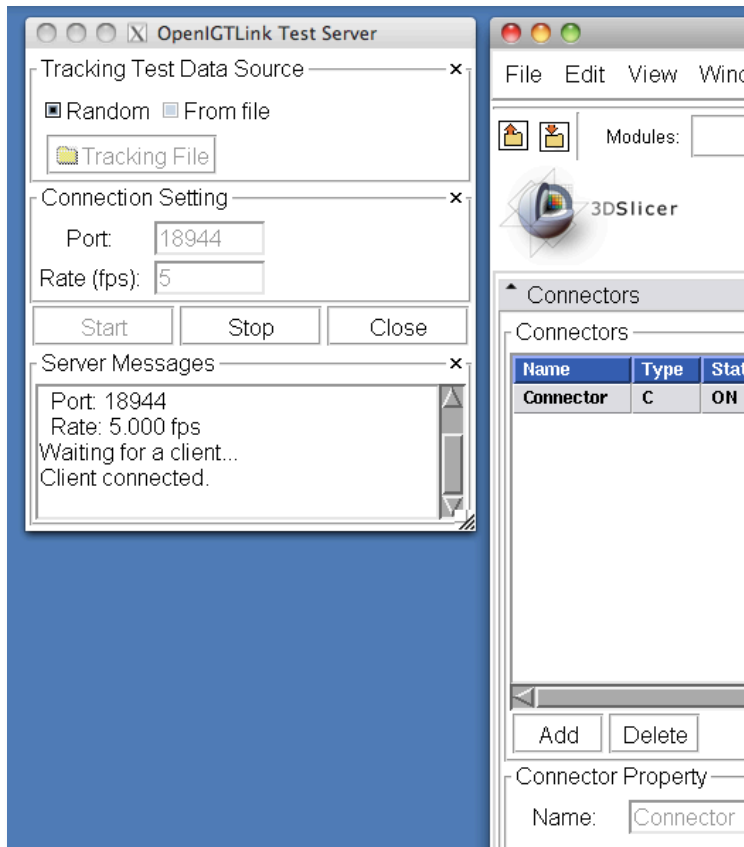
The image shows two screenshots of the 3DSlicer Connectors panel, illustrating the process of setting a connector type. A yellow arrow points from the left screenshot to the right screenshot.

Left Screenshot: The Connectors table shows a connector named "Connector" with a question mark in the Type column, "OFF" in the Status column, and a dashed line in the Destination column. In the Connector Property panel below, the "Server" radio button is selected, and the "Client" radio button is unselected. A yellow callout box with the text "Check 'Client'" points to the "Client" radio button.

