WEEKLY REPORT DE BENEDETTI MATTEO

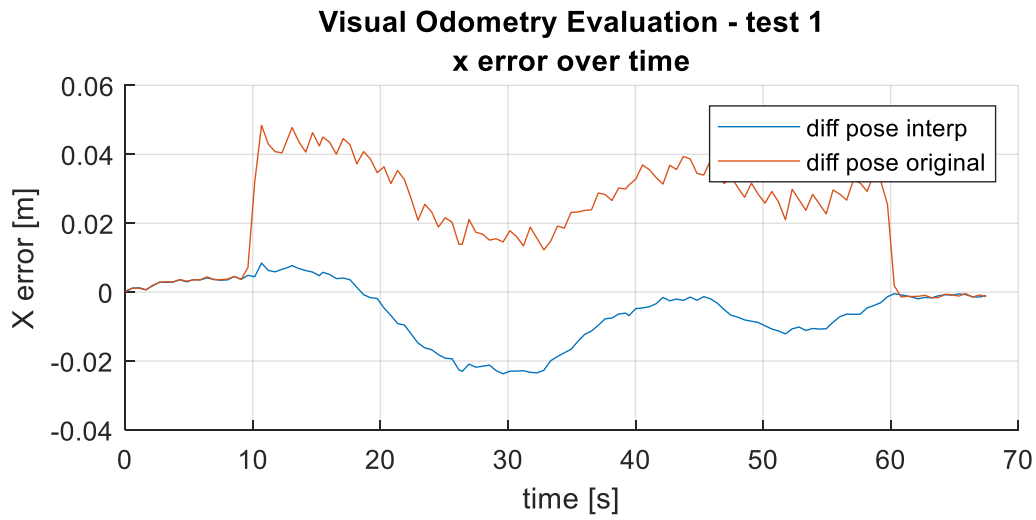
WEEK 11: 11/11/2019 – 15/11/2019

FIXING THE INITIAL AND FINAL ERROR

The error that affected the VO pose estimation was caused by a misalignment in the timestamp of the VO poses and Ground Truth poses provided by Vicon which leads to an error in the direction of motion (x in the case of the first tests of a 5m traverse).

This was fixed by correctly setting the VO pose timestamp at the time of acquisition of the frames instead of at the output of the SpartanVO task, and computing the pose error using the time-aligned pose from an interpolated version of the signal from Vicon.

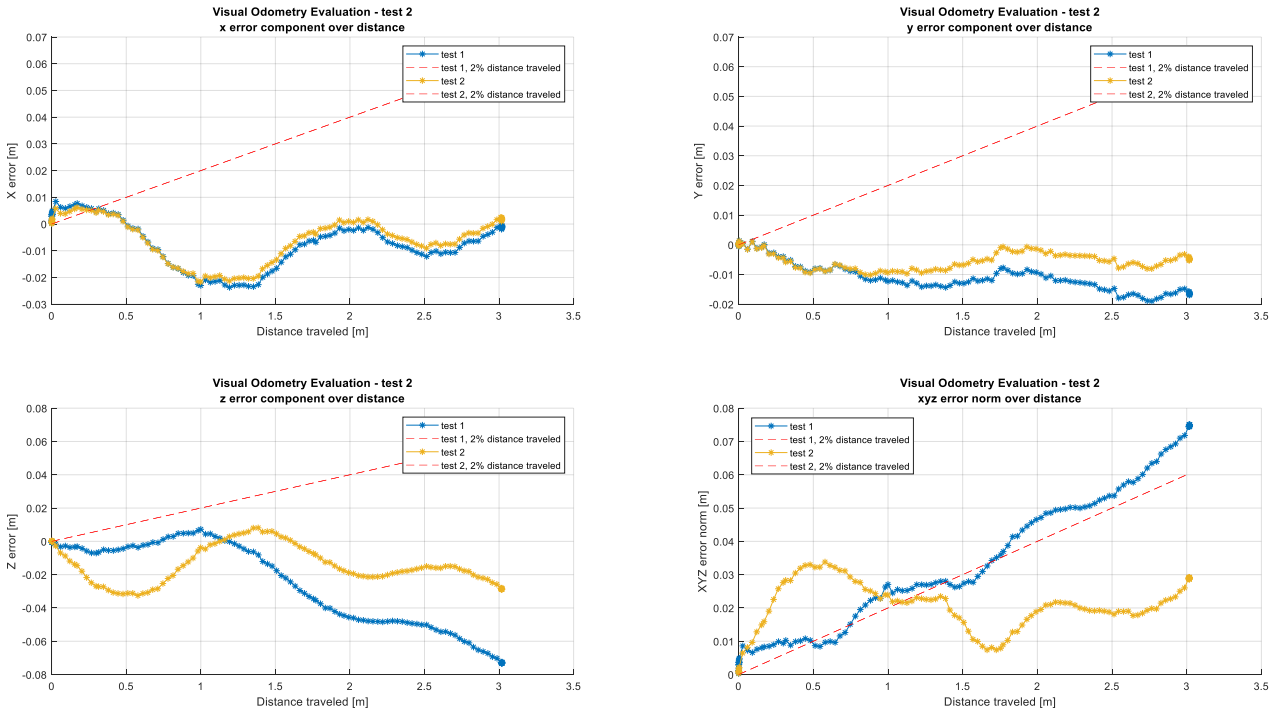
The following picture shows the resulting pose (blue line) that is now not affected by said error.

