

ArduPilot Mounted on Vehicle and RC-Boat-Towed Barge

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3D Robotics ArduPilot, a \$316 IMU with GPS and Telemetry



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Overview

- Following on a handheld run with the ArduPilot (reported 19 May 2013), my NCS Subsea collaborators (Eddie Majzlik, Tommy Rosa, who programmed the Arduino board, and Walter Rodriguez, who took the pictures) collected data on 23 May 2013 on a vehicle in a parking lot (at about 3-4m/s) and on a toy remote-controlled boat in a neighborhood lake (at less than 1m/s)
- This report exhibits the application of the Hydrometronics Kalman filter (described previously) to the recent ArduPilot data
- The earlier report can be found here:
<http://www.hydrometronics.com/downloads/Kalman%20Filter%20for%203D%20Robotics%20ArduPilot%20x.pdf>

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Tommy downloading the ArduPilot after the parking lot run, Eddie and Noel watch

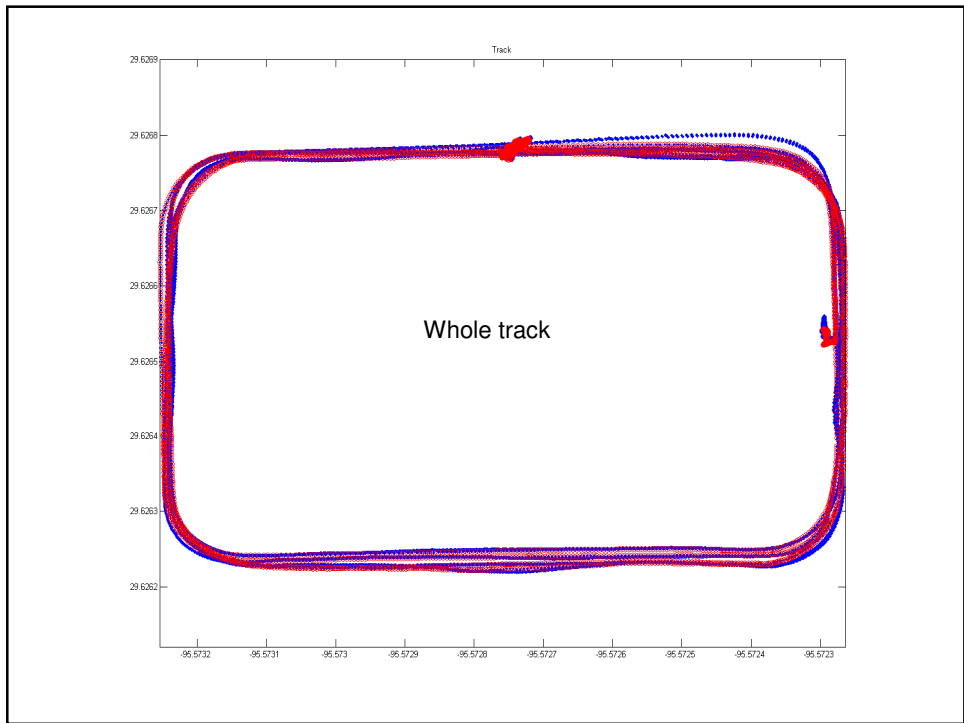


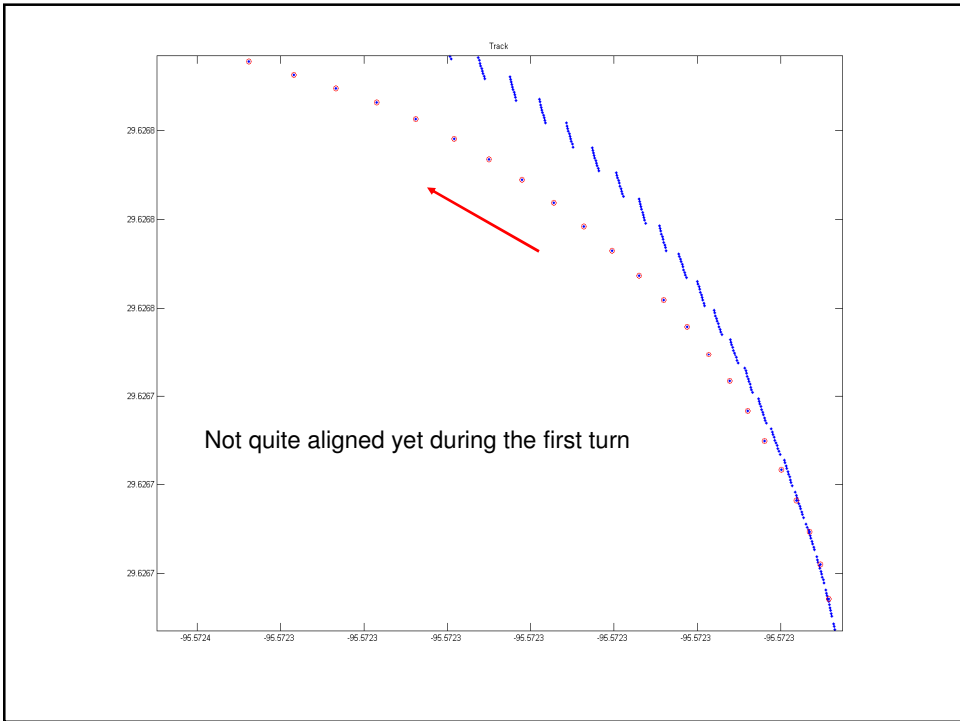
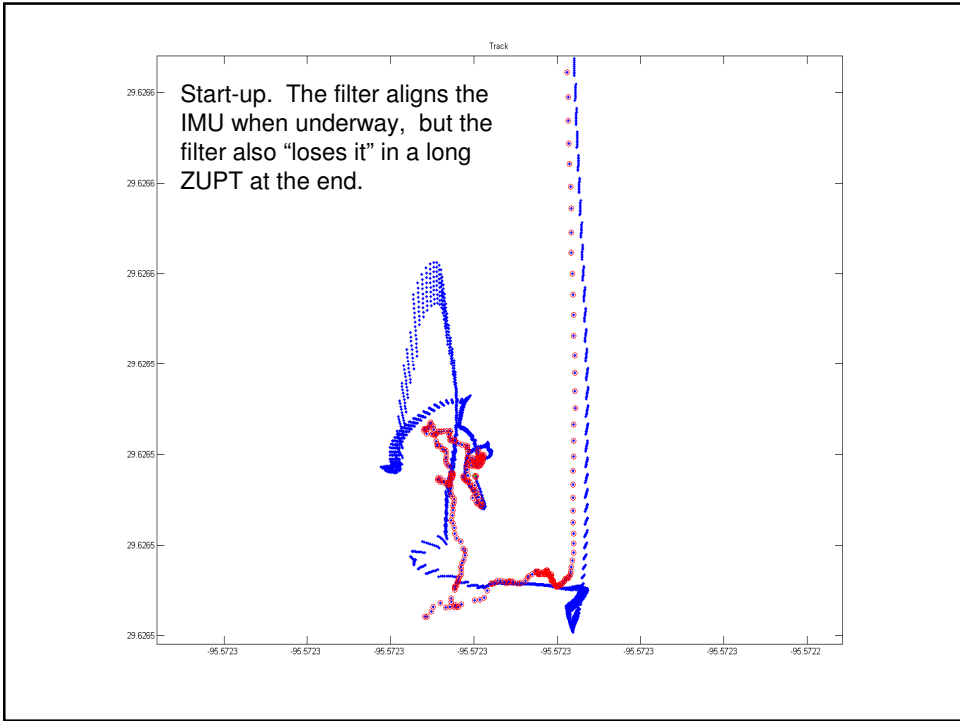
Part I:
Vehicle in Parking Lot