Name	Type	Status	Destination
Connector	?	OFF	-----

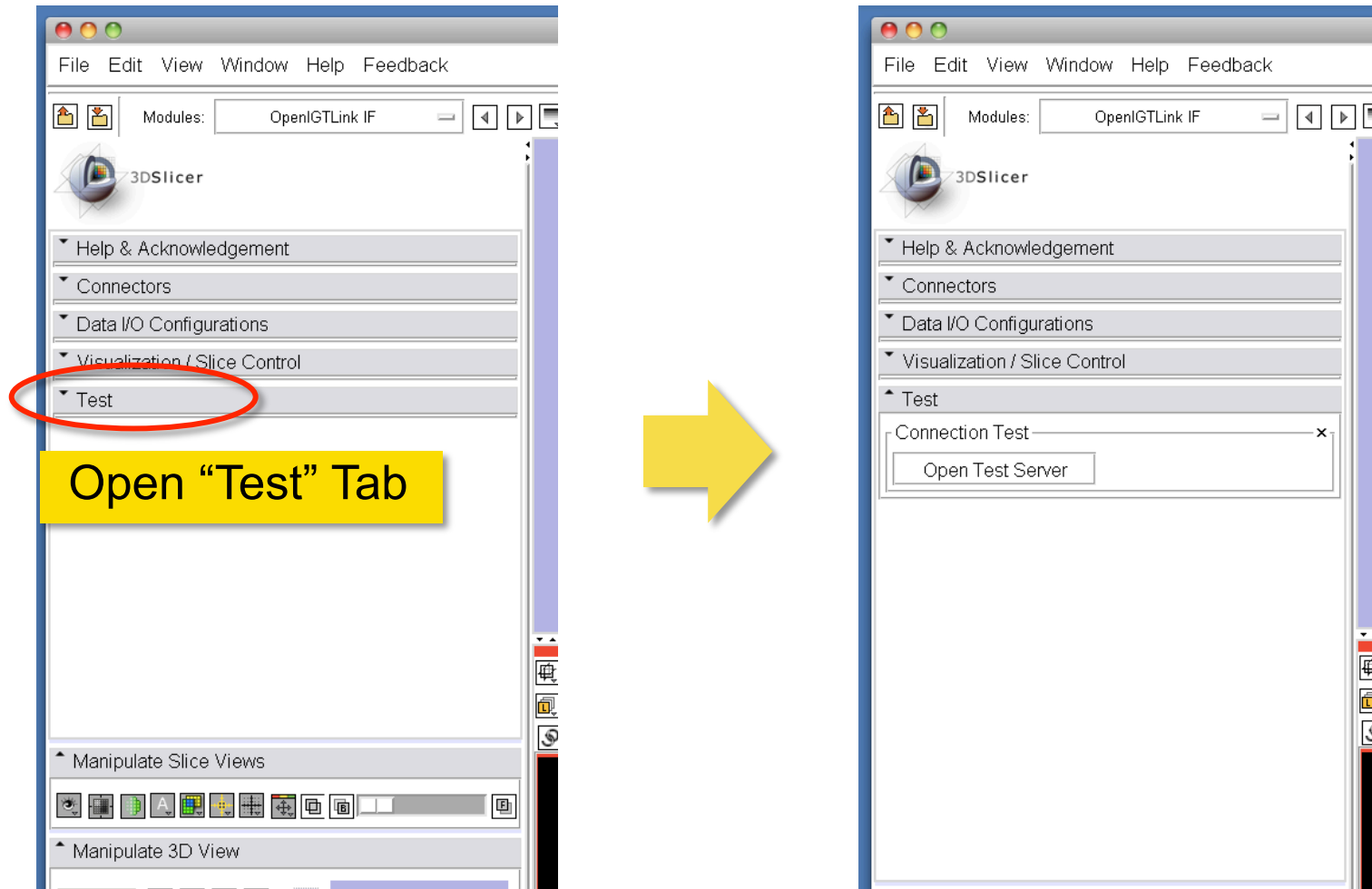
Right Screenshot: The Connectors table shows the connector "Connector" with "C" in the Type column, "OFF" in the Status column, and "localhost:18944" in the Destination column. In the Connector Property panel below, the "Client" radio button is now selected. A yellow callout box with the text "Type and destination appears on the list" points to the "C" and "localhost:18944" cells in the table.

