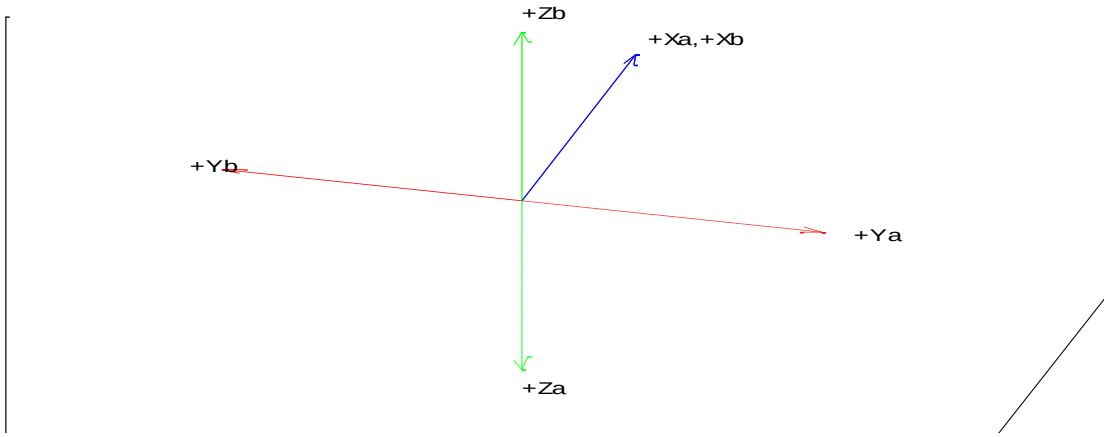
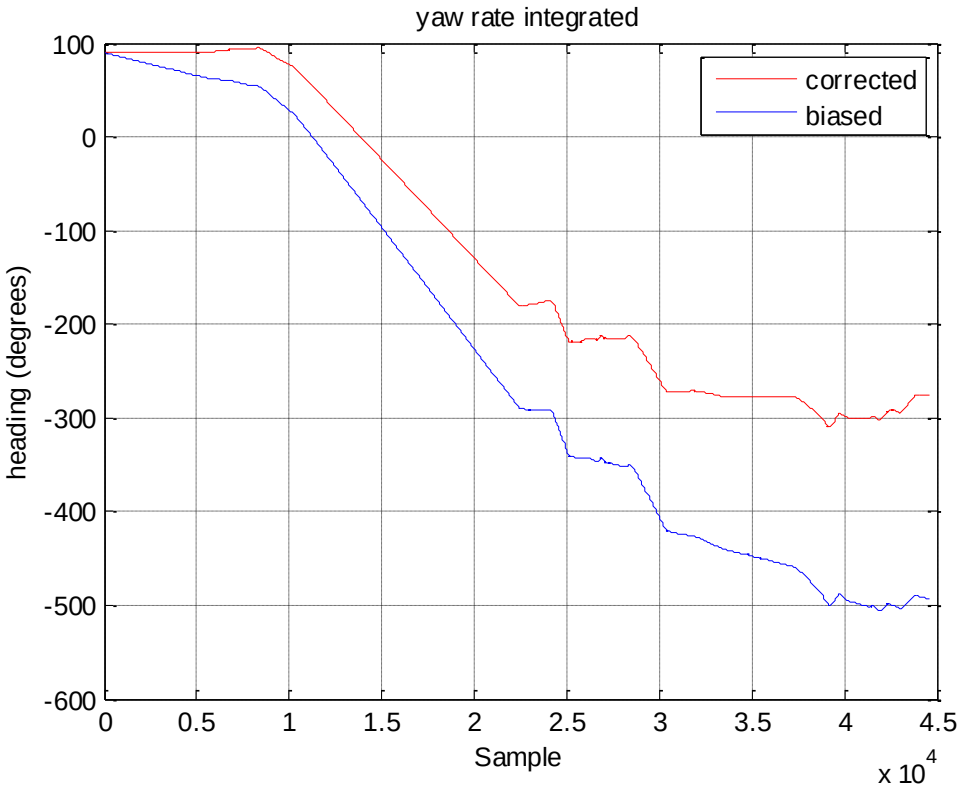
This document is for showing, approximately, the results for parts C,D of Project 1.

First, a brief discussion about the axes conventions.

