



A hybrid opto-inertial Tracking System Prototype

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Partners: IFL & FRAMOS

Project Requirements

Computer Aided Medical Procedures (CAMP) Technische Universität
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Background and Motivation

➤ Electromagnetic Tracking

➤ Pros

- No line of sight restrictions

➤ Cons

- Limited accuracy [mm]
- Small working volume

➤ Optical Tracking

➤ Pros

- High Accuracy

➤ Cons

- Strong Line of Sight Restriction

➤ Inertial Tracking

➤ Pros

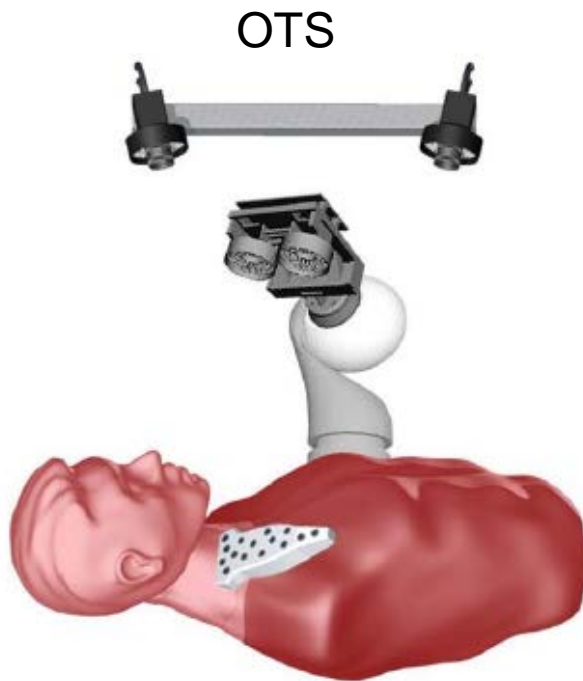
- No line of sight restriction

➤ Cons

- Gyroscope drift with time

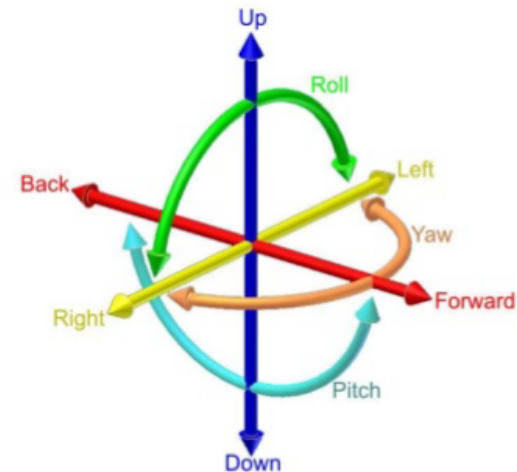
Problem Statement

- To develop a software prototype that fuses the data streams of both an inertial measurement unit (IMU) and an optical tracking system (OTS)



IMU

6 degrees of freedom



- Accelerometer: Left-Right, Back-Forward, Up-Down
- Gyroscope: Pitch, Roll, Yaw

B. Busam – Optical Tracking for Medical Applications

<http://image.slidesharecdn.com/mpu6050-slides-160111030027/95/mpu6050-imu-with-arduino-5-638.jpg?cb=1455865197>



Stakeholders

➤ Project Partners

- IFL[1]
- FRAMOS[2]

➤ Supervisor

- Benjamin Busam

➤ Project Manager

- Faisal Kalim



[1] <https://www.amos.com>

[2] <http://campar.in.tum.de/Chair/IFL>

<http://drmullibusinessmanagement.wikispaces.com/file/view/stakeholders.jpg/174196091/stakeholders.jpg>



Requirements and Specifications

➤ Tracking

- Tracking of device based on IMU data
- Fusion of data from OTS and IMU based tracking

➤ Evaluation

- Compare results of IMU based tracking to OTS

➤ GUI

- Display individual + hybrid pose values

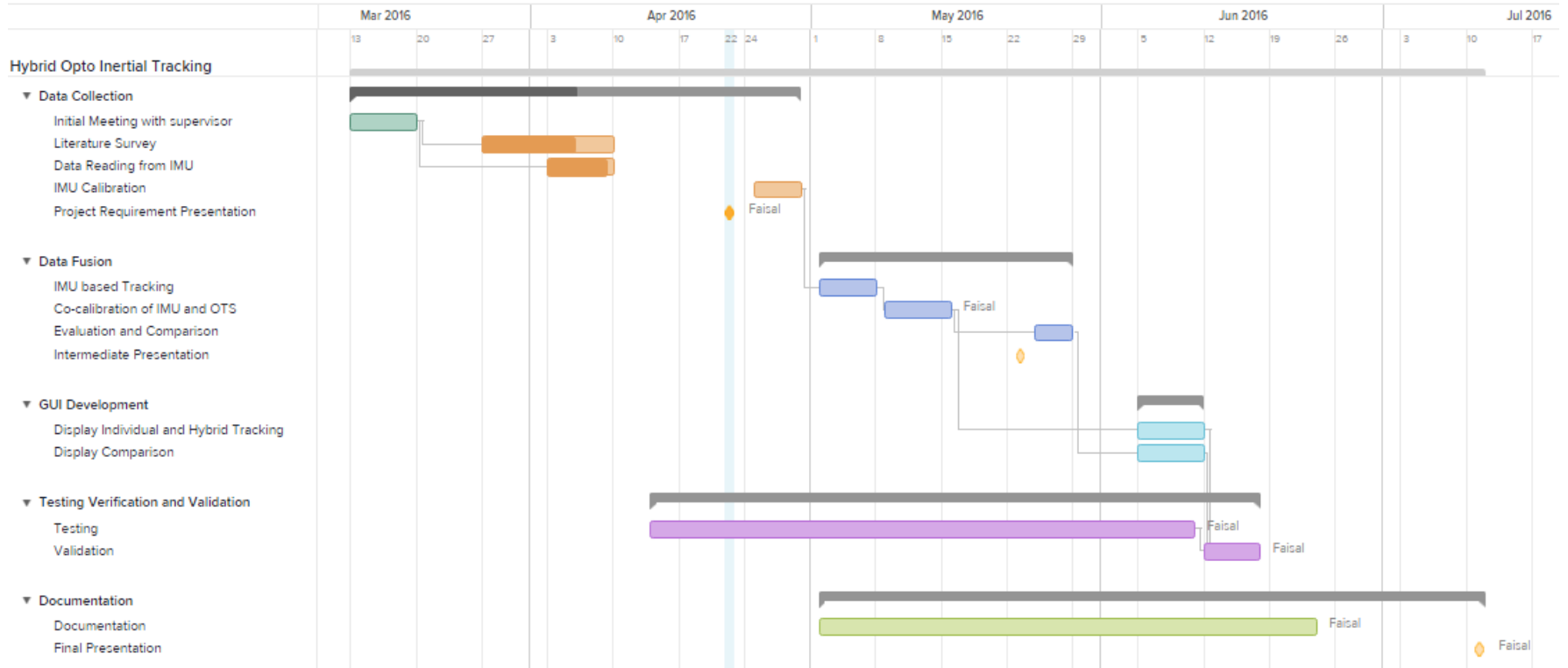


Tasks

- Data reading from IMU
- Calibration of IMU
- IMU tracking
- IMU and OTS Co-calibration and fusion
- GUI Development
- Evaluation of IMU based tracking vs OTS
- Tests/Verification
- Documentation/Reports



Gantt Chart [1]



[1] Created with Team Gantt