POSTER SESSION FOR 02901 ADVANCED TOPICS IN MACHINE LEARNING

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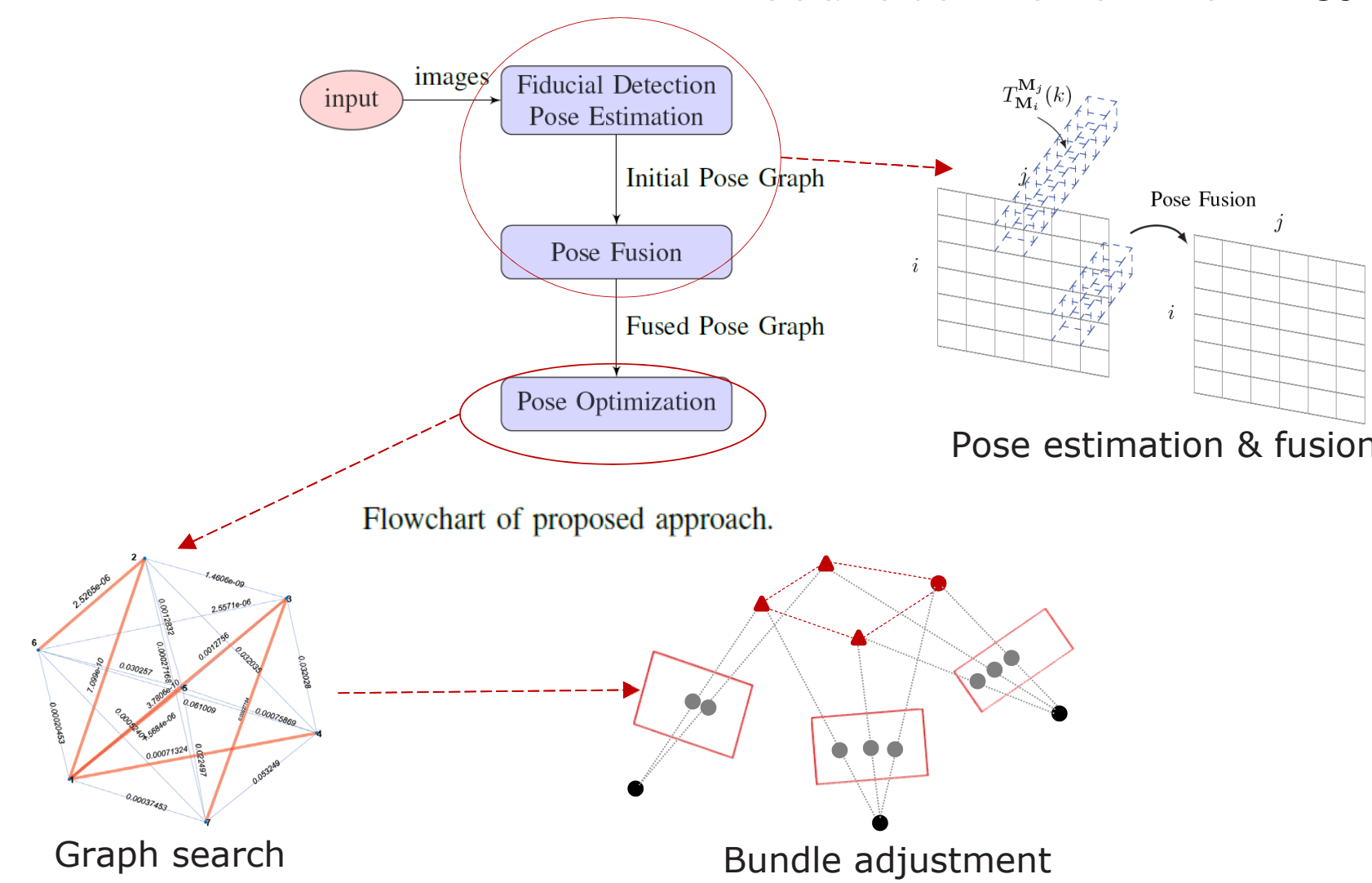
DTU