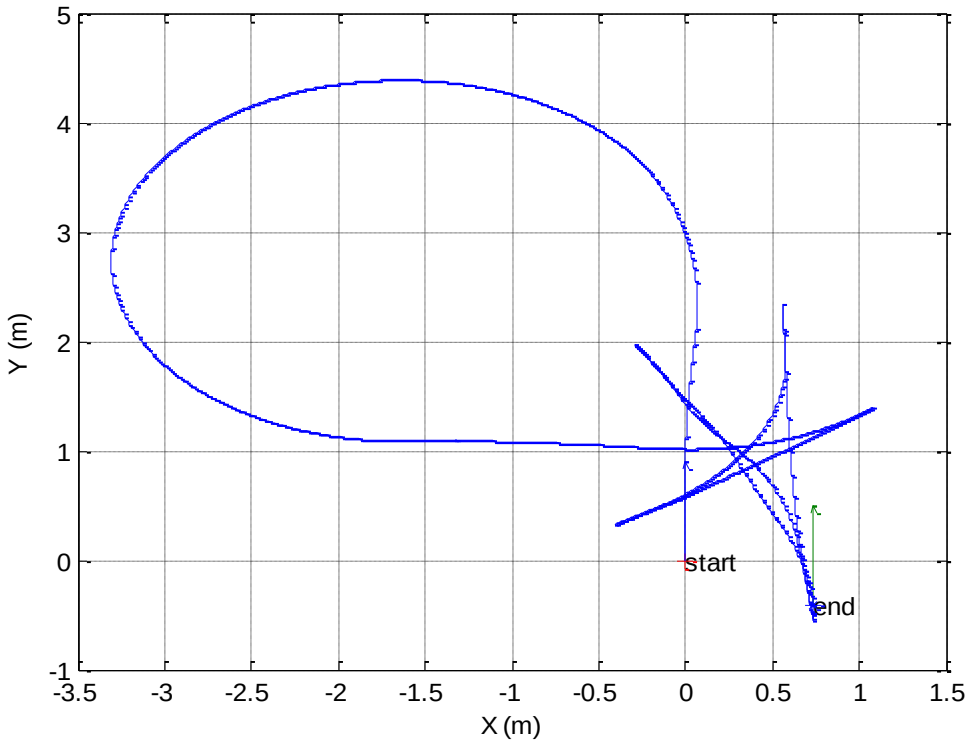


Axes convention (A: IMU ; B: Navigation coordinate frame). The IMU measurements are expressed using convention A (as it was indicated in the lecture notes, when we discussed about attitude.). However, for the navigation we will use Convention B. So, some transformations need to be applied (In this task, in which we work in pure 2D, just doing **YawB=-YawA** is sufficient.)



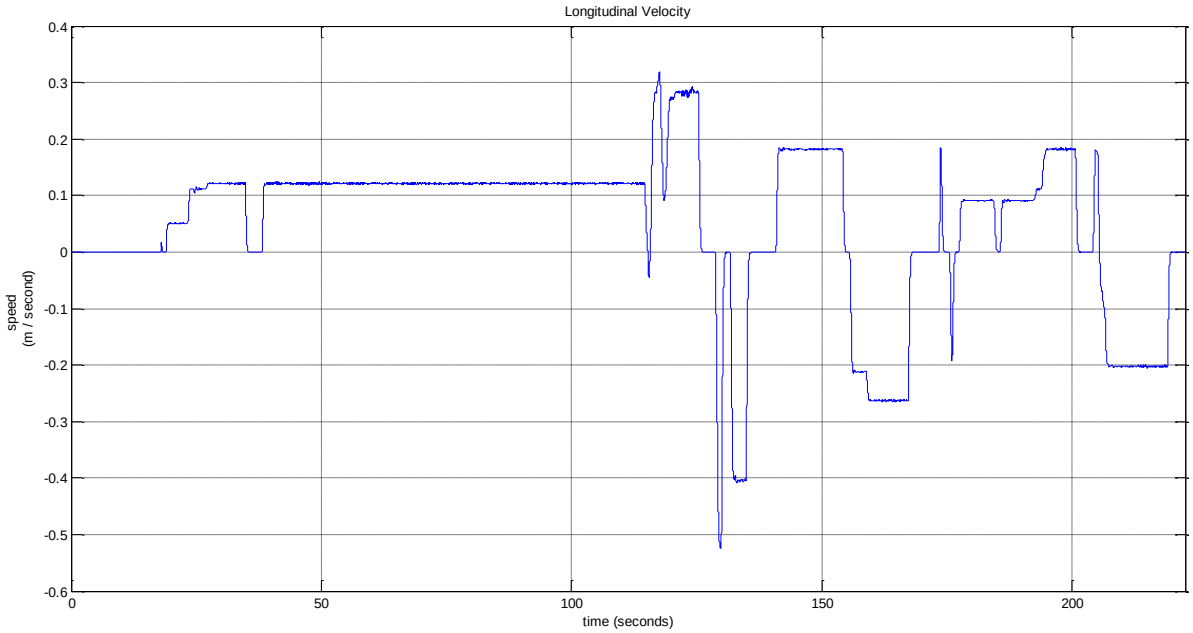
UGV started at heading 90 degrees, position (0,0). It was stationary for about 20 seconds. Started to move forward, turned to the left slightly (small increase in heading), and then turned to right (heading angle decreases), for completing a full loop. The figure which shows the estimated heading, uses convention B (the one you should use). The red curve is the heading, obtained by integrating the angular rate, after removing certain bias which pollutes it.

