



*Project Management and Software Development for
Medical Applications*

A Virtual Multi-View Optical Tracking System

Intermediate Presentation – 23NOV16

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Supervisor: Benjamin Busam

Partners: FRAMOS & IFL

Presented by: Mahdi Hamad

Problem Statement

Implement a Framework to overcome the line-of-sight issue by using a moveable tracked planar mirror

Requirements and Specifications

Tracking

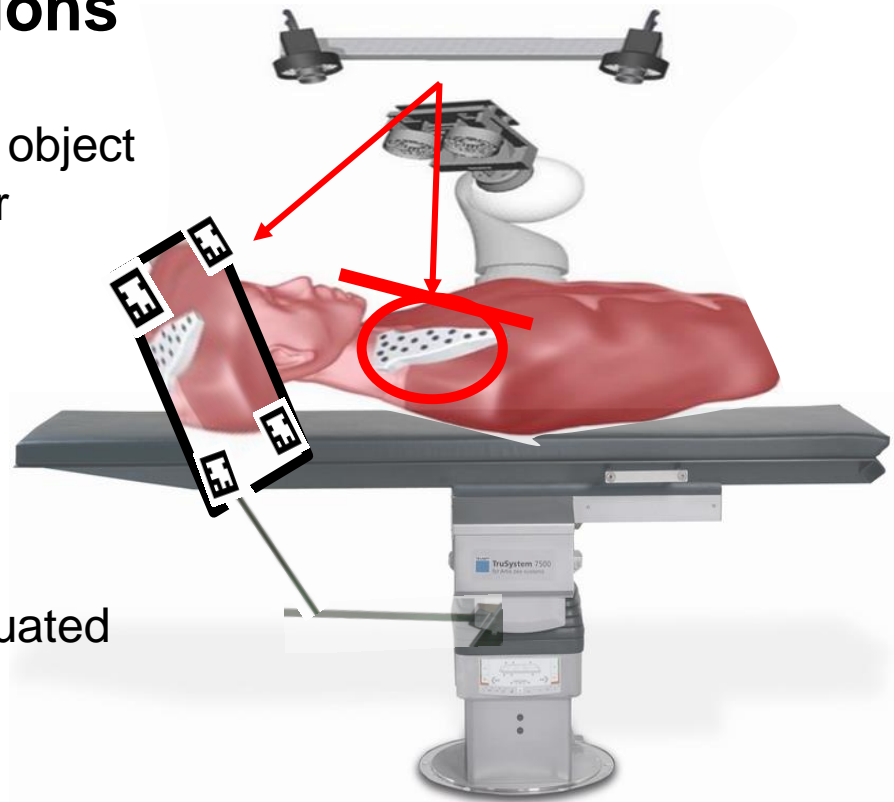
Tracking of the movable mirror & object
Fusion of data from OTS & Mirror