Name	Type	Status	Destination
Connector	C	OFF	localhost:18944

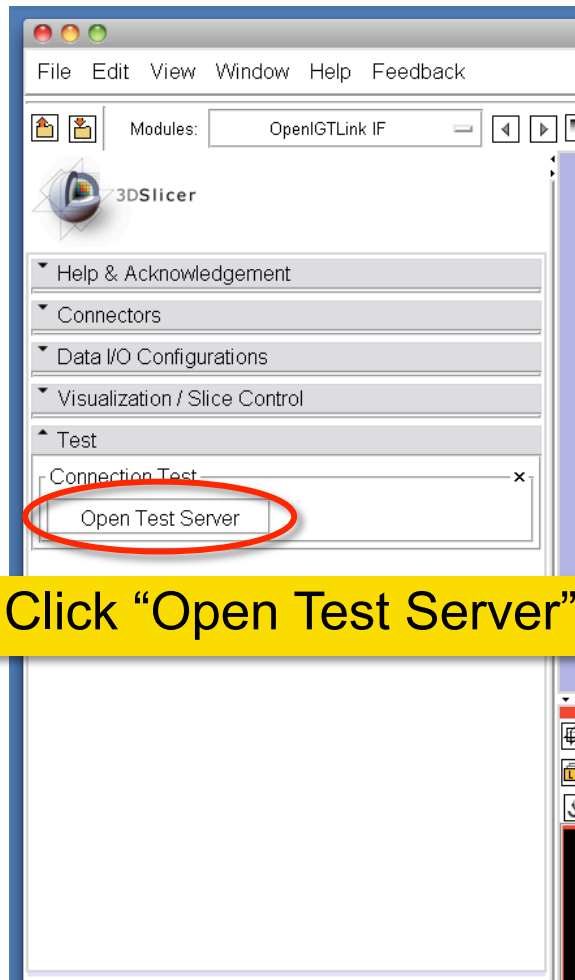


Part 2: Setting up Test Server

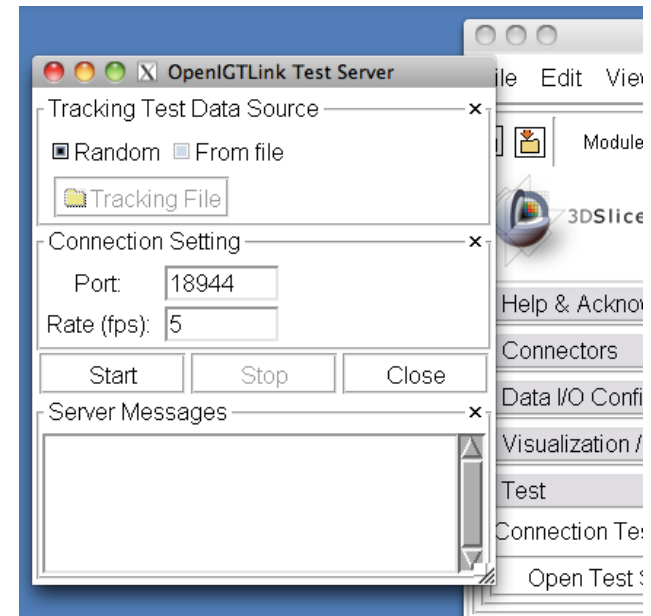
Open Test Server



Open Test Server

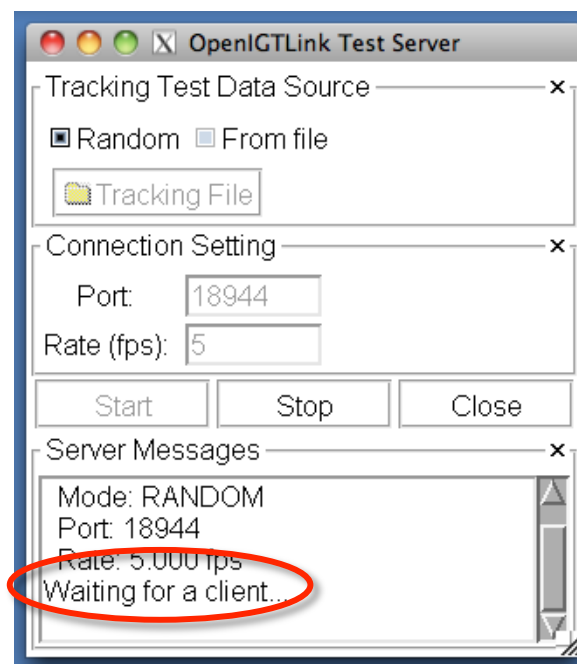
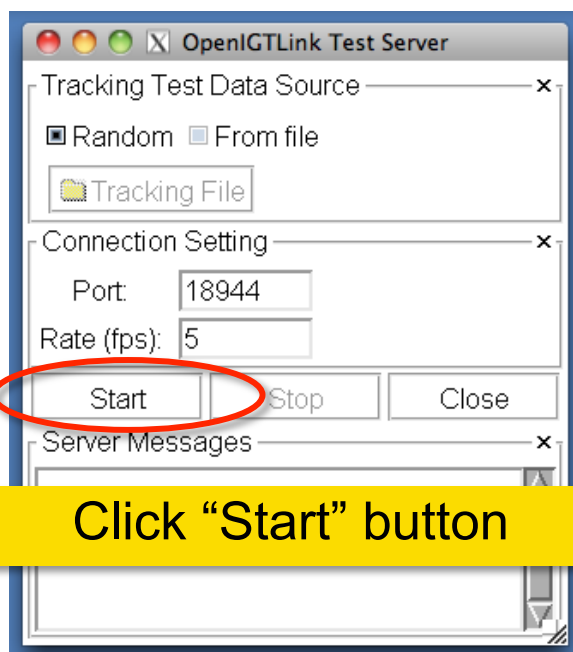


Click "Open Test Server"