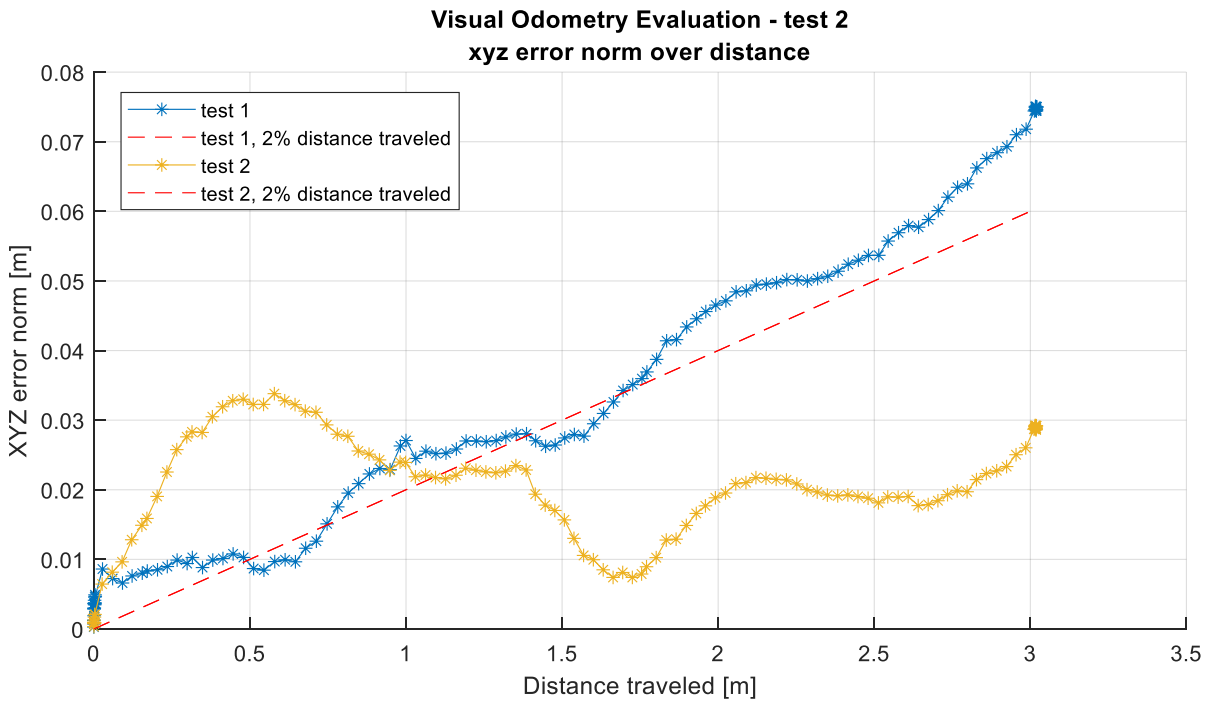


ADDITION OF THE IMU DATA TO THE ESTIMATE:

The viso2_with_imu task was also fixed to work correctly with the Spartan VO (it was originally designed for Viso2 and some adjustments were needed).

The addition of the IMU does indeed help, as the following plot shows, reducing the position error in all components.

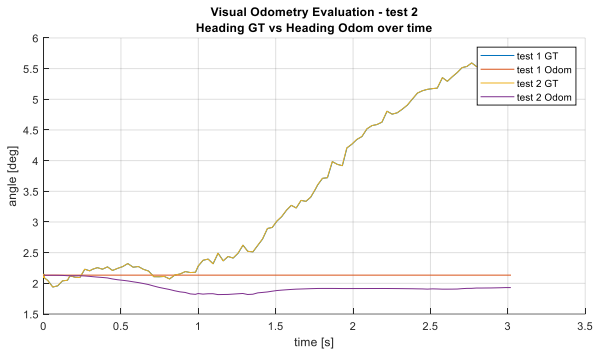


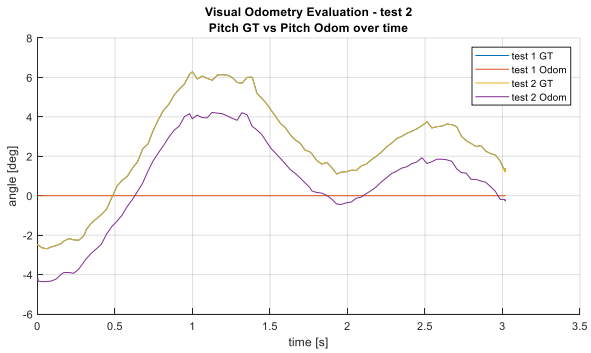


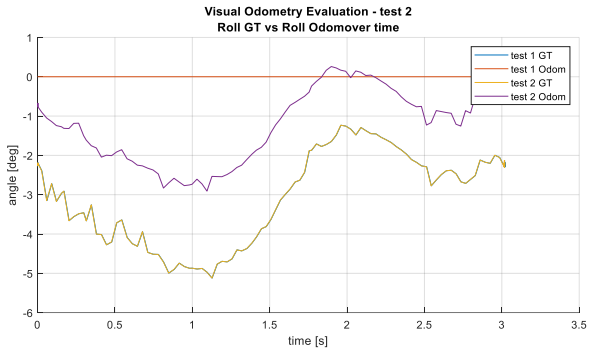
The addition of the IMU does also raise some questions:

- Looking in detail at the VO orientation estimates, rather than just the error, it is now clear that it just estimates a 0 in pitch and roll, which anyway leads to small errors since the trajectory of the rover did not involve a significant change in either roll or pitch.
- The IMU seems to have a little constant offset on pitch and roll channels, since it shows an almost constant error.

The following plot shows the differences in orientation estimates between the SpartanVO without IMU (test1 in the plots' legend) and with the IMU (test2 in the plots' legend)







FUTURE OBJECTIVES:

The work of the next week will focus on understanding why the SpartanVO outputs a constant 0 for roll and pitch and then resume the tests.

Also, better ways to fuse the IMU and VO estimate could be investigated In the future.