PROJECT: UAV-QMS

The UAV-QMS project aims to develop a cost-efficient and long range Unmanned Aerial Vehicle for high-Quality Magnetic Surveying. Due to the sensitivity of the surveying sensors, direct positioning the magnetic bird via traditional sensors like GPS is infeasible. Relative pose estimation using computer vision will be investigated in the project. The focus of the PhD thesis is to investigate:
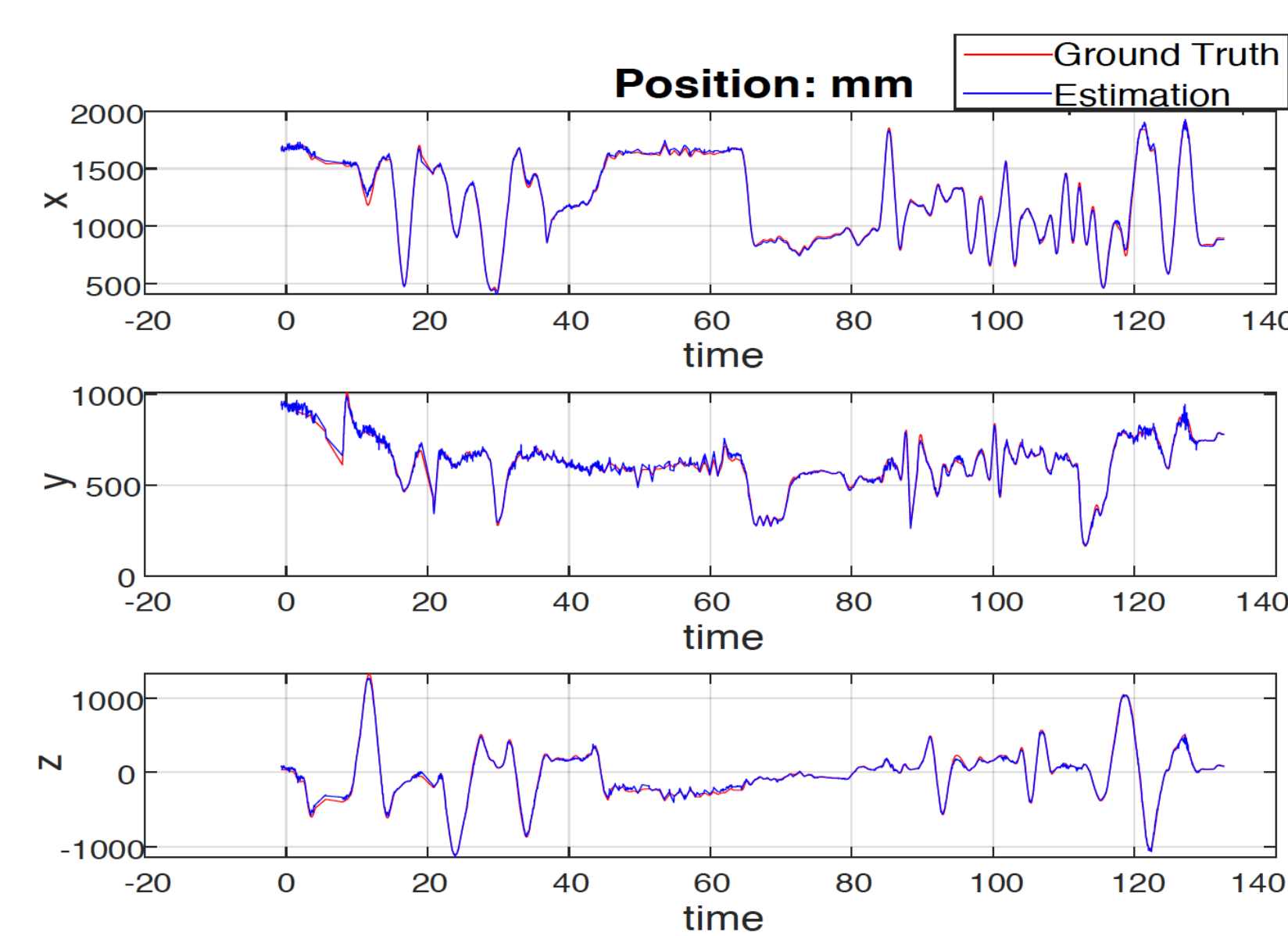
- Pose estimation.