GUI

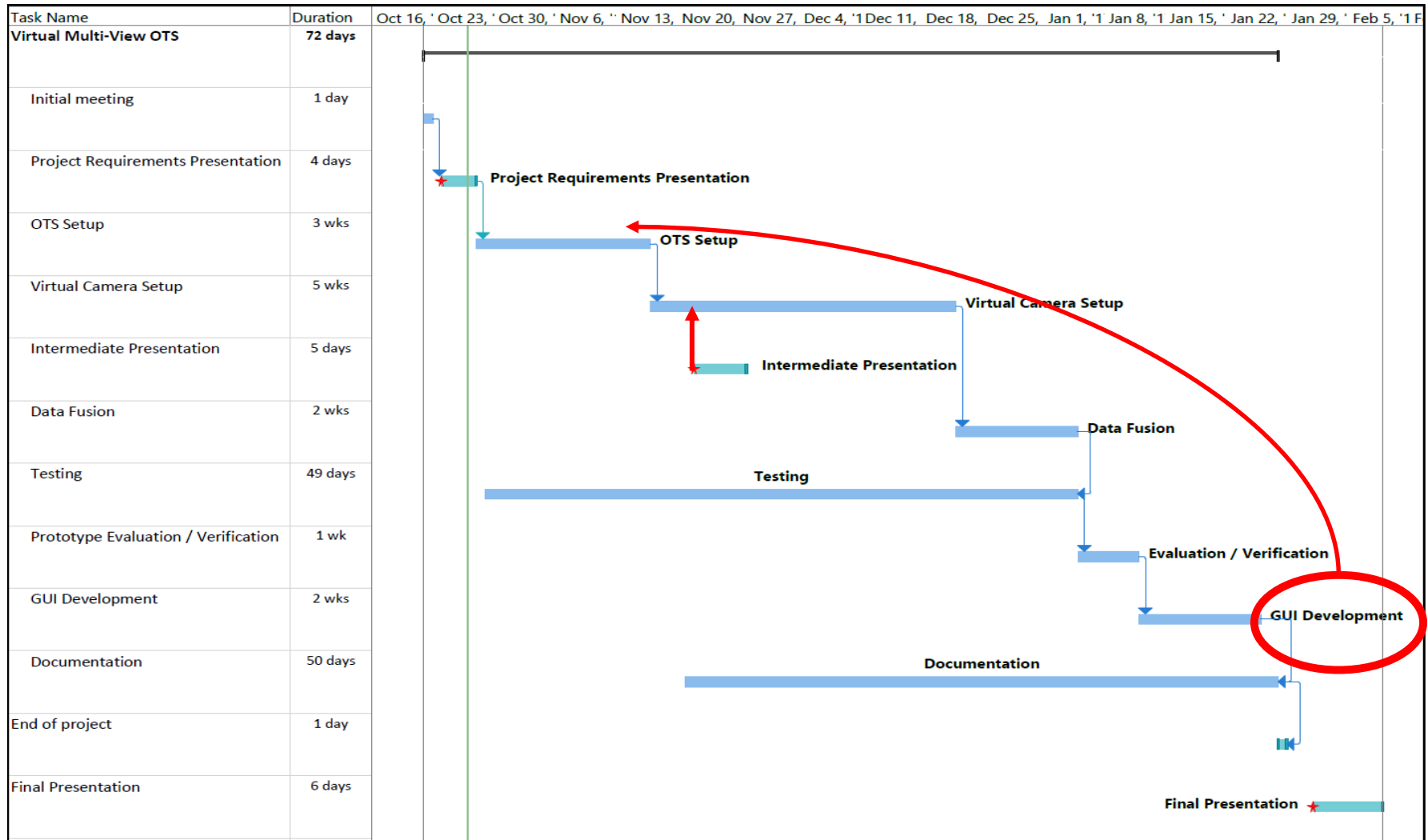
Server Implementation
Data Visualization

Testing

Performance of prototype is evaluated
in different occlusion setups



Original Project Plan



Work Progress

The screenshot shows a software application window titled "MainWindow". It is divided into three main sections:

- Object Data:** Contains input fields for "Object Server" (localhost), "Port" (8080), and "FrameRate" (400). Below these are "Connect" and "Disconnect" buttons. A text area displays:

```
position = (46.8847, 17.373, 46.8847)
quaternion = (0, -0.6562, 0.57735, -0.117668)
position = (42.4999, 26.3392, 42.4999)
quaternion = (0, -0.641179, 0.57735, -0.182575)
```
- Mirror Data:** Contains input fields for "Mirror Server" (localhost), "Port" (9000), and "FrameRate" (300). Below these are "Connect" and "Disconnect" buttons. A text area displays:

```
position = (9.69881, -49.0503, 9.69881)
quaternion = (0, -0.5151, 0.57735, 0.423221)
position = (19.248, -46.1467, 19.248)
quaternion = (0, -0.554769, 0.57735, 0.369696)
```
- 3D Visualization:** A large black rectangular area on the right side of the window. It contains a dense cluster of small green dots. In the bottom-left corner of this area, the text "1342.2 FPS" is visible.

Red annotations are present on the image:

- A red arrow points from the text "Separate Threads" to the "Object Data" section.
- Another red arrow points from the same text to the "Mirror Data" section.
- A red arrow points from the text "Not Our Data(Random Data)" to the 3D visualization area.



Work Progress

Object Data

Object Server

Port

FrameRate

position = (46.8847, 17.373, 46.8847)
quaternion = (0, -0.6562, 0.57735, -0.117658)
position = (42.4999, 26.3392, 42.4999)
quaternion = (0, -0.641179, 0.57735, -0.1825)

Mirror Data

Mirror Server

Port

FrameRate

position = (9.69881, -49.0503, 9.69881)
quaternion = (0, -0.5151, 0.57735, 0.423221)
position = (19.248, -46.1467, 19.248)
quaternion = (0, -0.554769, 0.57735, 0.36969)