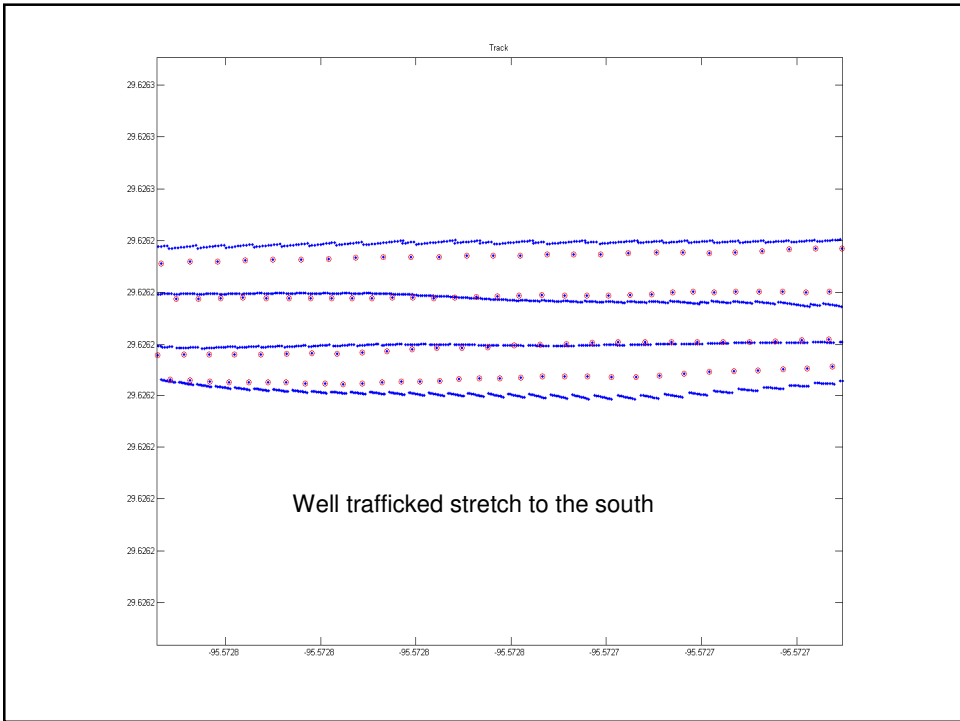
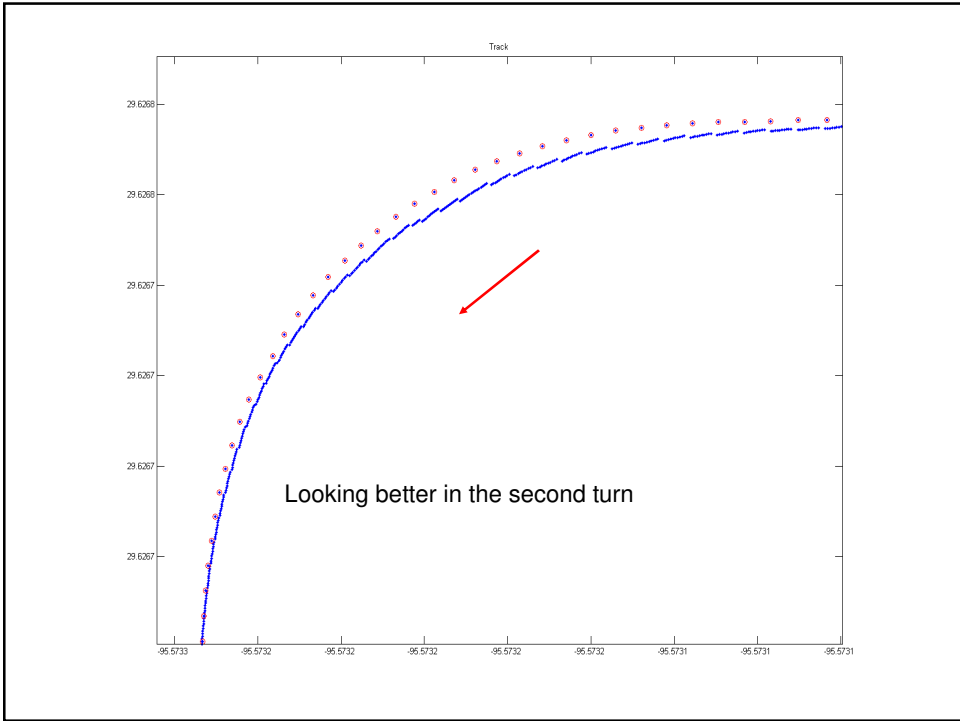
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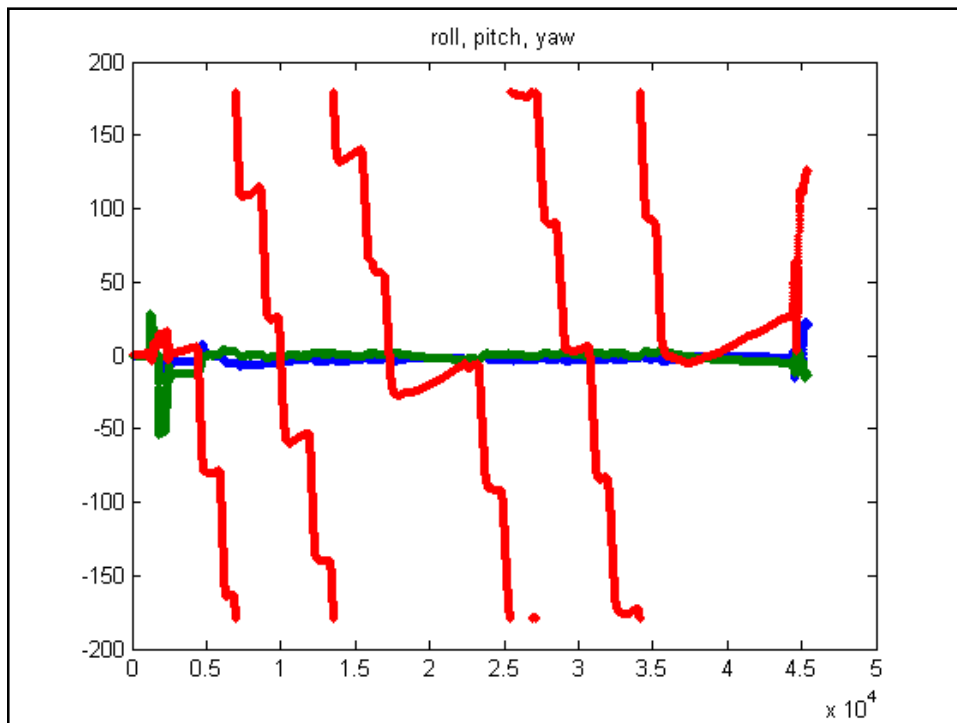
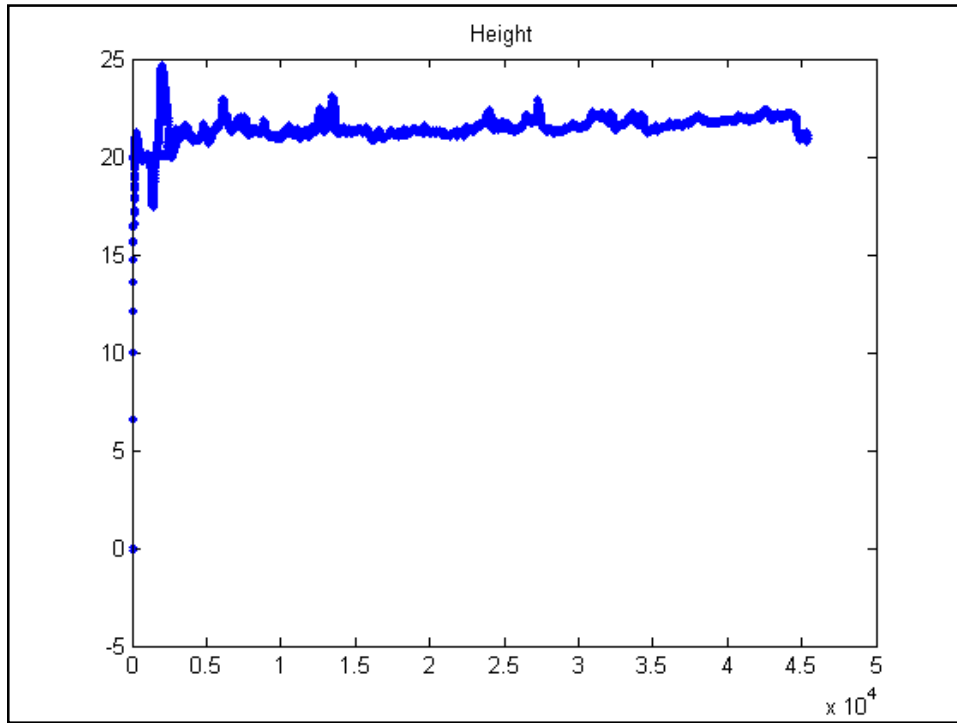
The vehicle with ArduPilot mounted on top

