SLAM Report

For this problem, I assumed robot frame, odometry and IMU all share the same frame, base_link.

I have used *robot_localization* package for ROS in python. It offer two methods for localization EKF and UKF. I have used EKF as our system is not highly non-linear therefore EKF will produce fairly accurate approximation with lower computation cost.

robot_localization package have decent community support and uses standard approach to solve the problem. Thus this will present less problem with multiple people working on same project.

Although package have a decent documentation and community support, it still lacks good quality tutorial that explain various parameters and setting. Also, documentation is not very thorough and at some point its really difficult to connect dots especially for a beginner.

I found few other approaches that can be used in combination with current implementation to achieve better result.
https://github.com/AtsushiSakai/PythonRobotics#what-is-this

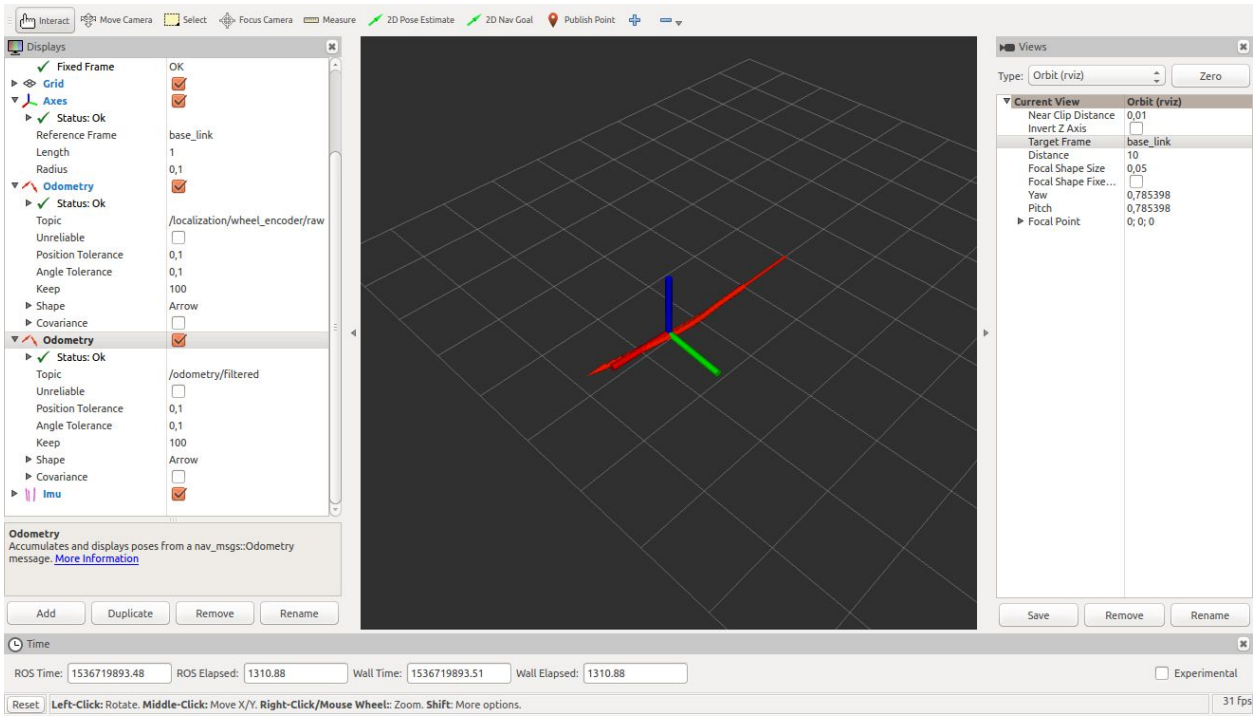

Fig 1- Stable odometry from noisy data

1. If one measurement is delayed, it should use previous value and become unstable when new delayed measurement is received as calculation depends on *dt.*

2. System will fail.

3. I am assuming question is related to actual formula vehicle rather than this problem.
We can use visual odometry in conjugation with GPS to landmark various point on track. This will ensure less drift and can be used to remove error during such situation.