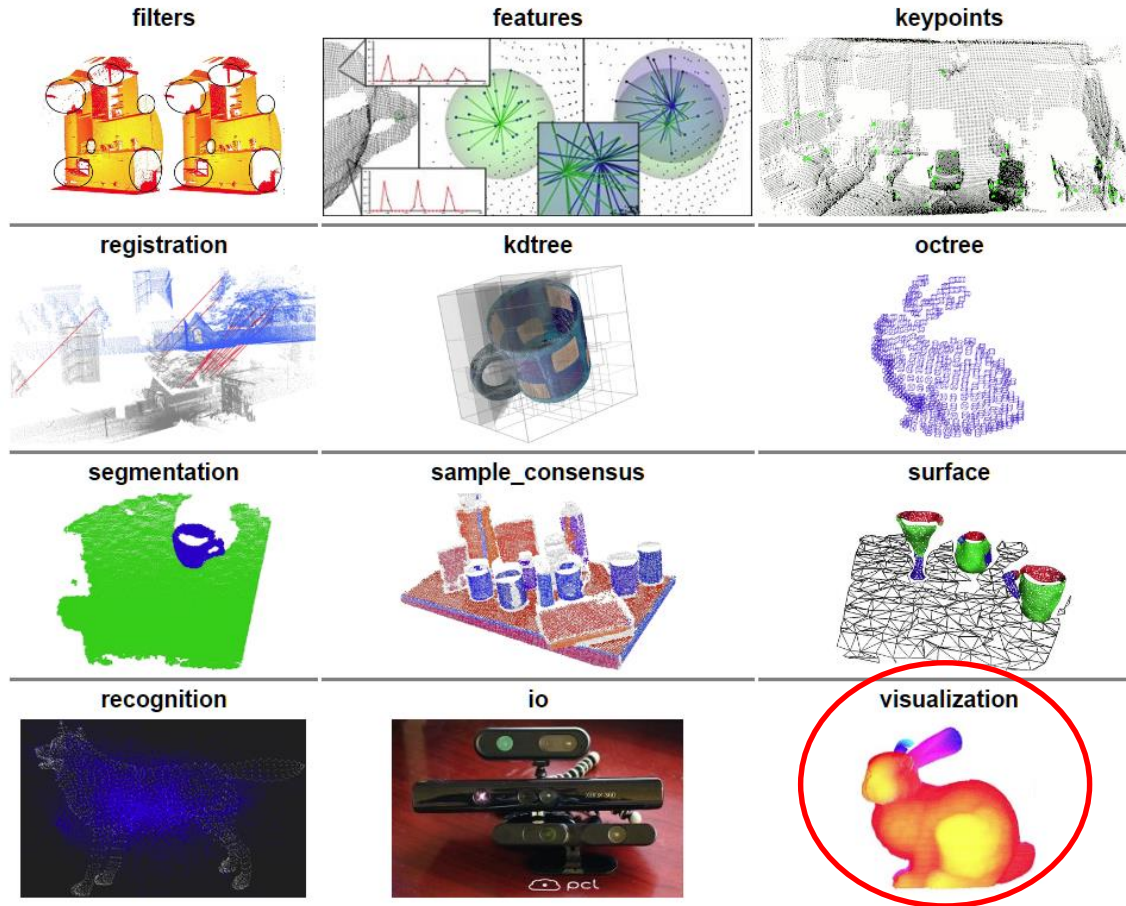
```
Terminal File Edit View Search Terminal Help
sose16cpp@sose16cpp-VirtualBox ~/Desktop/software/OpenIGTLink-Software/OpenI
OpenIGTLink-build/bin ./TrackerClient2 localhost 8080 400
position = (50, 0, 50)
quaternion = (0, 0.666667, 0.57735, 0)
position = (49.0033, 9.93347, 49.0033)
quaternion = (0, 0.663336, 0.57735, 0.0665556)
position = (46.0531, 19.4709, 46.0531)
quaternion = (0, 0.653378, 0.57735, 0.132446)
position = (41.2668, 28.2321, 41.2668)
quaternion = (0, 0.636891, 0.57735, 0.197013)
position = (34.8353, 35.8678, 34.8353)
quaternion = (0, 0.614041, 0.57735, 0.259612)
position = (27.0151, 42.0735, 27.0151)
quaternion = (0, 0.585055, 0.57735, 0.319617)
position = (18.1179, 46.602, 18.1179)
quaternion = (0, 0.550224, 0.57735, 0.376428)
position = (8.49835, 49.2725, 8.49835)
```

Scripts to send dummy data (we can't always test on actual Tracking system)

