

Project Management and Software Development FMtrack - Optical Tracking System for Medical Procedural Simulator

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# **Problem Statement**

- Automatic identification and tracking of non-rigid medical instruments
- Simulation of medical images
- Goal: Creation of a training/assessment tool for minimally-invasive procedures





Non-rigid instrument<sup>[2]</sup>

Simulation setup<sup>[1]</sup>



<u>http://www.medability.de/for-instrument-manufacturers/</u> (26.10.2016)
<u>https://www.merit.com/interventional-oncology-spine/spine-ablation/ablation/star-tumor-ablation-system/</u> (07.02.2017)

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# **Original GANTT Project Plan**

W 43/201	6 W 44/20	16 W 45/2016	5 W 46/2016	W 47	/2016	W 48/2016	W 49/2016	W 50/2016	W 51/2016	W 52/2016	W 1/2017	W 2/2017	W 3/2017	W 4/2017	W 5/2017	W 6/2017
	requirem	ents presen	tation													
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			Testing/documentation											$\rightarrow$		
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# **Actual GANTT Project Plan**

VV 43/201	10 10 44/2010	VV 40/2010	VV 40/2010	VV 477	2010	VV 40/2010	VV 4J/2010	VV J0/2010	VV J1/2010	VV J2/2010	VV 1/2017	VV 2/2017	VV 3/2017	VV 4/2017	VV 3/2017	VV 0/201
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						Pivot										
						Calibration										
								Rigid Trac	king Imple	mentation					-	
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														fina	al presenta	tion



## Requirements

requirement	achieved
Real-time processing of data	yes
Tracking and identification of medical instruments (multiple, rigid, non-rigid)	Rigid: works Multiple: not tested yet Non-rigid: not working yet
Simulated images (current instruments, correct position/shape)	Instruments, position: works Shape: not working yet



## Components





# **Class Design**

FramosTracker -instrument_listener : Thread -simulator_listener : Thread		QThread					
-m_calibrated : boolean		Thread					
+FramosTracker(instrument_port : int, simulator_port : int) +update() : void +calibrate() : void +isCalibrated() : boolean +listen() : boolean +getTrackerToWorldPosition() : chai3d::cVector3d +getLocalPosition() : chai3d::cVector3d +getWorldPosition() : chai3d::cVector3d -computeTipPosition()	1 2	-m_port : int -matrices : std::vector <std::pair<chai3d::cmatrix3d, chai3d::cvector3d="">&gt; -m_calibrate : boole an -rot : chai3d::cMatrix3d -pos : chai3d::cVector3d +Thread(port : int) +getMatrices() : std::vector<std::pair<chai3d::cmatrix3d, chai3d::cvector3d="">&gt; +getRotation() : chai3d::cMatrix3d +getPosition() : chai3d::cVector3d</std::pair<chai3d::cmatrix3d,></std::pair<chai3d::cmatrix3d,>					
0n 1 Model	-	+setCalibration(calibrate : boolean) : void -run() -ReceiveTransform(socket : igtl::Socket, header : igtl::MessageHeader) : int					
-m_ots : FramosTracker							



Setup



Application

### Instrument with markers



Tracking Cameras



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### Demo

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# **Future Work**

- More testing
- Tracking of multiple instruments
- Non-rigid tracking



## Summary

### • Achieved:

- OpenIGTLink Interface / optical tracking integrated in Medability software
- Rigid instruments can be tracked
- Position can be shown

### • Problems:

- Time
- Linking problems

### • Still to do:

- Tracking of multiple instruments
- Non-rigid tracking