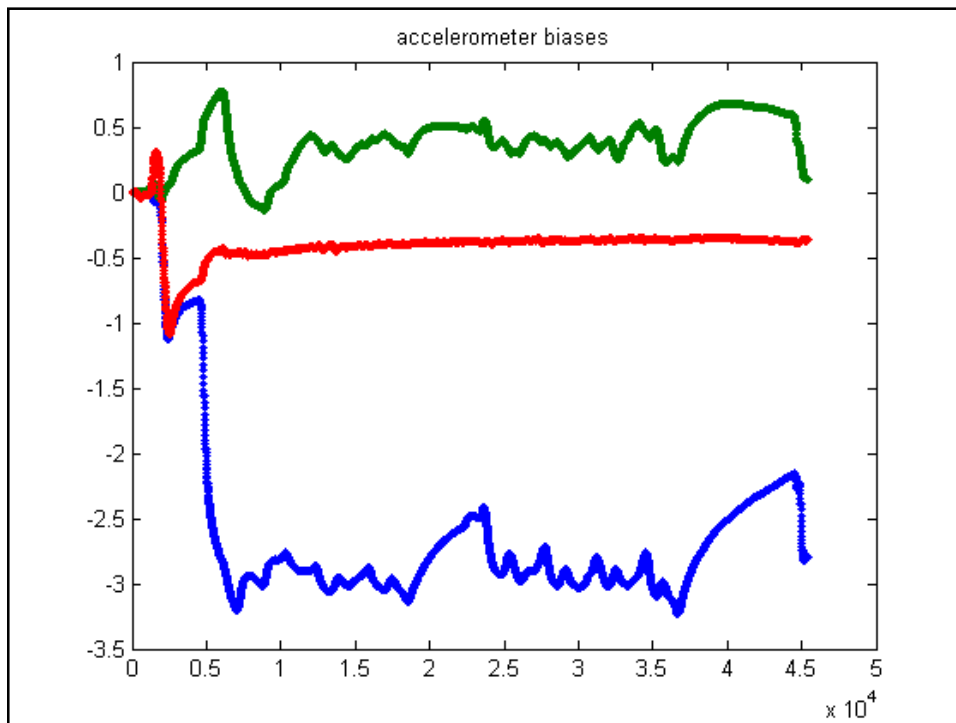
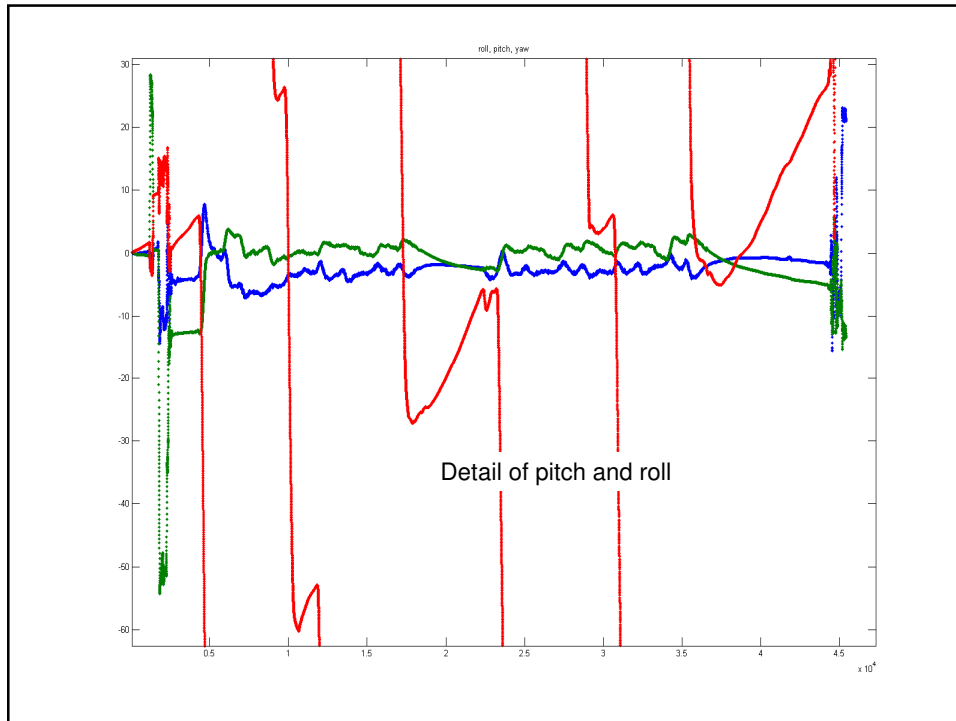