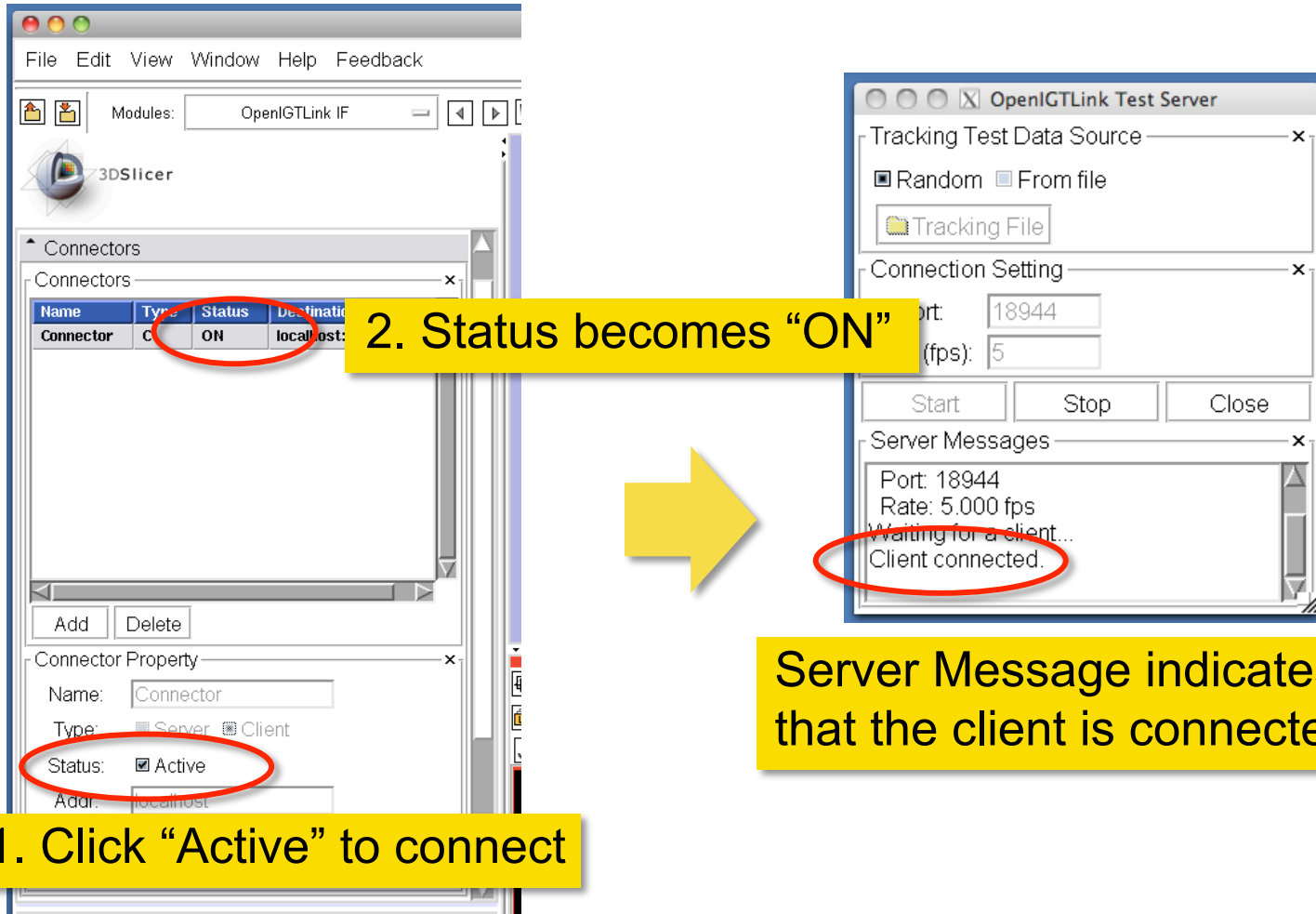


OpenIGTLink Test Server window pops up on the screen

Start Test Server



Connect to Test Server



The image shows two screenshots from the 3DSlicer software. The left screenshot shows the 'Connectors' panel with a table of connectors. The 'Status' column for the 'Connector' is circled in red. Below the table, the 'Connector Property' section has the 'Status' checkbox checked and circled in red. A yellow callout box points to the 'Status' column with the text '2. Status becomes "ON"'. The right screenshot shows the 'OpenIGTLink Test Server' dialog box. The 'Server Messages' section shows the text 'Client connected.' circled in red. A yellow callout box points to this text with the text 'Server Message indicates that the client is connected.' A large yellow arrow points from the left screenshot to the right screenshot.

Name	Type	Status	Destination
Connector	C	ON	localhost

Connector Property

Name: Connector

Type: Server Client

Status: Active

Addr: localhost

OpenIGTLink Test Server

Tracking Test Data Source

Random From file

Tracking File

Connection Setting

Port: 18944

(fps): 5

Start Stop Close

Server Messages

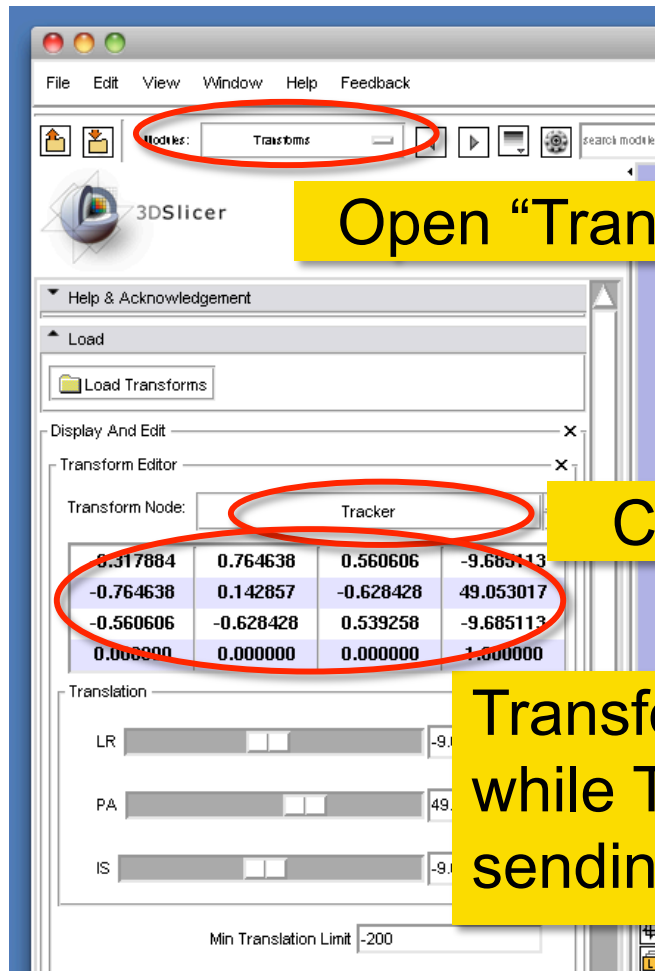
Port: 18944
Rate: 5.000 fps
Waiting for a client...
Client connected.

