ELEC 5660 Project 3: Phase 1

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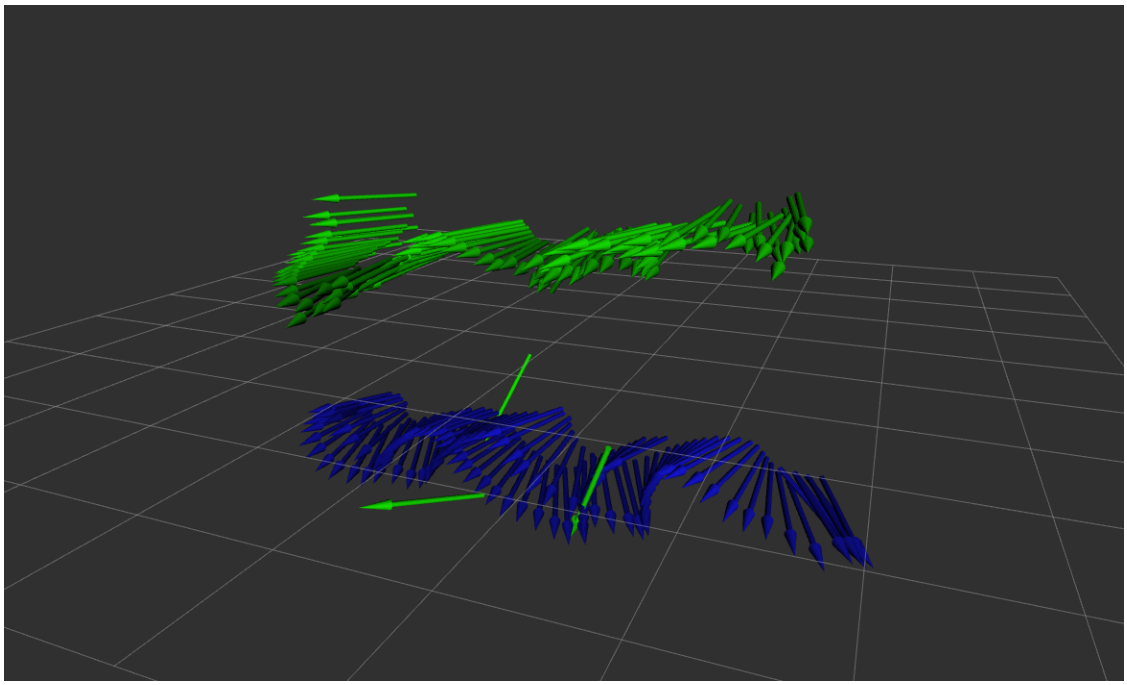
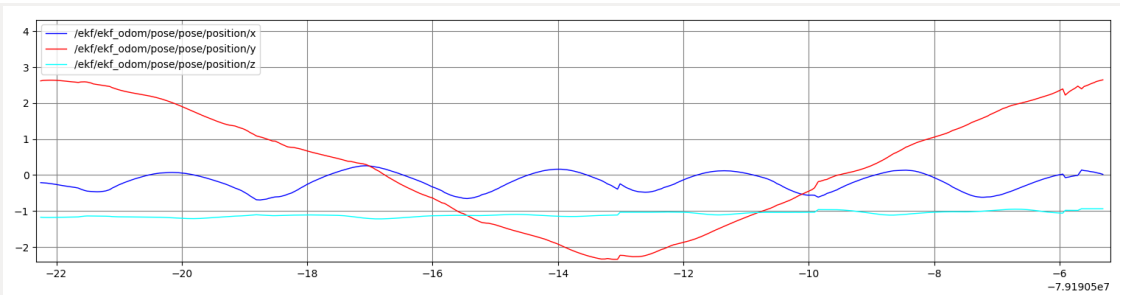
Figures

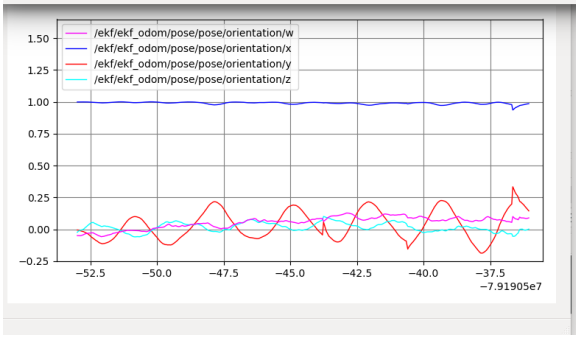
Odometry visualization

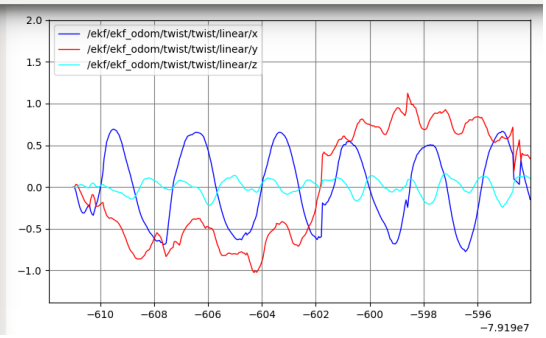
The green one is the pose from the tag-based localization, and the blue one is the odom after filtering. The filtered odometry is more consistent and smooth. Since they are T_{iw} and T_{wi}, so they are not aligned together.



State visualization







Description

1. The whole system is designed using the routine of EKF in the lecture note 9.
2. Although the clocks of the two data topics are said to be synchronized, the actual time of calling `imu_callback` and `odom_callback` is not as the recorded time order (see below), this lag is caused by processing time cost of PnP pose estimation.
    1. My solution to solve this problem is to use a queue to record imu measurements, and only process (pop element) when we receive a PnP estimation, and do the prediction till the imu measurement before current PnP estimation.
    2. This method does not use thread management libs like `mutex` and may be thread unsafe.
    3. Also this merges prediction and updating into the same thread, which is not efficient.