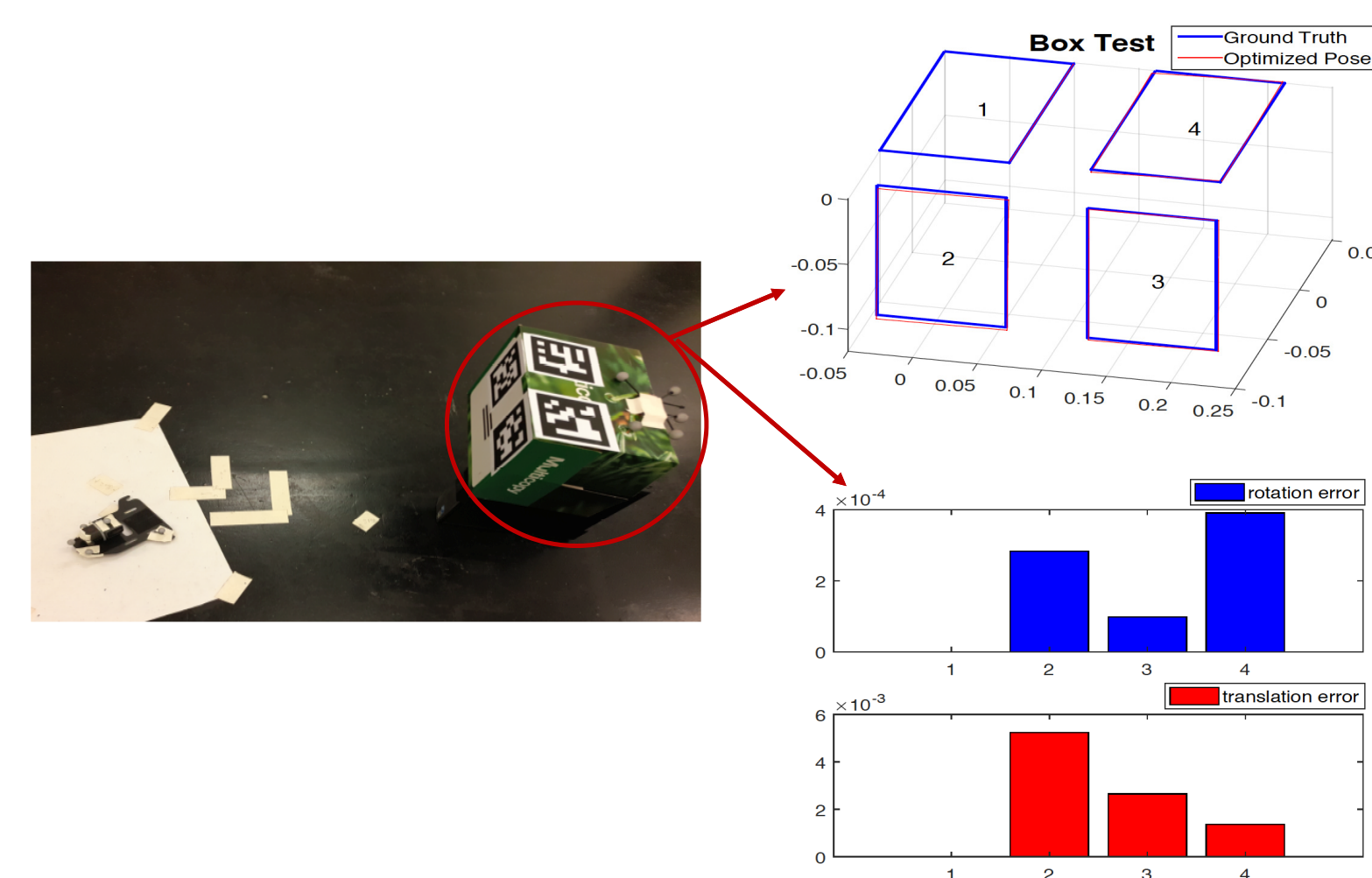- Navigation.
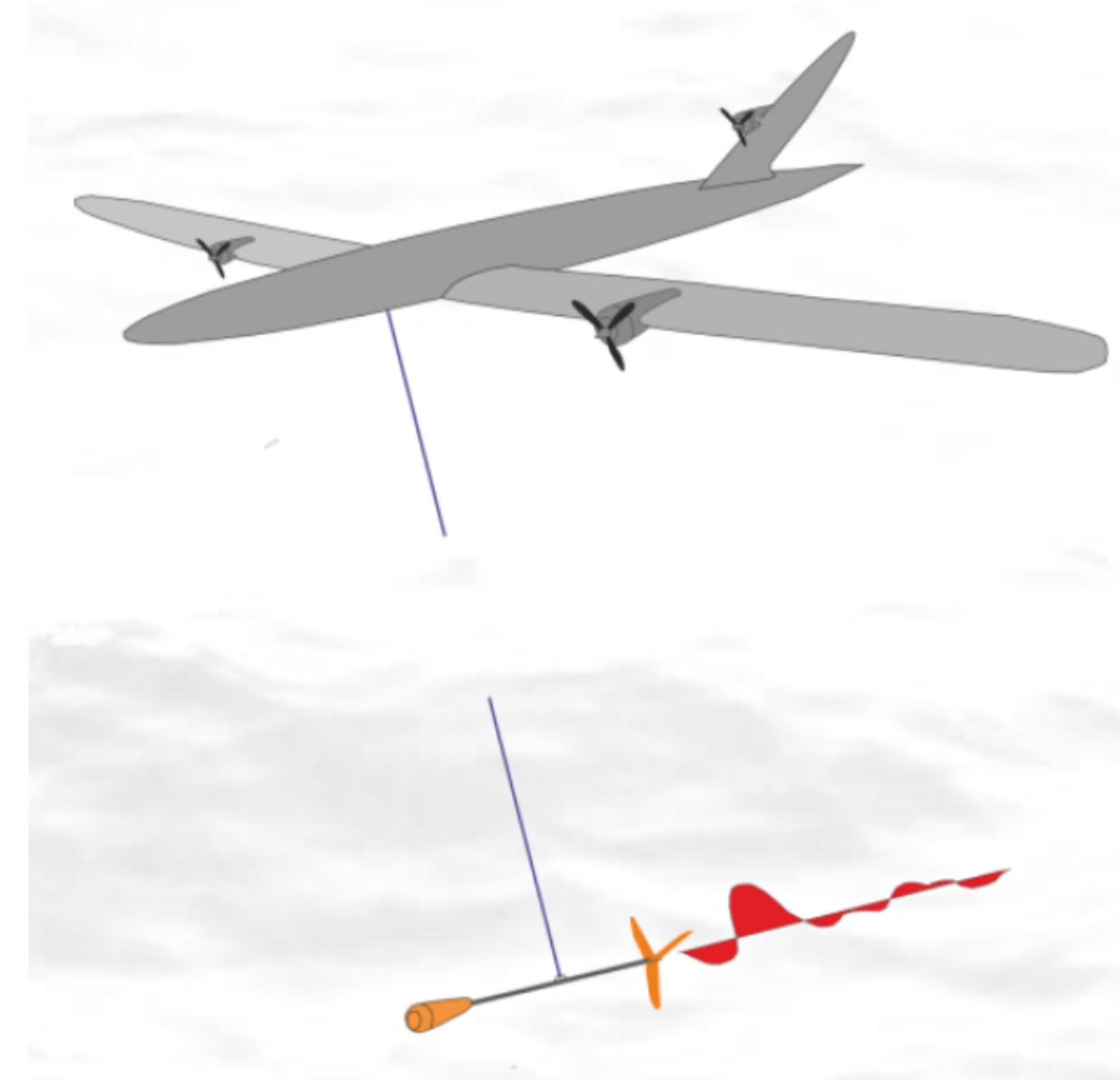