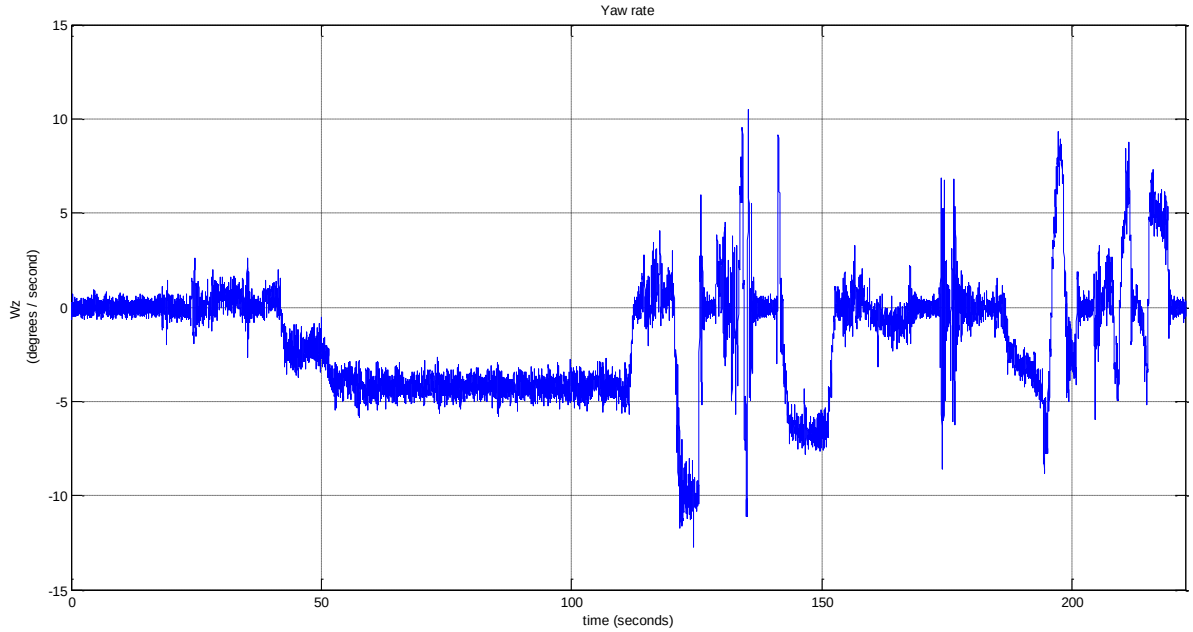
At some point, it changed gear, to move in reverse (where the speed measurements are < 0; see the next figure). It performed a number of maneuvers (forward / reverse) for finally parking at the point "end". At that point, its heading is similar to the initial one. The starting position and final one where in fact very close, but due to the errors, the dead-reckoning process introduced some drift.



(This plot used axes convention A. Yours should appear horizontally inverted, due to be using convention B)

Sensors' data (speed and Angular rate)





Questions: ask the lecturer. Via Moodle or email: j.guivant@unsw.edu.au

Recommended: Watch the related video/demo, given in the lecture ("Demo[Project01DEF_MTRN4010][2020].mp4"). Note: In the solution shown in that vide , convention B is also used.