1. Click "Active" to connect

2. Status becomes "ON"

Server Message indicates that the client is connected.

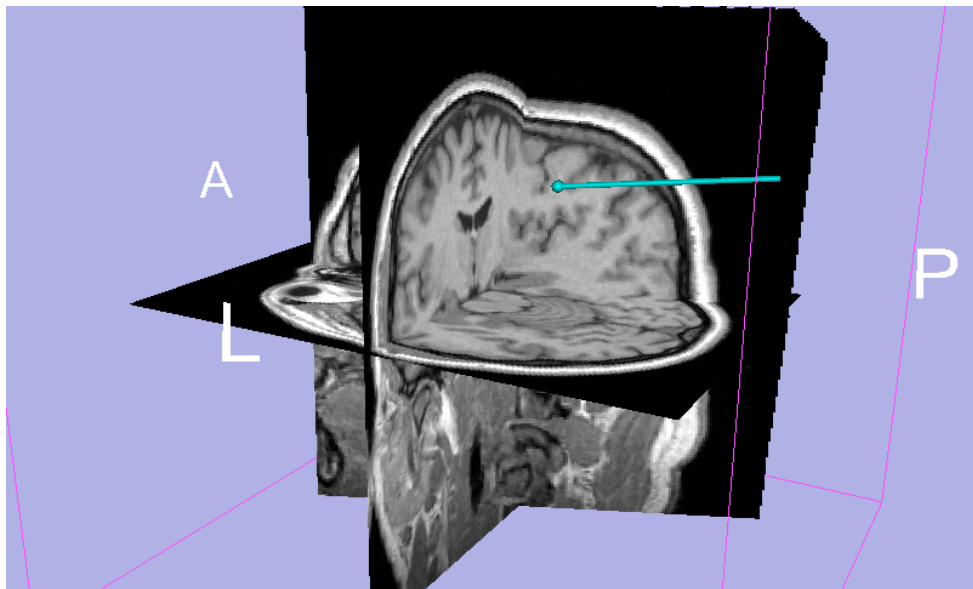
Checking Transform



Open "Transforms"

Choose "Tracker"

Transform is being updated while Tracker Simulator is sending data.



Part 3: Visualizing Tracking Data



Loading Sample MRI Data

The screenshot shows the 3DSlicer application interface. The 'File' menu is open, and the 'Download Sample Data' option is selected, which has opened a sub-menu. In this sub-menu, 'MRI Head' is highlighted with a red circle. A yellow callout box on the left contains the text: 'File -> Download Sample Data -> MRI Head'. Another yellow callout box on the right says: 'Data I/O Manager Window pops up and download starts'. Below the menu, the 'Cache & Remote Data I/O Manager Window' is visible, showing a table with columns for 'type', 'status', 'cancel', 'clear', 'info', and 'source uri'. The 'source uri' column contains the URL: '(cached): http://www.slicer.org/slicerWiki/images/4/43/MR-head.nrrd'. A red circle highlights this window. At the bottom right, the 'Manipulate Slice Views' panel shows three MRI slices (Axial, Sagittal, Coronal) with a red circle around them. A yellow callout box at the bottom right says: 'Sample MRI shows up'. A large yellow arrow points from the menu area towards the slice views.

