Project Management and Software Development for Medical Applications

A Virtual Multi-View Optical Tracking System

Intermediate Presentation – 23NOV16
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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

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Duration</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Multi-View OTS</td>
<td>72 days</td>
<td>Oct 16, Oct 23, Oct 30, Nov 6, Nov 13, Nov 20, Nov 27, Dec 4, Dec 11, Dec 18, Dec 25, Jan 1, Jan 8, Jan 15, Jan 22, Jan 29, Feb 5, Feb 12</td>
</tr>
<tr>
<td>Initial meeting</td>
<td>1 day</td>
<td></td>
</tr>
<tr>
<td>Project Requirements Presentation</td>
<td>4 days</td>
<td></td>
</tr>
<tr>
<td>OTS Setup</td>
<td>3 wks</td>
<td></td>
</tr>
<tr>
<td>Virtual Camera Setup</td>
<td>5 wks</td>
<td></td>
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<tr>
<td>Intermediate Presentation</td>
<td>5 days</td>
<td></td>
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<tr>
<td>Data Fusion</td>
<td>2 wks</td>
<td></td>
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<tr>
<td>Testing</td>
<td>49 days</td>
<td></td>
</tr>
<tr>
<td>Prototype Evaluation / Verification</td>
<td>1 wk</td>
<td></td>
</tr>
<tr>
<td>GUI Development</td>
<td>2 wks</td>
<td></td>
</tr>
<tr>
<td>Documentation</td>
<td>50 days</td>
<td></td>
</tr>
<tr>
<td>End of project</td>
<td>1 day</td>
<td></td>
</tr>
<tr>
<td>Final Presentation</td>
<td>6 days</td>
<td></td>
</tr>
</tbody>
</table>

![Gantt Chart](chart.png)
Work Progress

Not Our Data(Random Data)

Separate Threads

Not Our Data(Random Data)
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)

dummy data (we can’t always test on actual Tracking system)
PCL/VTK Visualizer

- PCL: Point Cloud Library, VTK: Visualization Toolkit
UML Sequence Diagram

Main: GUI

Start Server

Server

Create Socket

Create Socket on different port

Object Client

Listens For connection

Sends position

Sends position

Mirror Client

Sends Data

Visualize the position in Real time

PCL/VTK (Visualizer)

Stop Server

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?