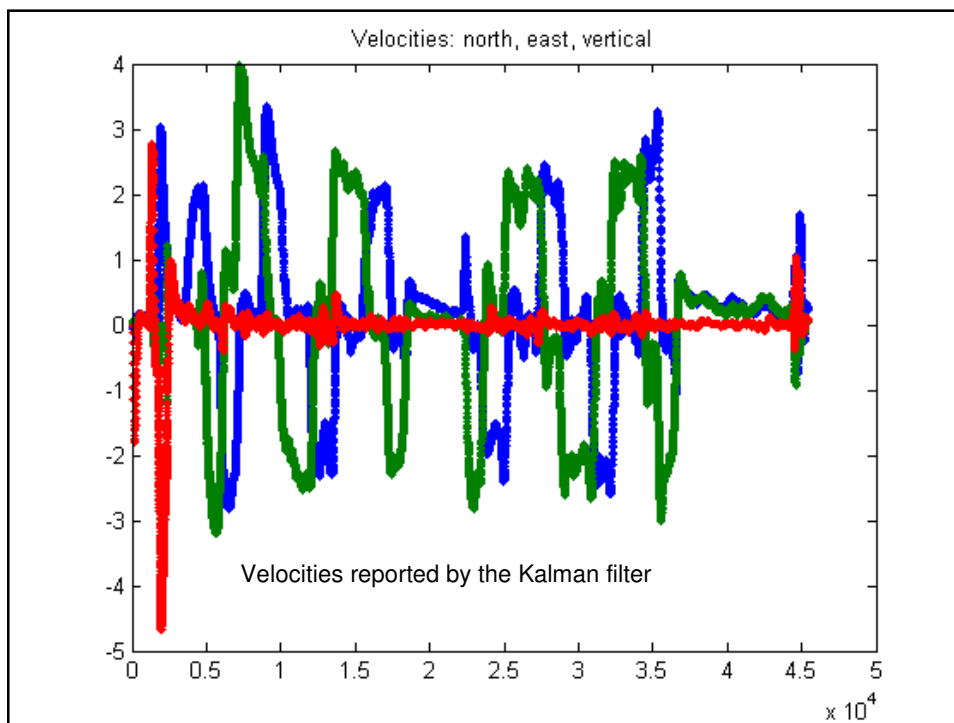
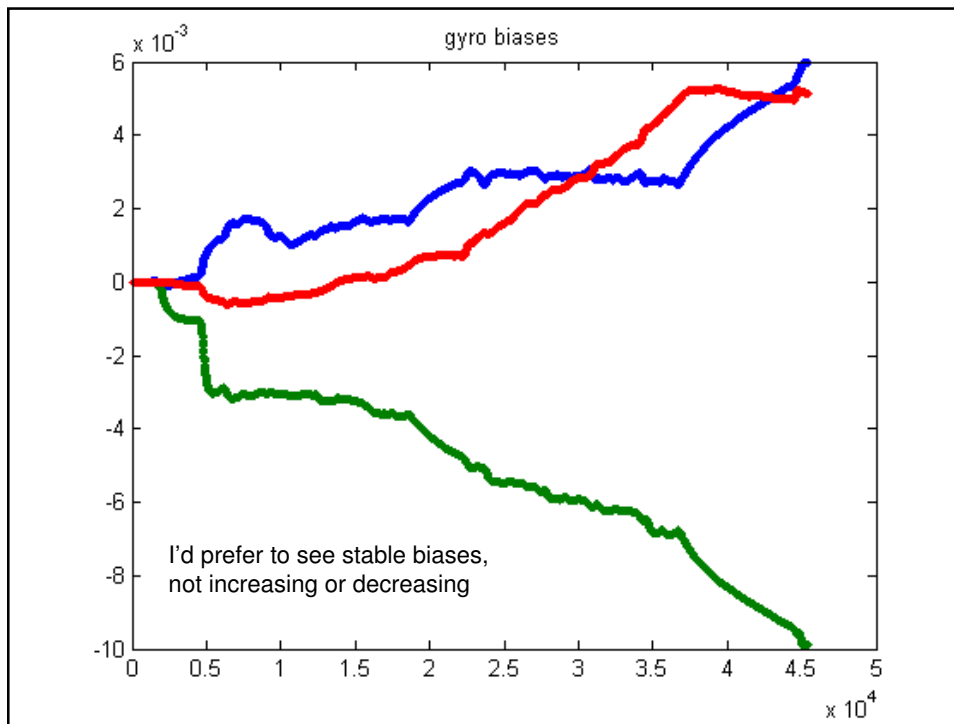


