

Slicer3 Training Compendium

Connecting IGT Device with OpenIGTLink



Junichi Tokuda, PhD

Tokuda, J

National Alliance for Medical Image Computing



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.

Tokuda, J

National Alliance for Medical Image Computing



Learning objective

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



Tokuda, J

National Alliance for Medical Image Computing



Overview

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

Tokuda, J

National Alliance for Medical Image Computing





Part 1: Configuring OpenIGTLinkIF module

Tokuda, J National Alliance for Medical Image Computing



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

SDSlicer Welcome & About			
Module GUIe	3DView <mark>er</mark> •		
30. Slicer is a free open source software printing including to the software software printing in the software soft			
please see <u>http://www.slicer.org/col-bin/licensel%licer.icenseForm.pl</u> The software has been designed for research purposes only and has not been reviewed or approved by the Food and Drug Administration, or by any other agency. Hint: to open any information panel below, click on its grey title bar.			
Opritshow this module on startup. Overview Basic & Extended Modules Memorylate value in the			
Manpulate 3D MSTICE and 3D	Slice Viewer		

Tokuda, J

National Alliance for Medical Image Computing



Starting OpenIGTLinkIF



Tokuda, J

National Alliance for Medical Image Computing



Adding Connector

$\Theta \Theta \Theta$	
File Edit View Window Help Feedback	File Edit View Window Help Feedback
Modules OpenIGTLink IF = I I I C search	nodule
3DSlicer	3DSlicer
Help & Acknowledgement	
Connectors	
Connectors	
Name Type Status Destination	Type Status Destination
	Connector1 ? OFF
	"Connector1" or
	"vtkMRMLIGTLConnectorNode1"
	— shows up on the list
Add Delete	
Connector Property X	Add Delete
Name:	Name: Connector 1
Click "Add" button	Type: Server Client
SICK AUG DULLOIT	Status: Active
Addr:	Addr. localhost
	Port: 18944
Data I/O Configurations	Configurations Sector
Visualization / Slice Control	▼ Visualization / Slice Control
Manipulate Slice Views	A Manipulate Olice Meyer
	manipulate Since views

Tokuda, J

National Alliance for Medical Image Computing



Setting Connector Type

	000
\sim	File Edit View Window Help Feedback
Help & Acknowledgement	Modules OpenIGTLink IF = () (search module
Connectors	3DSlicer
Connectors	
Name Type Status Destination	Connectors
Connector1 ? OFF:	Connectors X
	Name Type Status Destination A Connect r1 S WAIT 38944 A
	Status shows "WAIT."
	T T
	Add Delete
	Connector Property X
Add Delete	Name: Connector1
Connector Pr 1 Chock "Sorvor"	Status I Active
Name:	Now 3D Slicer is
Type: Server Client	I Dat weiting for o
Status: Active	waiting for a
Addr: localh	^{***} connection from the
Port: 18944 2. Check ACTIVE	
▼ Data VO OppEnventiona	Tracking Simulator
Tokuda	



Terminal — TrackerClient — 80×24

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

4

Tokuda, J

National Alliance for Medical Image Computing



Extracting Simulator Files

			In the .zip archive of Tracking Simulator contains the following command line programs:	
0 0 0 ▲ ►	OIGTL_Simulators	Q.	ImagerClient	
DEVICES Macintosh HD Disk SHARED	Ole 1 _ Simulators OpenIGTLinkExamples_Darwin_x86.tgz	ImagerClient ImagerServer ReceiveClient ReceiveServer	ImagerServer	
▶ PLACES▶ SEARCH FOR	CES StatusServer RCH FOR TrackerClient TrackerClient2 TrackerServer	ReceiverClient		
			StatusClient	
	10 items, 230.72 GB available	ии	StatusServer	
			TrackerClient (used in this Tutoria	ıl)
			TrackerClient2	
			TracerServer	
_			TrackerServer2	

Tokuda, J



Starting Tracking Simulator

0 0	Te	erminal — bash –	- 80×24		
Last login: Fri Dec artemis:~ junichi\$ artemis:~ junichi\$ artemis:~ junichi\$ o artemis:Downloads ju artemis:DIGTL Simula	3 14:54:44 cd Downloads unichi\$ cd (ators junic)	3 on ttys002 5/ JIGTL_Simulators ni\$ ls	/		8
ImagerClient Reco ImagerServer Reco artemis:0IGTL_Simula	≥iveClient iveServer ators junicl	StatusClient StatusServer hi\$	TrackerClient TrackerClient2	TrackerServer TrackerServer2	
-	_				//

- 1. Unizp the downloaded file in the working directory.
- 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.

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.

Tokuda, J



Checking Connection



Tokuda, J





Tokuda, J National Alliance for Medical Image Computing



Choosing Locator Source



Tokuda, J

National Alliance for Medical Image Computing



Choosing Locator Source

Modules OpenIGTLink IF I I I I C search module	
3DSlicer	🖹 3D Slicer Version 3.3 Alpha Feedback
Help & Acknowledgement	s and a second sec
Connectors	
Data I/O Configurations	Locator model
Visualization / Slice Control	annears in 3D View
Locator source: Tracker (TRANSFORM) =	
Show Locator	
Driver x	
Check "Show Locator"	Freeze Orient
· · · · · · · · · · · · · · · · · · ·	
* Manipulate Slice Views	
Mangarate 30 View	
File	(°)

Tokuda, J

National Alliance for Medical Image Computing



Checking Transform



Tokuda, J

National Alliance for Medical Image Computing





• 3D Slicer OpenIGTLinkIF Documentation Page

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.

Tokuda, J

National Alliance for Medical Image Computing



Acknowledgments



National Center for Image Guided Therapy (NIH P41RR019703, P01CA067165), BRP Enabling Technologies for MRI–Guided Prostate Intervention (NIH R01CA111288)



National Alliance for Medical Image Computing (NIH U54EB005149)



Intelligent Surgical Instruments Project of METI (Japan)

Tokuda, J

National Alliance for Medical Image Computing