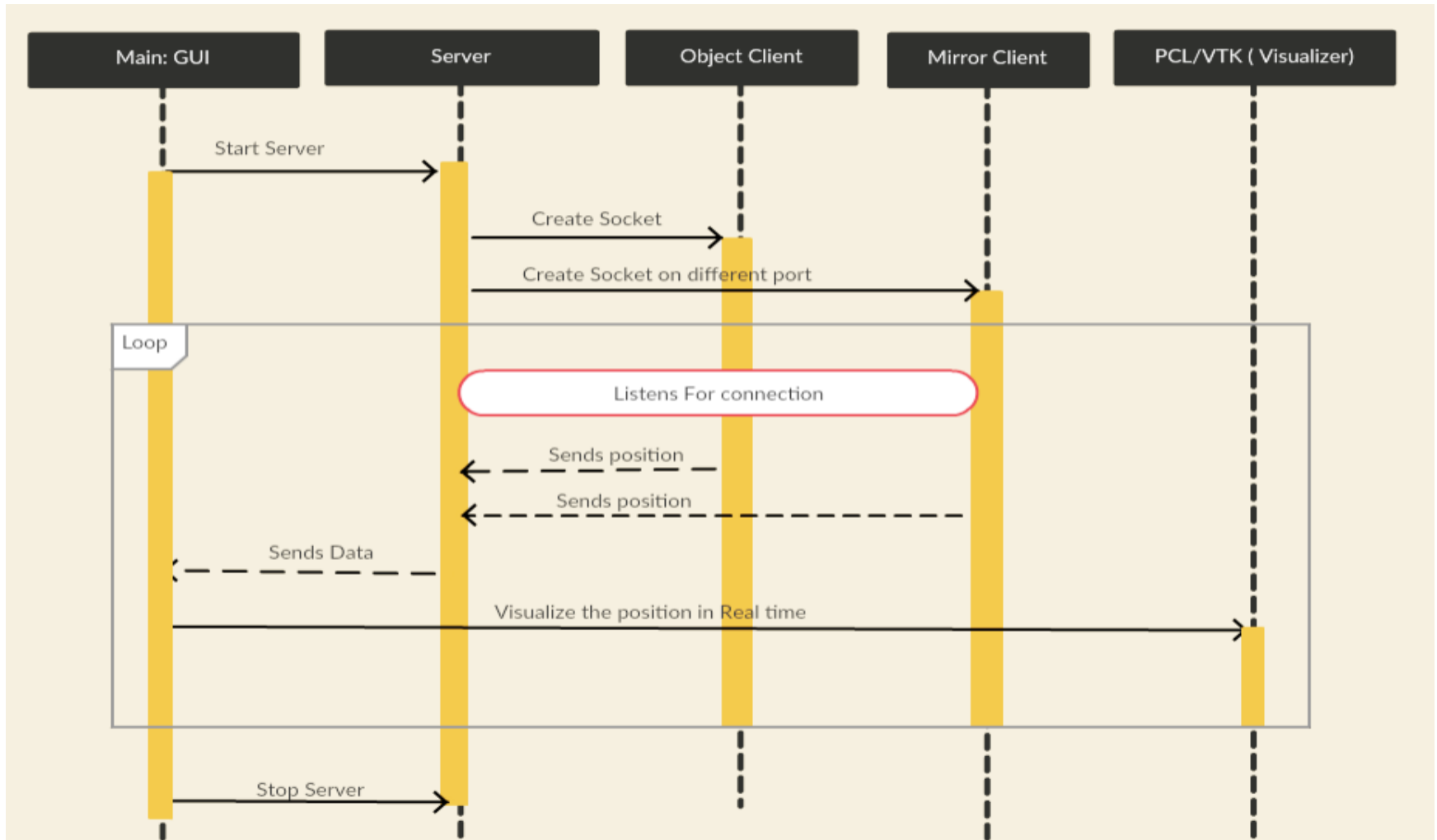


PCL/VTK Visualizer

- PCL: Point Cloud Library, VTK: Visualization Toolkit



UML Sequence Diagram



Created by : <https://creately.com/diagram-type/uml-sequence-diagrams>

Tasks Completed

Setting OpenIGTLink communication interface

Separate threads, different type of message (position, Image,..)

GUI Development

Environment: Ubuntu, C++, QT

Server-Client Communication: OpenIGTLink

Visualizing data: PCL, VTK

Tests / Verification



Challenges Faced

- Underestimated tasks
- Linking & Configuring third party libraries (OpenIGTLink, QT, PCL,VTK)
- Reconnecting to a socket on the same port after disconnect- Not working unless we restart the GUI(`ServerSocket::CreateServer(port)`)

Pending Tasks

- Finalize Data Visualizer
- Tracking of mirror & Object
- Fusion of data from Mirror & OTS



Thank you Questions?