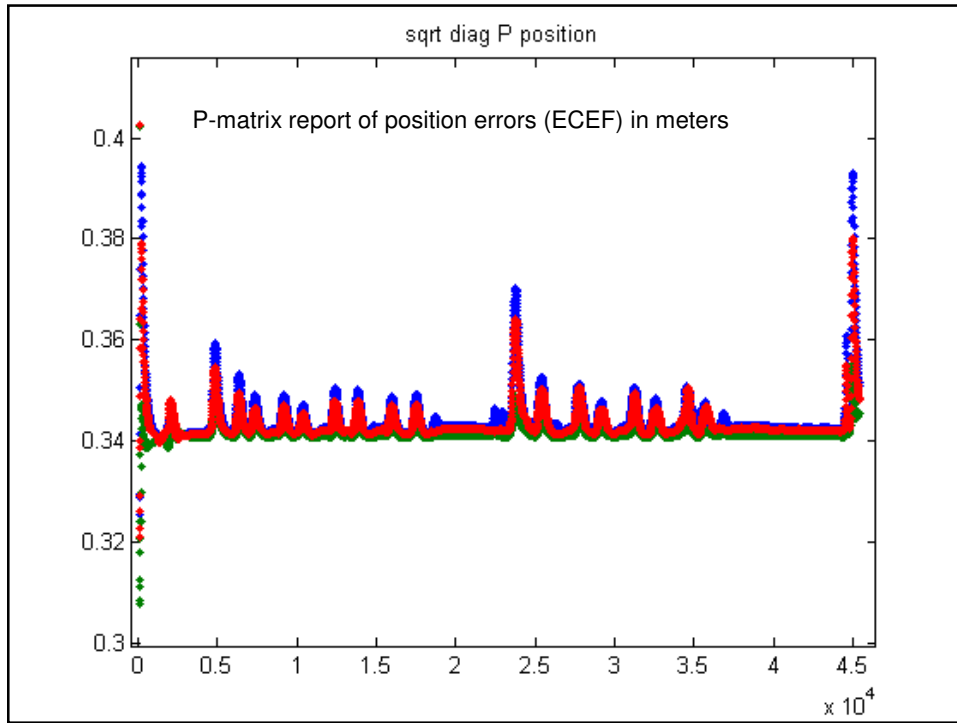






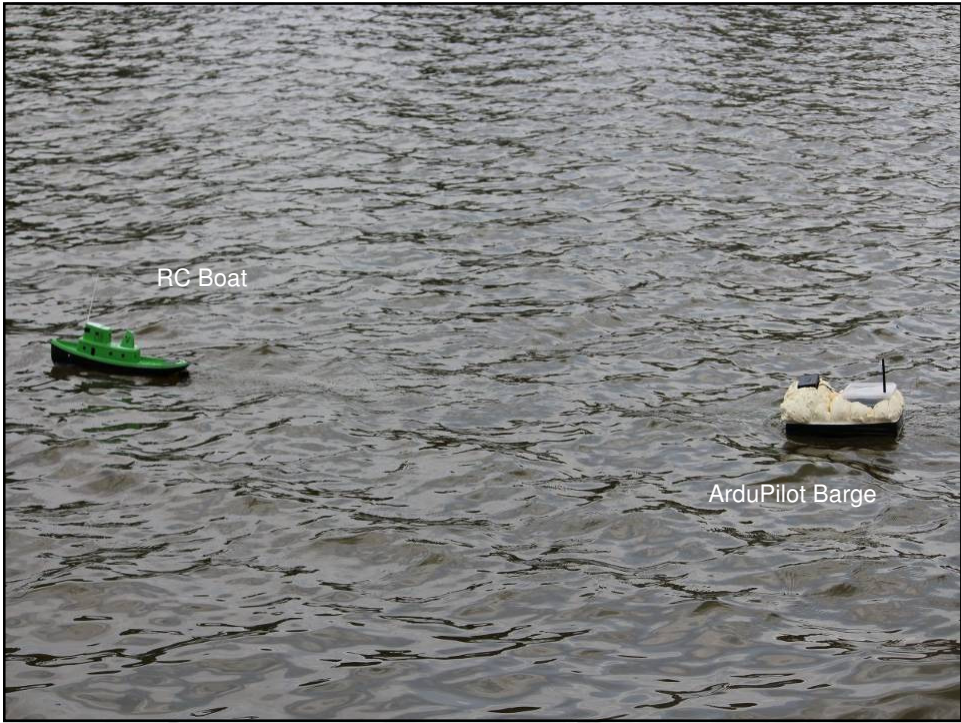


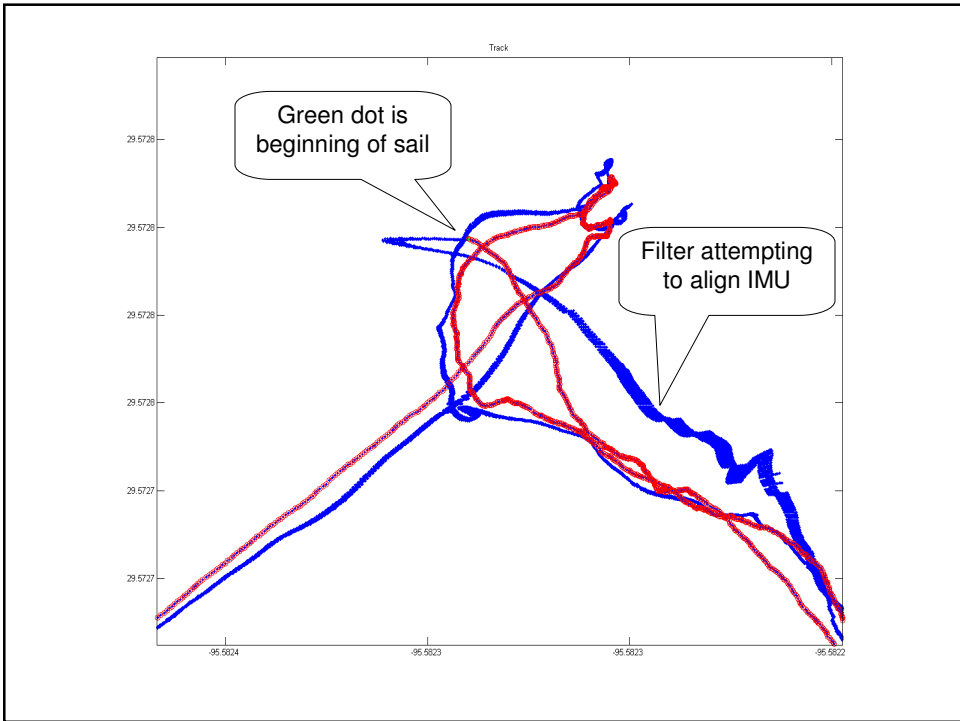
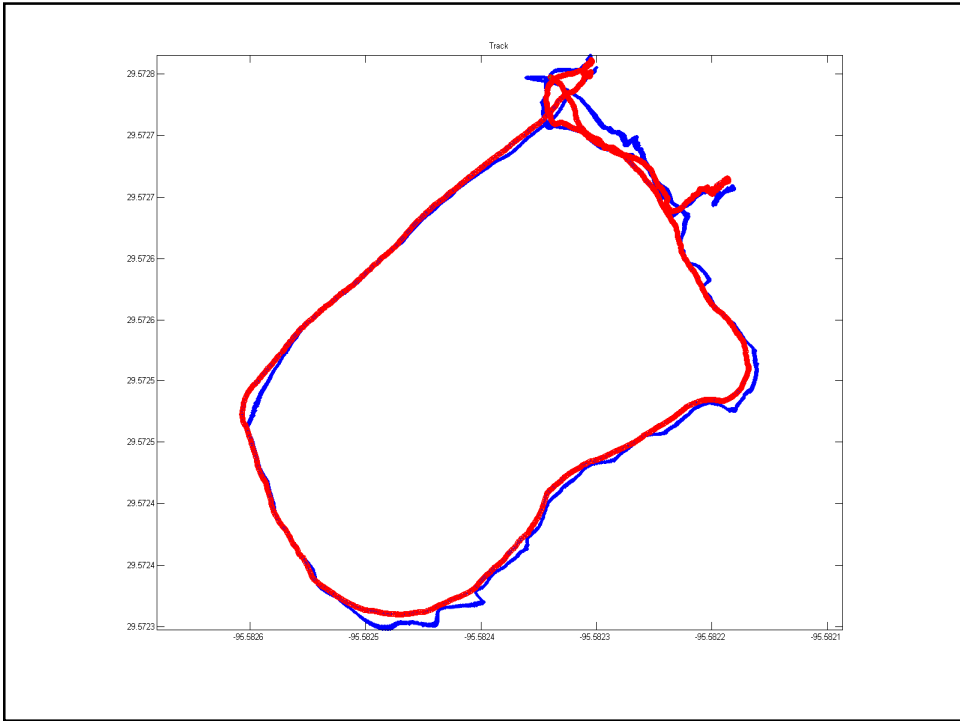