POSE ESTIMATION
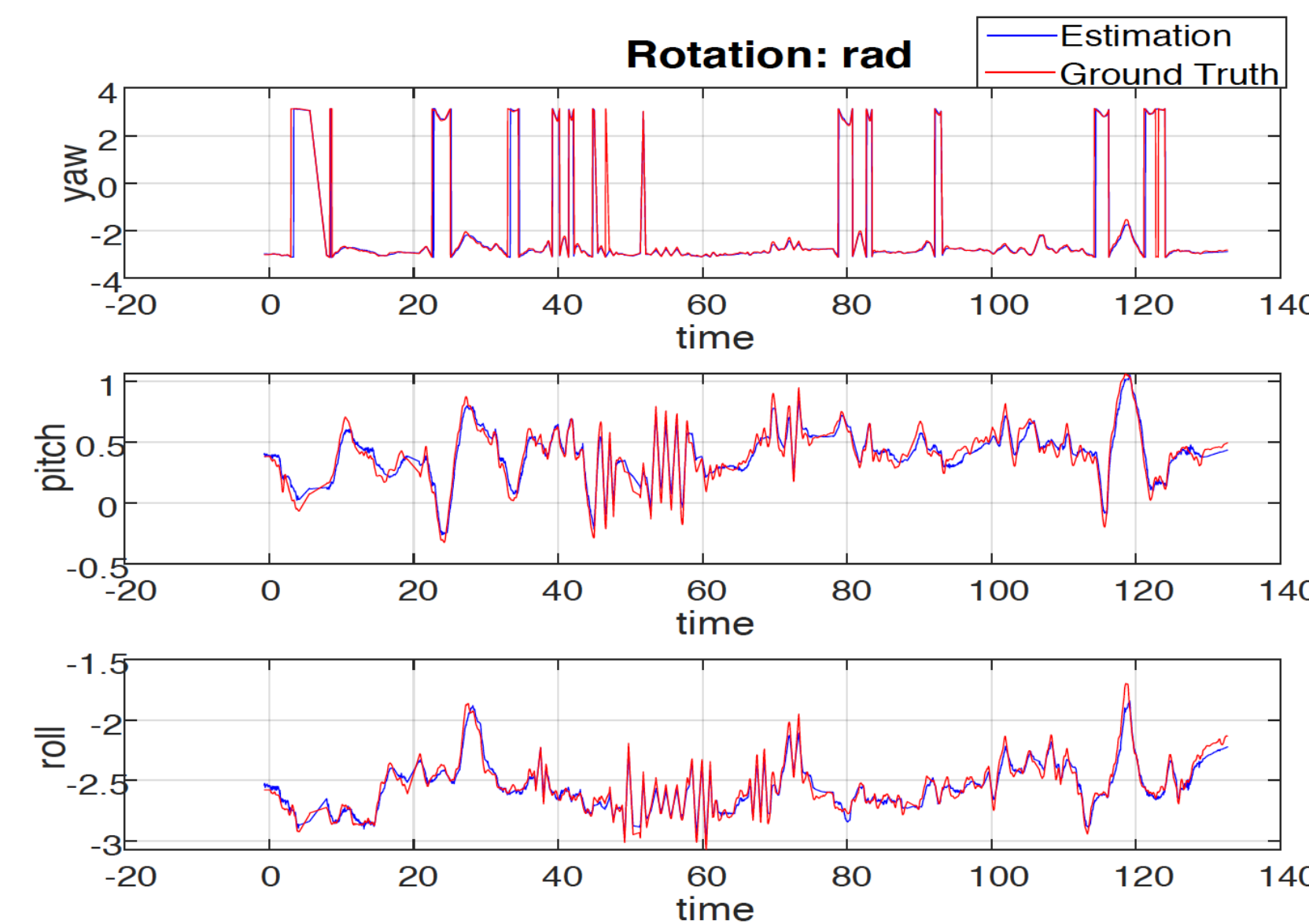
Accurate Benchmark & Pose Evaluation System

