ELEC5660 Project 3 Phase 1 Report

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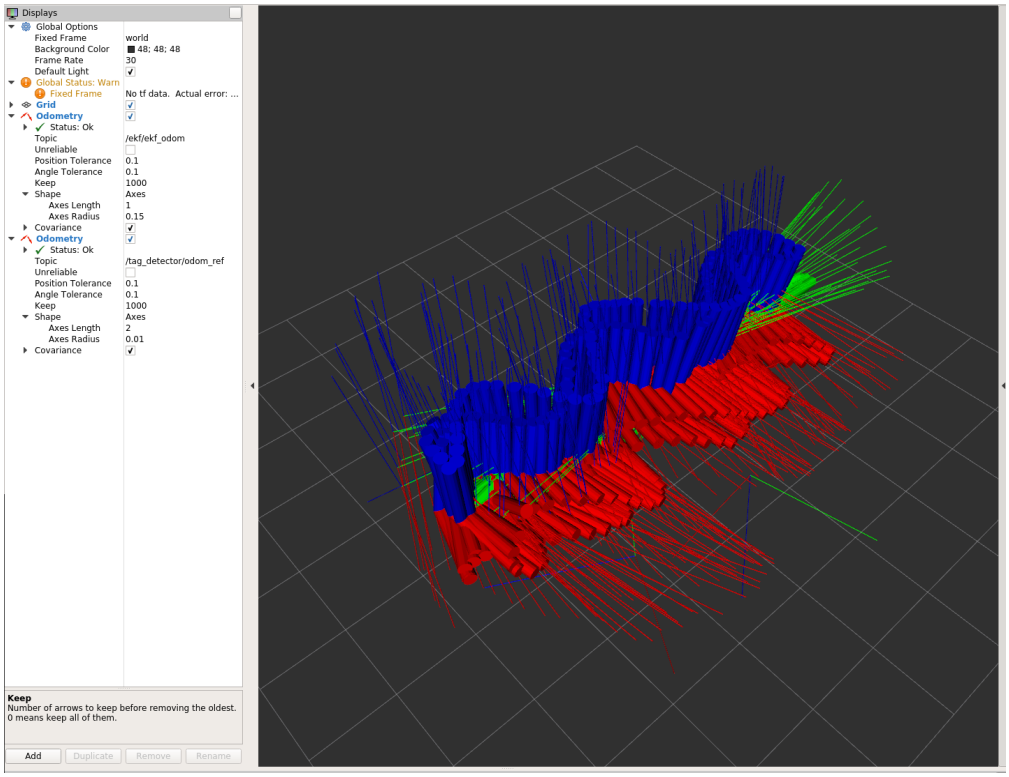
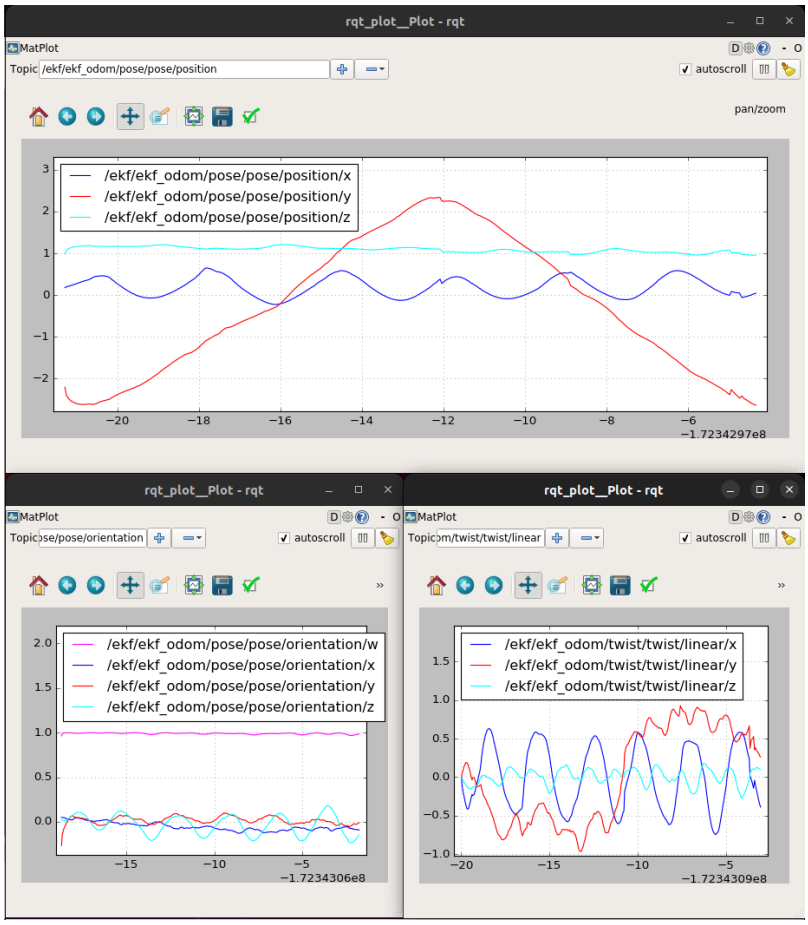
Figures plotted by rqt plot and rviz





Descriptions about your implementation

imu_callback

According to the lectuee notes. I divided the code into several step. Assumptions, Linearization, Discretization, Update mean and Update covariance.

odom_callback

According to the lectrue notes. I divided the code into several step. Assumptions, Linearization and Update. In this part, VO poses measured using tag detector is used to update IMU prior as shown on the lecture note. And at last, a topic is published to show the result.

Others

Originally, I found that the frame of tag_odom_ref and the ekf is not the same, so I tried to the frame when the odometry is published.

```
ekf_odometry.pose.pose.orientation.y = -Q_ekf.y();
ekf_odometry.pose.pose.orientation.z = -Q_ekf.z();
```

However, it did not work. So I changed the R_ekf y and z element directly instead.

```
Eigen::Matrix3d R_ekf;
R_ekf << cos(state(5))*cos(state(4))-
sin(state(3))*sin(state(5))*sin(state(4)),
        -cos(state(3))*sin(state(5)),

cos(state(5))*sin(state(4))+cos(state(4))*sin(state(3))*sin(state(5)),
        -(cos(state(4))*sin(state(5))+cos(state(5))*
(sin(state(3)))*sin(state(4))),
        -(cos(state(3))*cos(state(5))),
        -(sin(state(5))*sin(state(4))-
cos(state(5))*sin(state(3))*cos(state(4))),
        -(-cos(state(3))*sin(state(4))),
        -(sin(state(3))),
        -(cos(state(3))*cos(state(4)));
```

Hopefully this does not affect the latter project. Will try to fix it later.