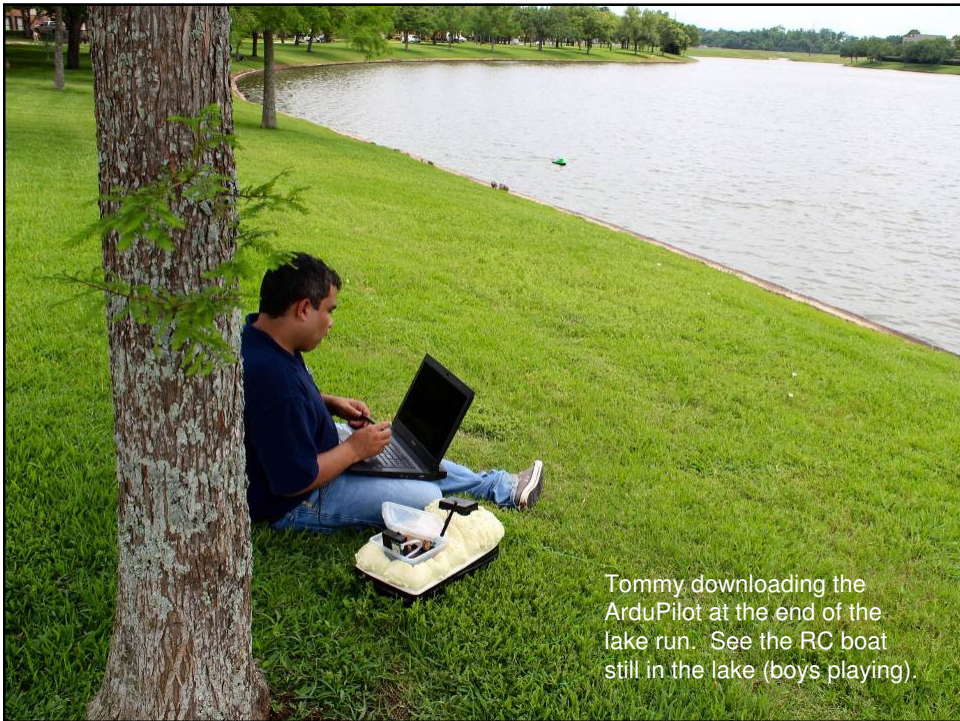
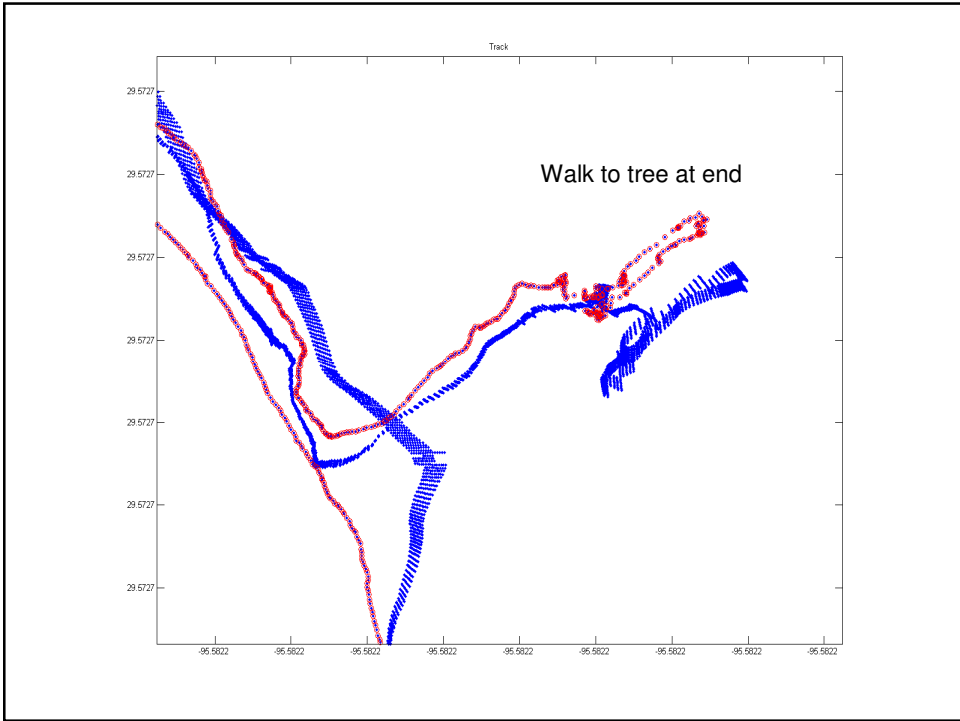


Part II:
Lake 1

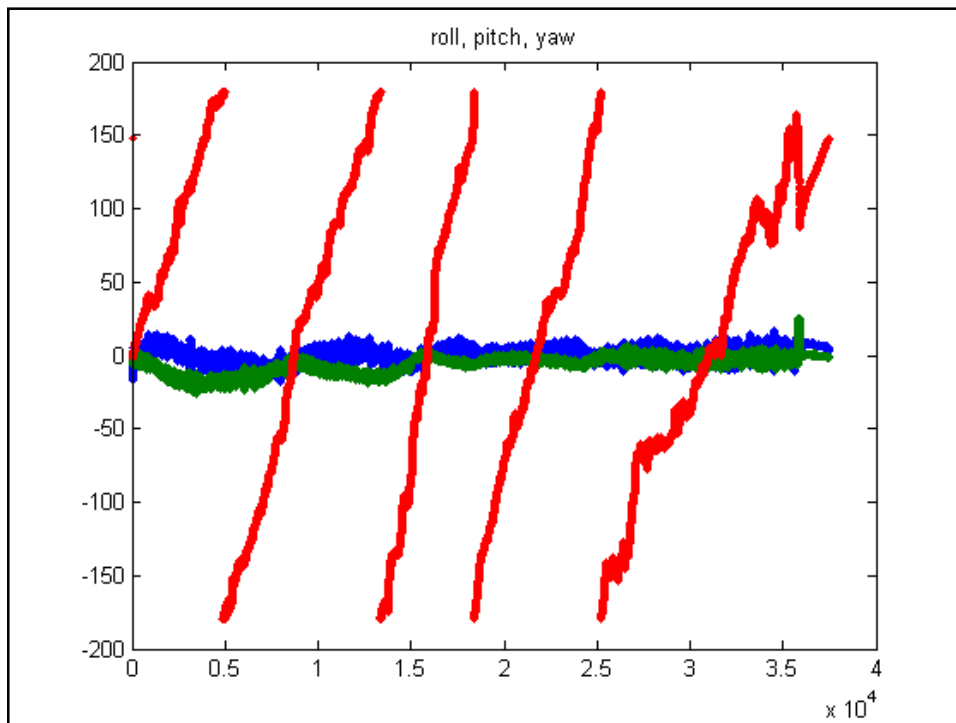
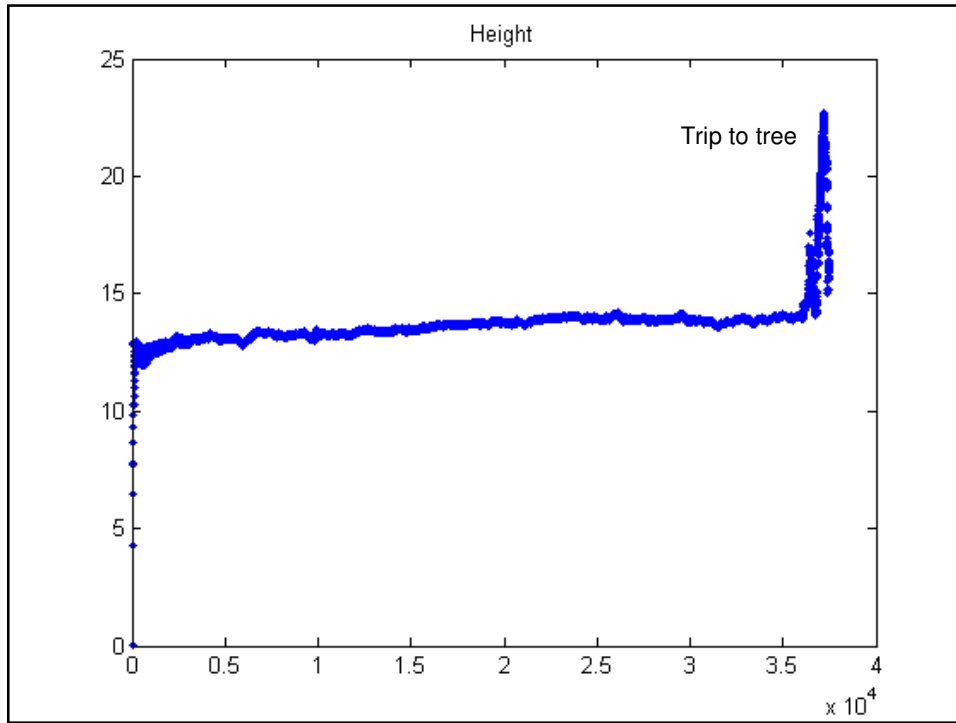