Schematic Diagram

Mapping

Translation Error

Rotation Error

NAVIGATION

Schematic Diagram

Trajectory

Distance to Cooridor

Vel Profile

Acc Profile

Perlin Noise Map
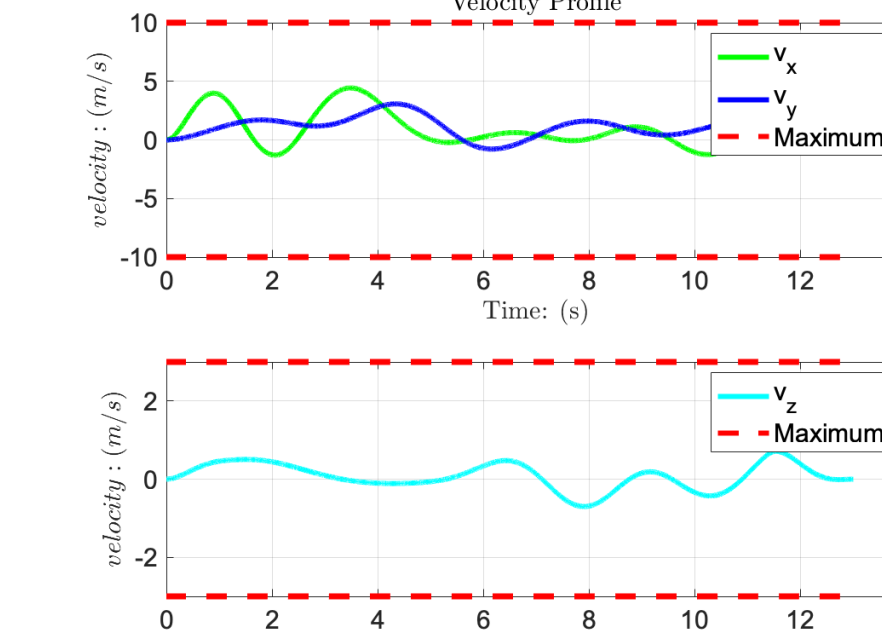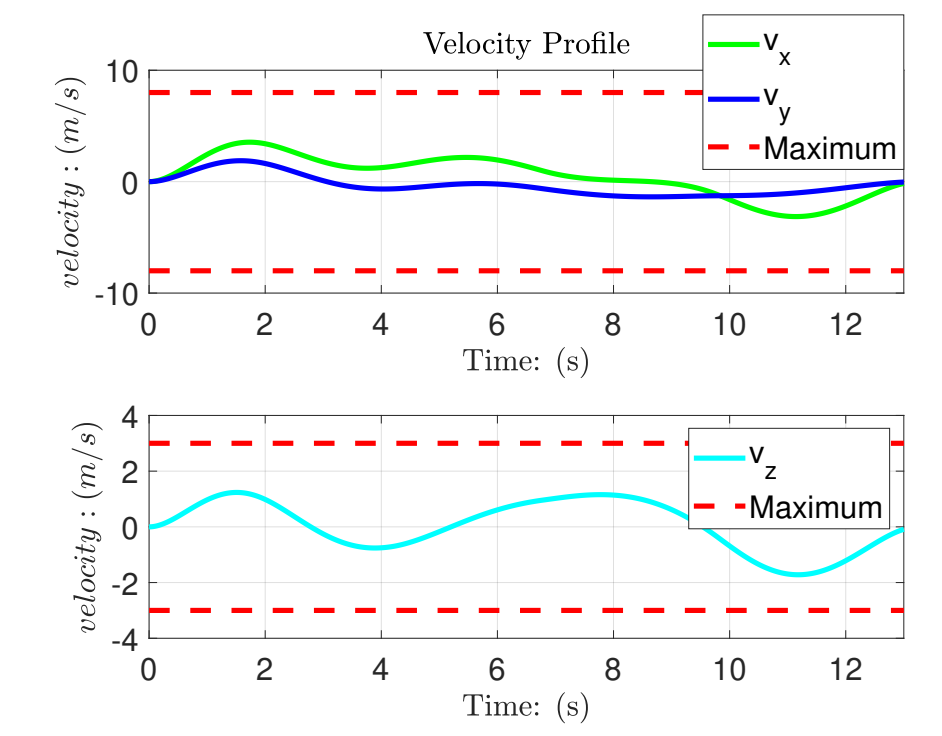
Vel Profile