File -> Download Sample Data -> MRI Head

Data I/O Manager Window pops up and download starts

Sample MRI shows up



Choosing Locator Source

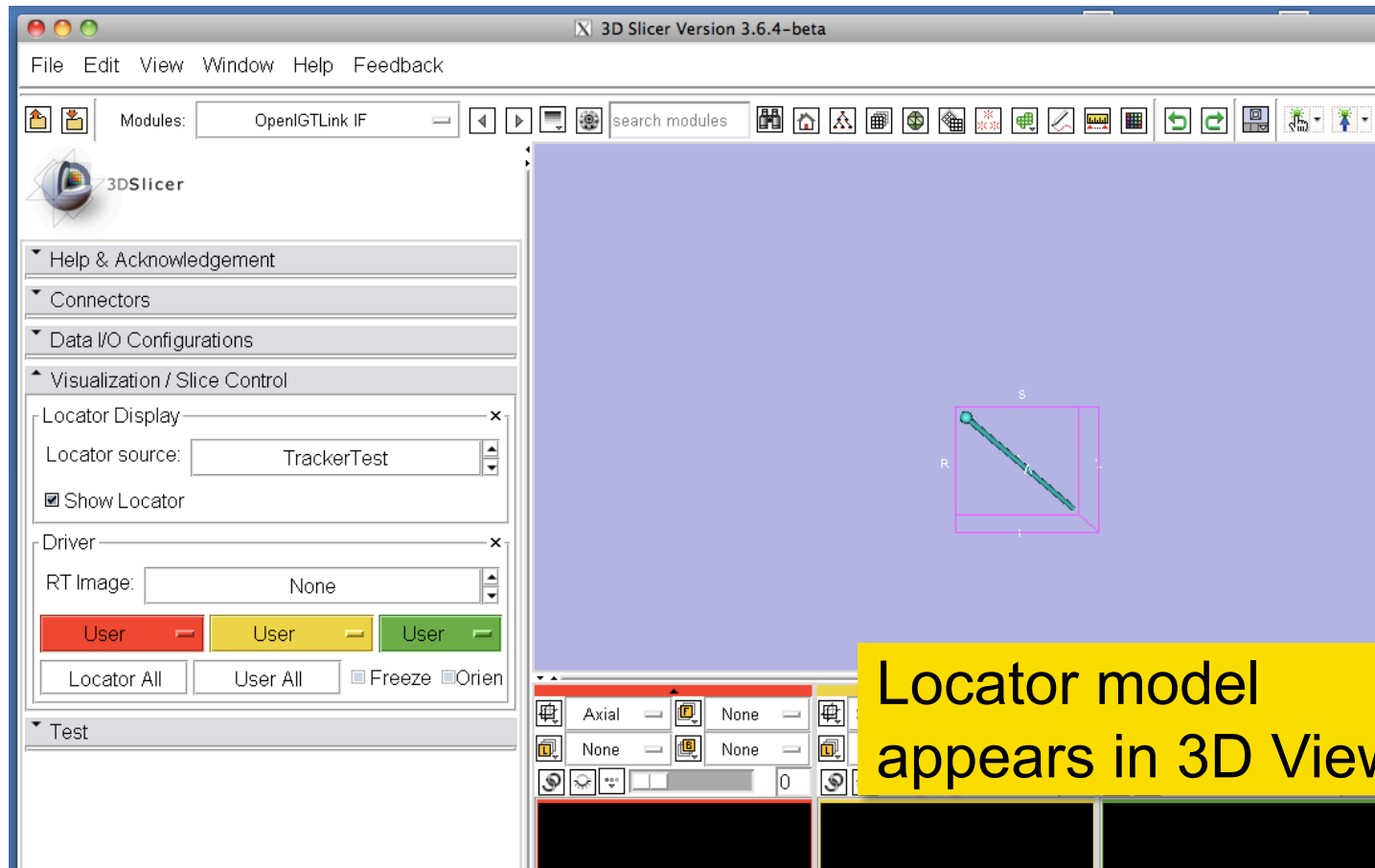
1. Open "Visualization / Slice Control" Tab

2. Make sure "TrackerTest" is selected.

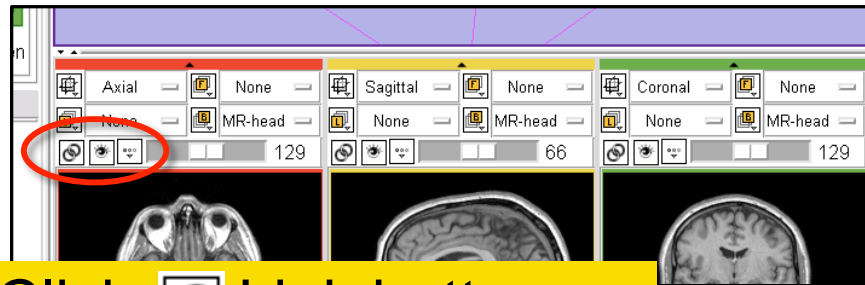
3. Click "Show Locator"