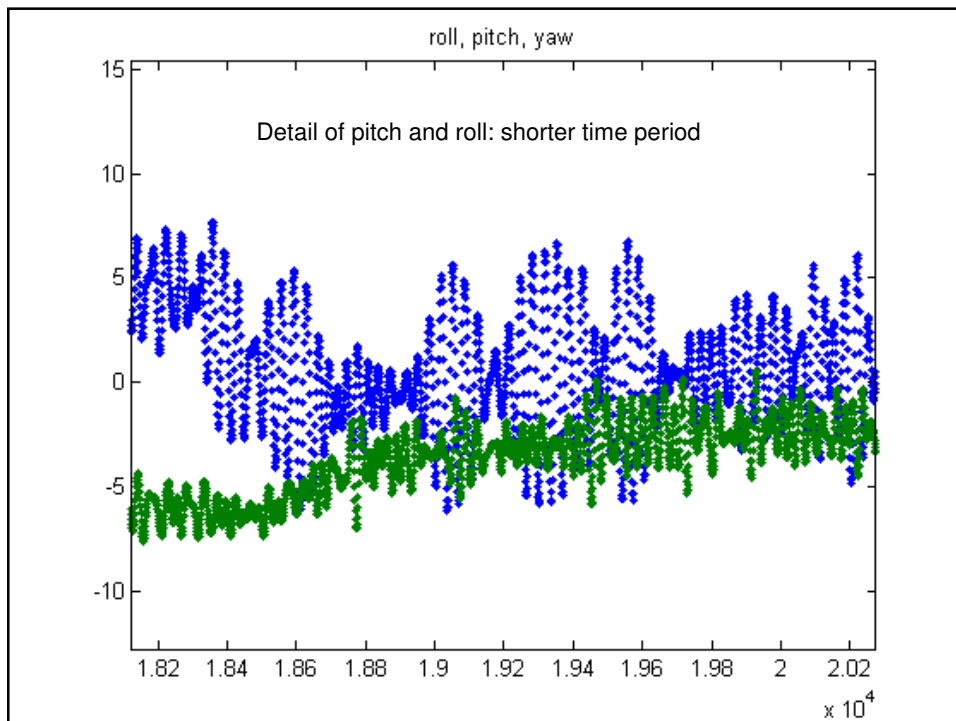
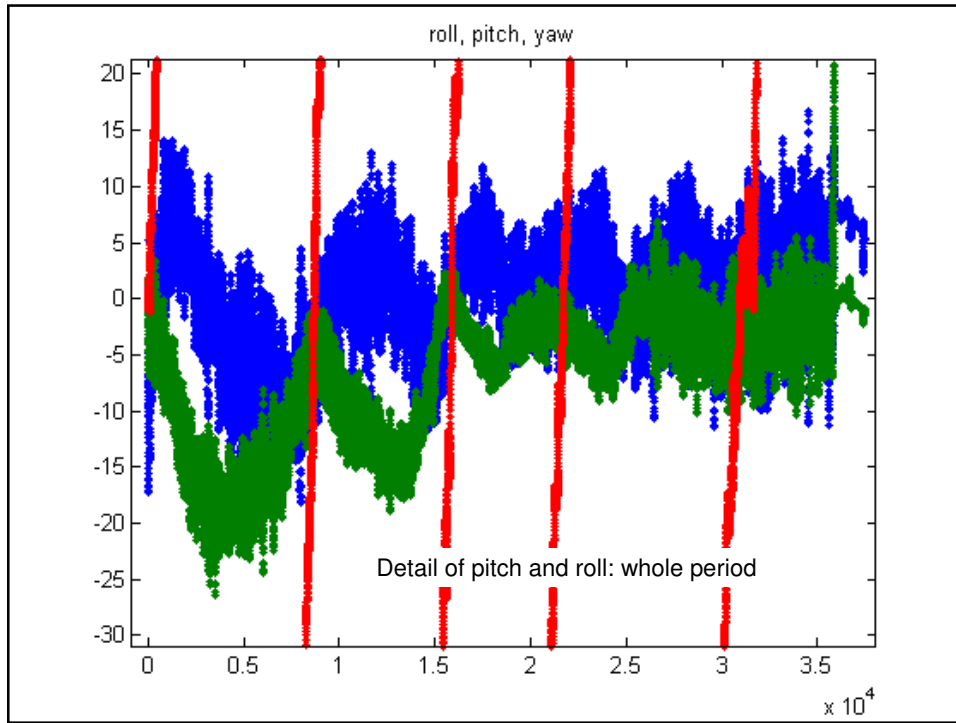