Acc Profile

CALIBRATION&SYNCHRONIZATION
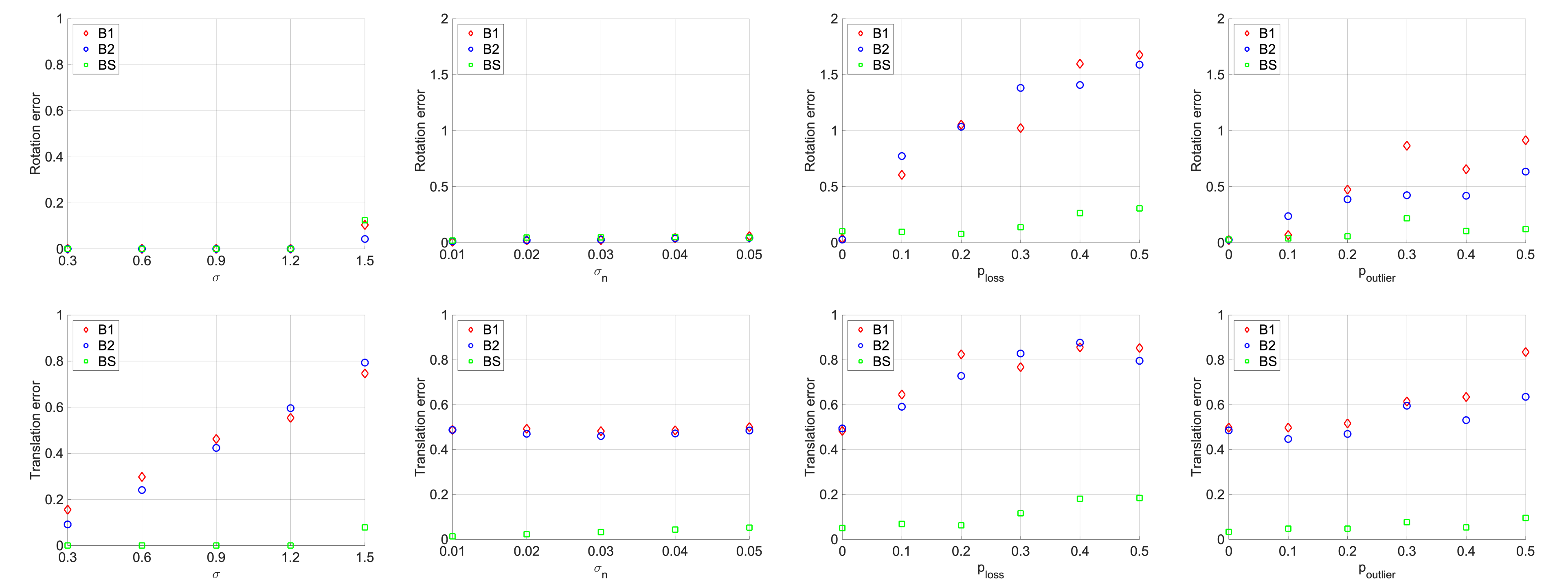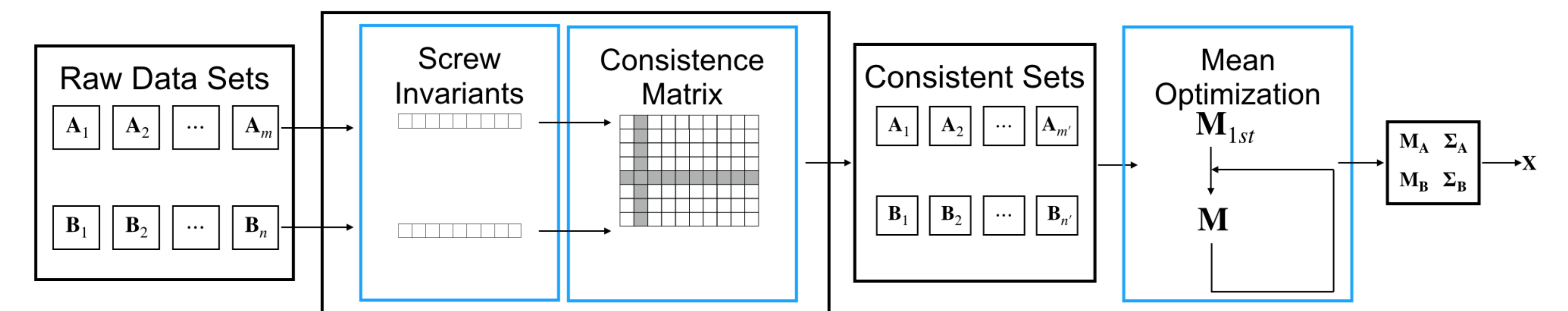
ML&FAIRNESS

Machine learning will be applied in this project for object detection, tracking, pose estimation. Learning based pose estimation is still very controversial, especially compared with traditional