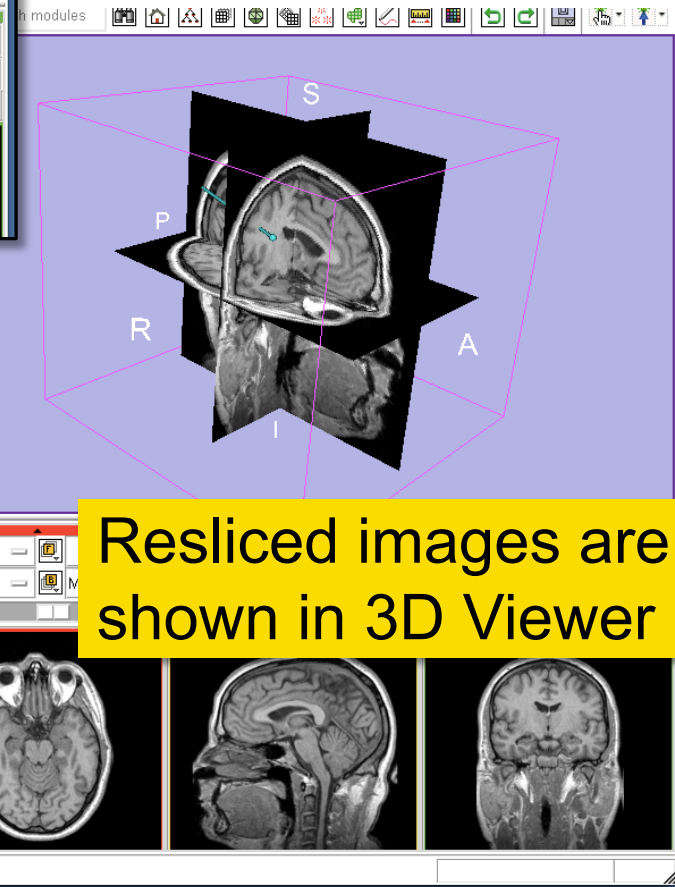
Visualizing Locator



Showing Resliced Images

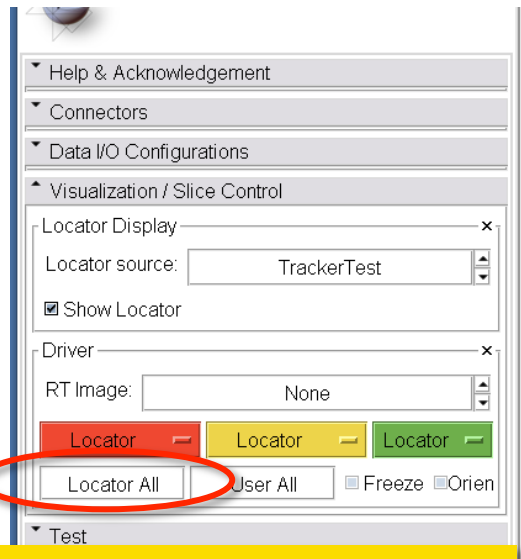


Click  Link button
and then  Eye button

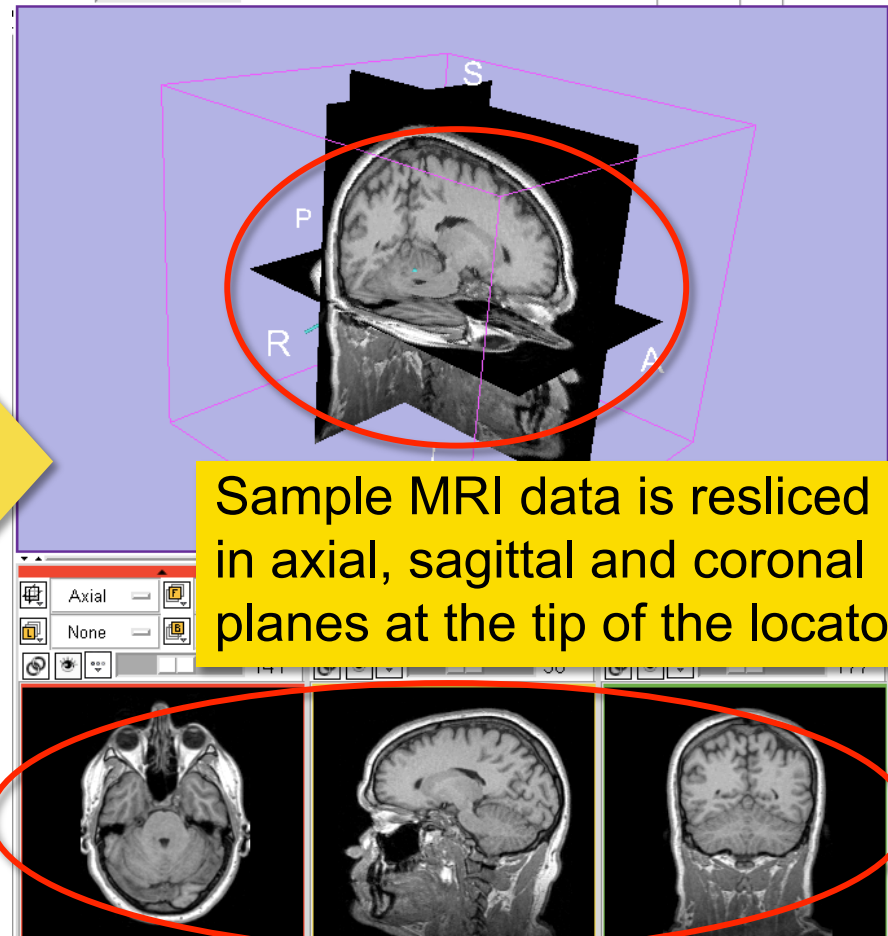


Resliced images are
shown in 3D Viewer

Setting Slice Driver

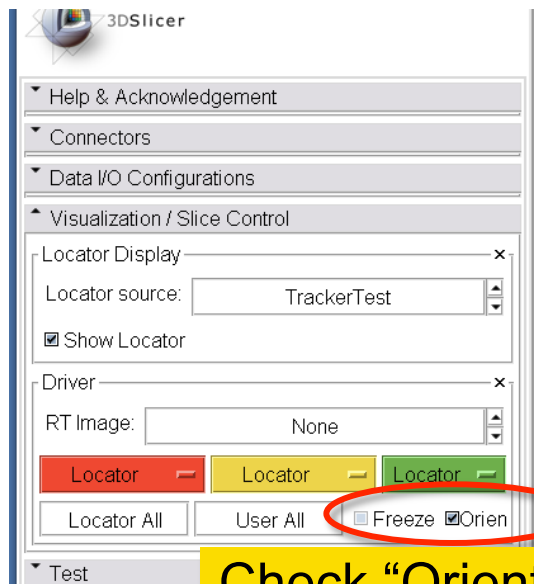


1. Open "Visualization / Slice Control" Tab

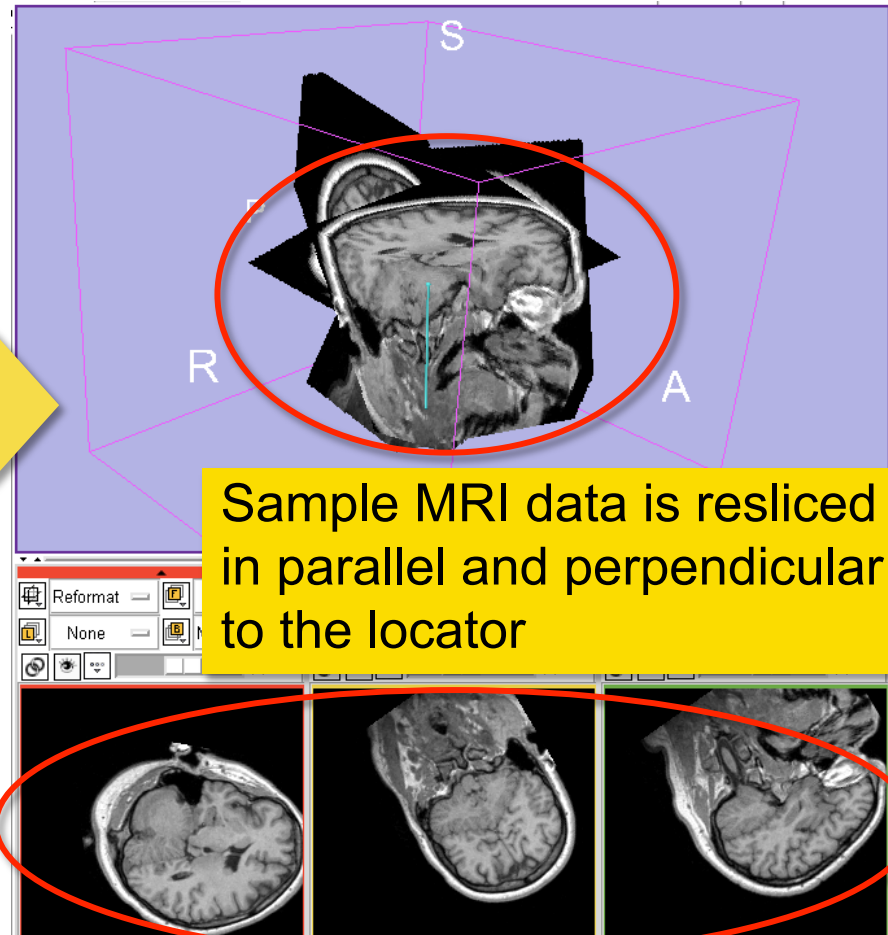


Sample MRI data is resliced in axial, sagittal and coronal planes at the tip of the locator

Setting Slice Orientation



Check "Orient"





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.



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Prostate Intervention (NIH R01CA111288)



National Alliance for Medical Image Computing
(NIH U54EB005149)



Intelligent Surgical Instruments Project of METI
(Japan)