geometry based solutions where the underlying mathematics are known explicitly. In this case, bias existed in the data may result in biased pose estimation. **Fairness** could be helpful to design unbiased pose estimation netwrok.
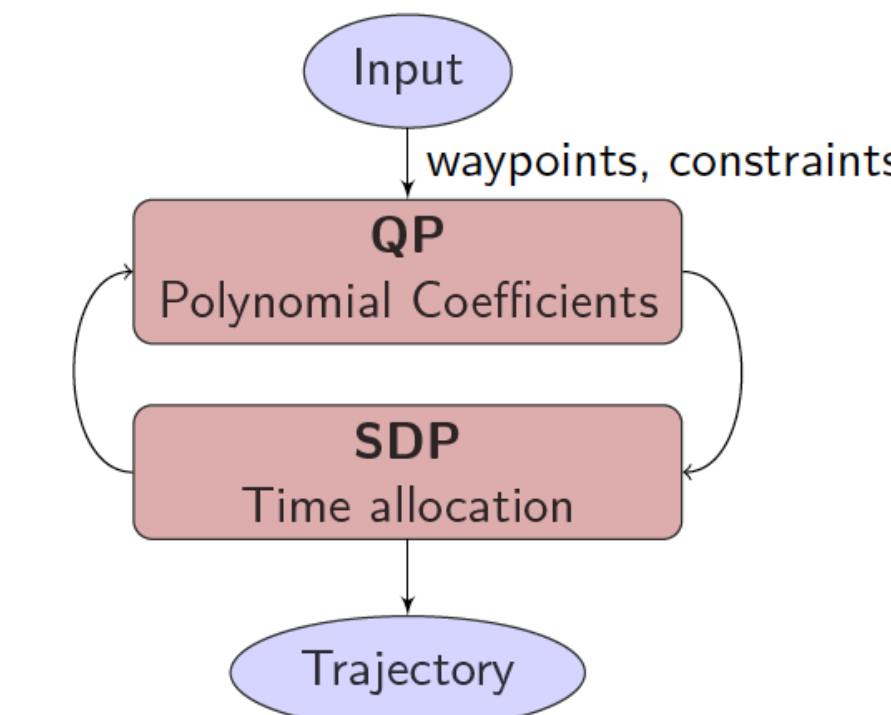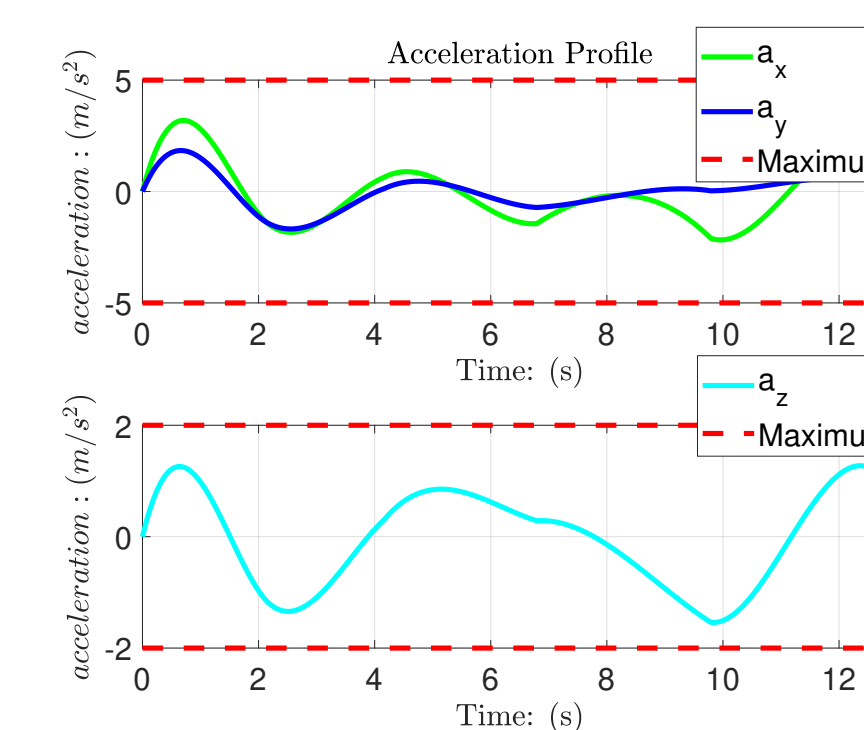
REFERENCES

[1] Hu, X., et al. A Novel Robust Approach for Correspondence-Free Extrinsic Calibration. 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019).

[2] Hu, X., Olesen, D., & Knudsen, P. (2019). Trajectory Generation Using Semidefinite Programming For Multi-Rotors. In Proceedings of the European Control Conference (ECC 2019) (pp. 2577-2582). IEEE.

[3] Hu, X., Jakobsen, J., Knudsen, P., & Wei , J. (2018). Accurate Fiducial Mapping For Pose Estimation Using Manifold Optimization. In 2018 International Conference on Indoor Positioning and In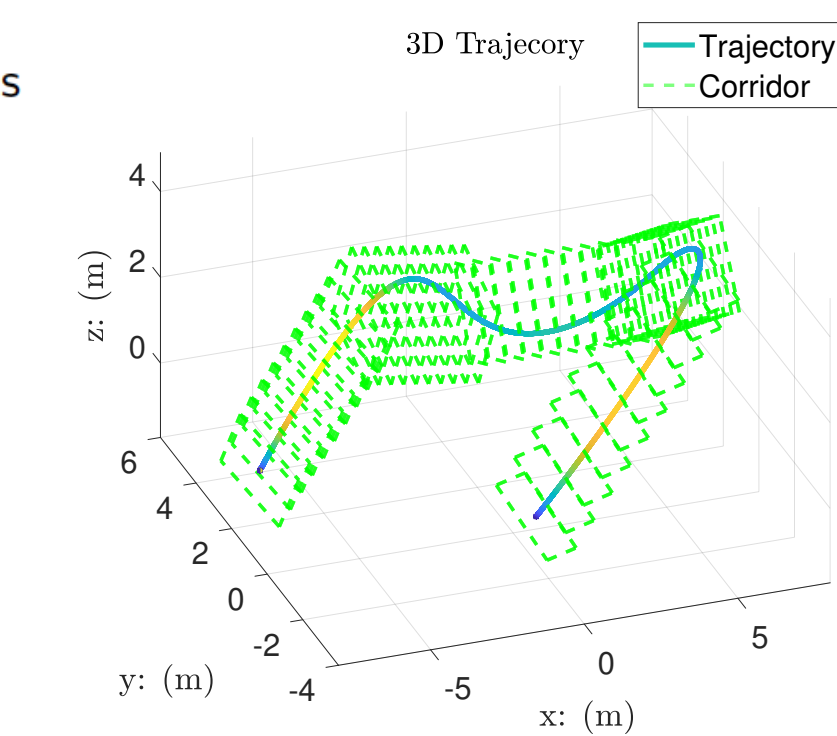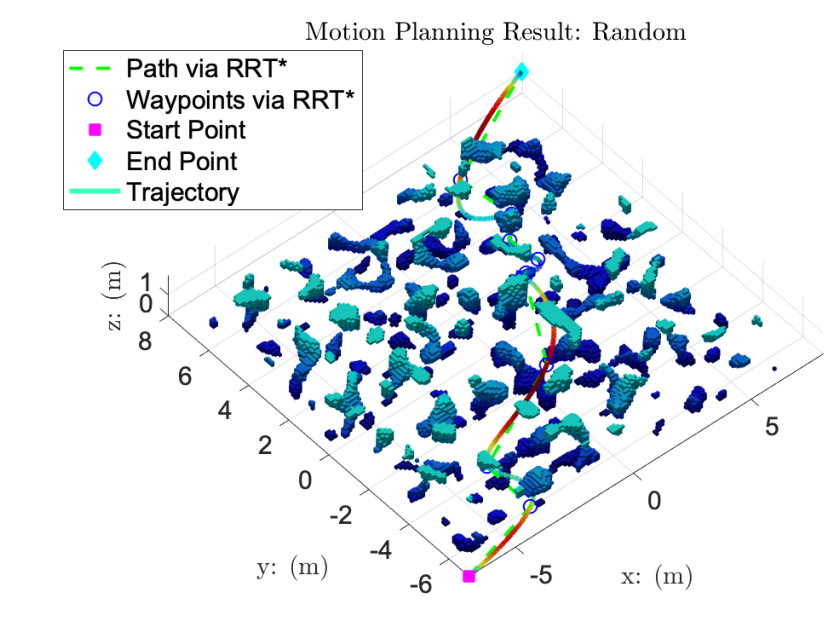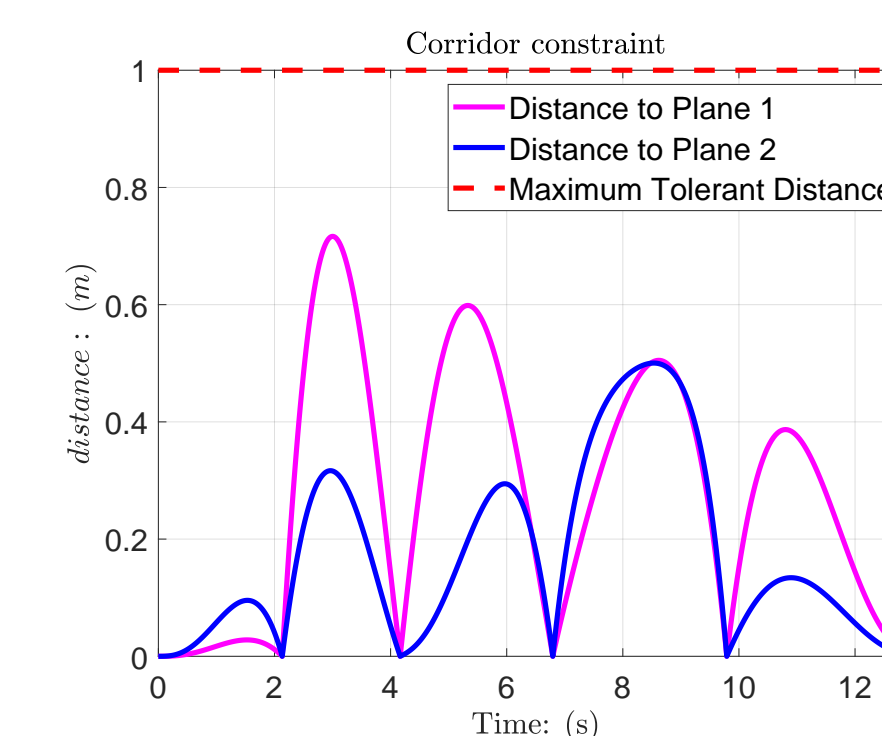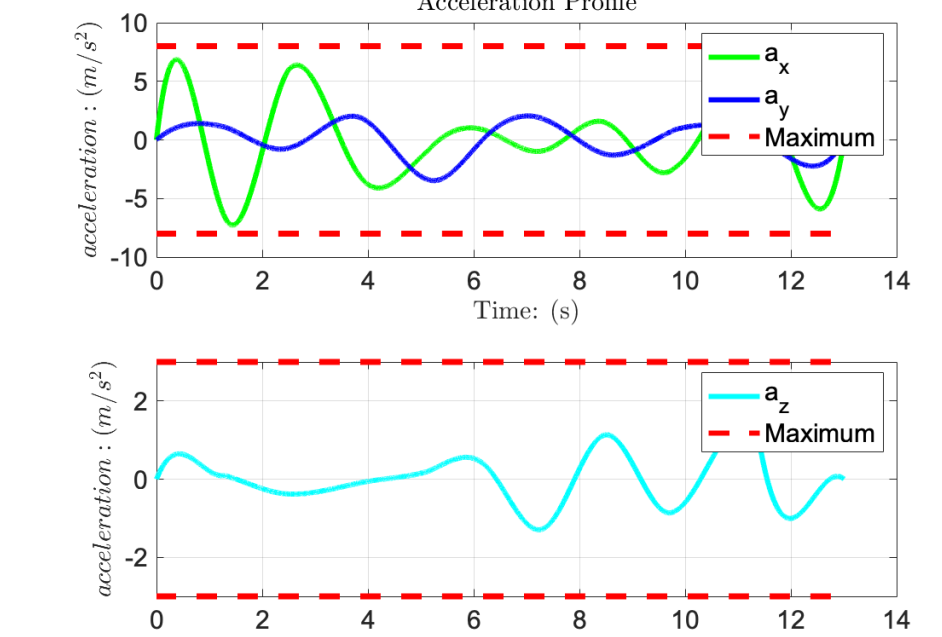door Navigation (IPIN) (pp. 206-212).