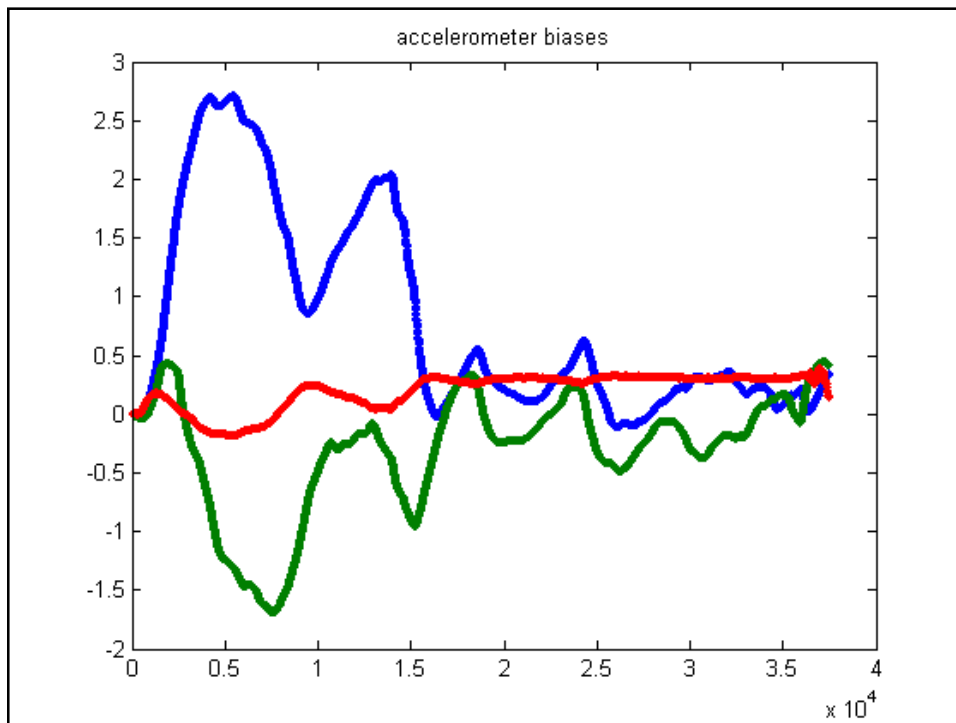
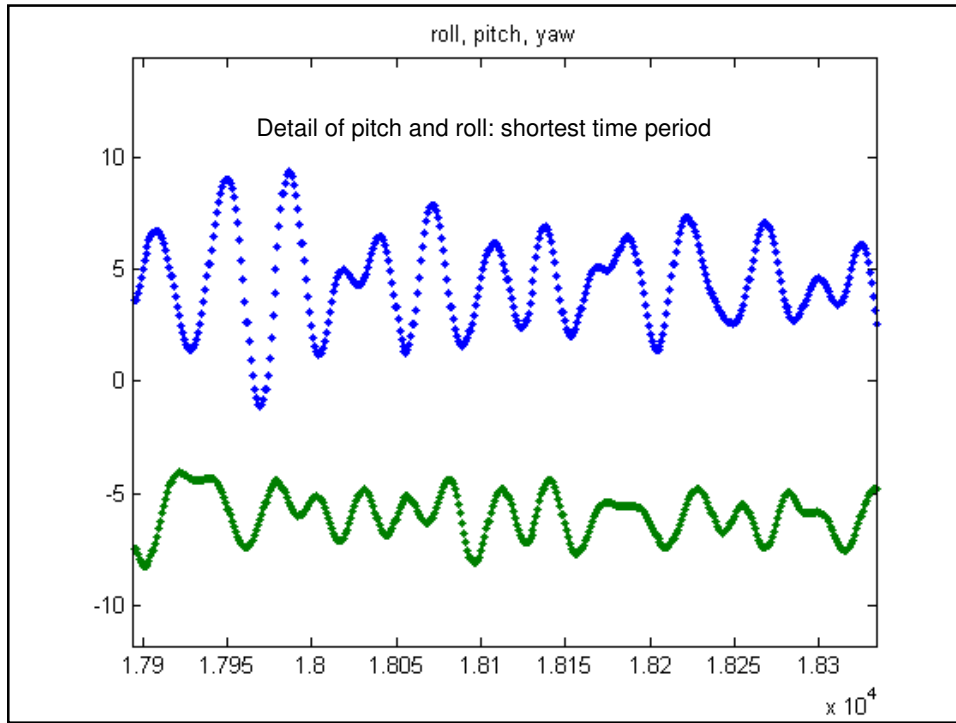


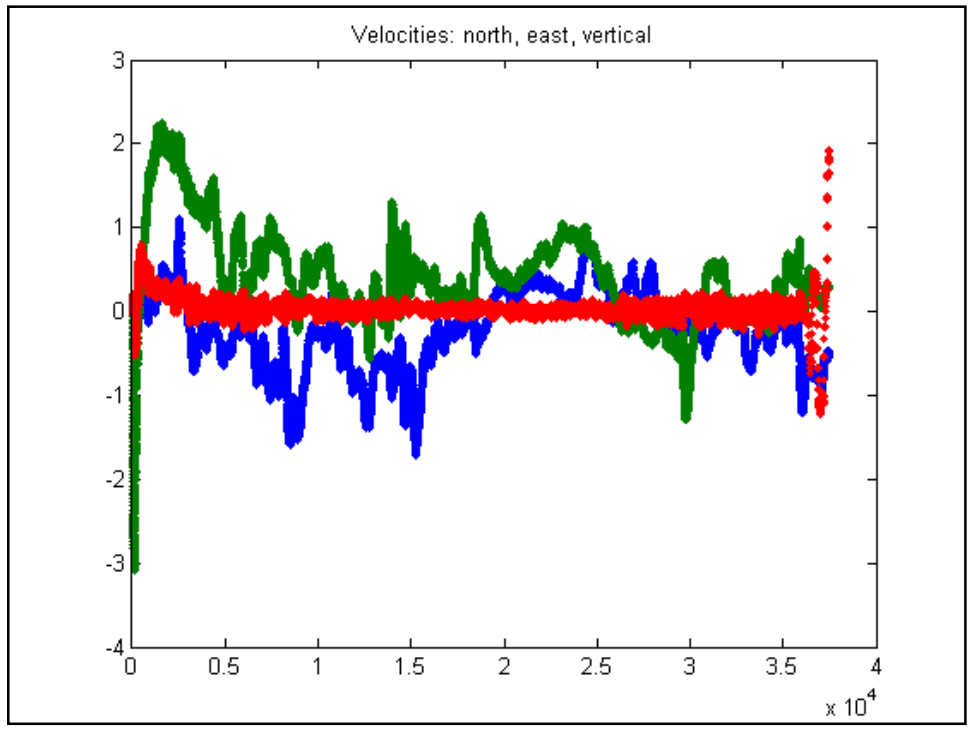
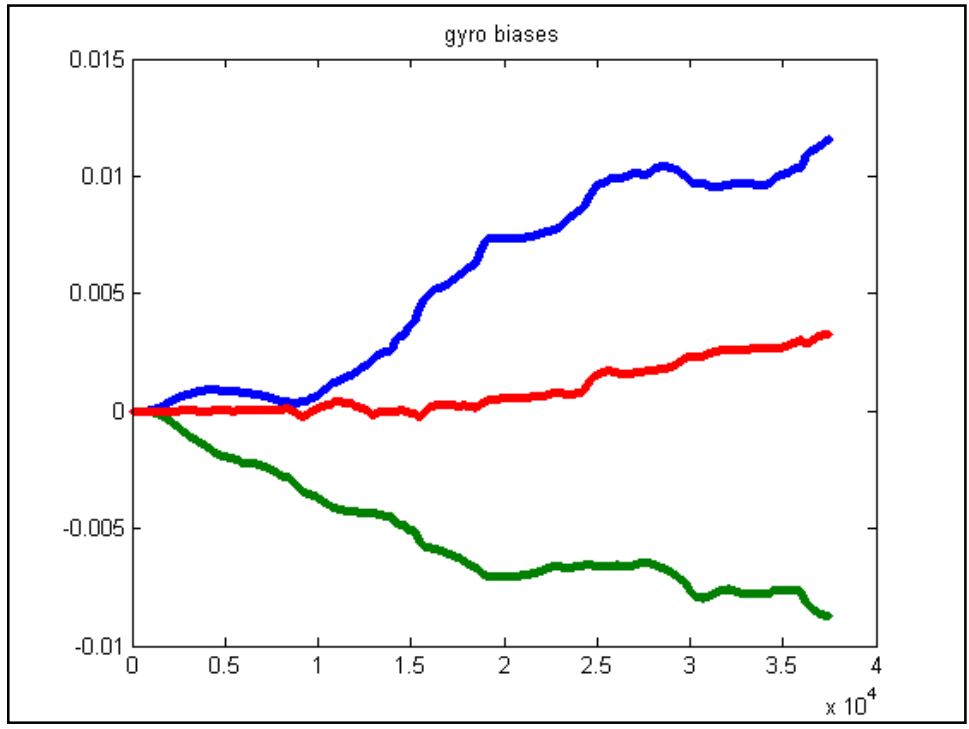


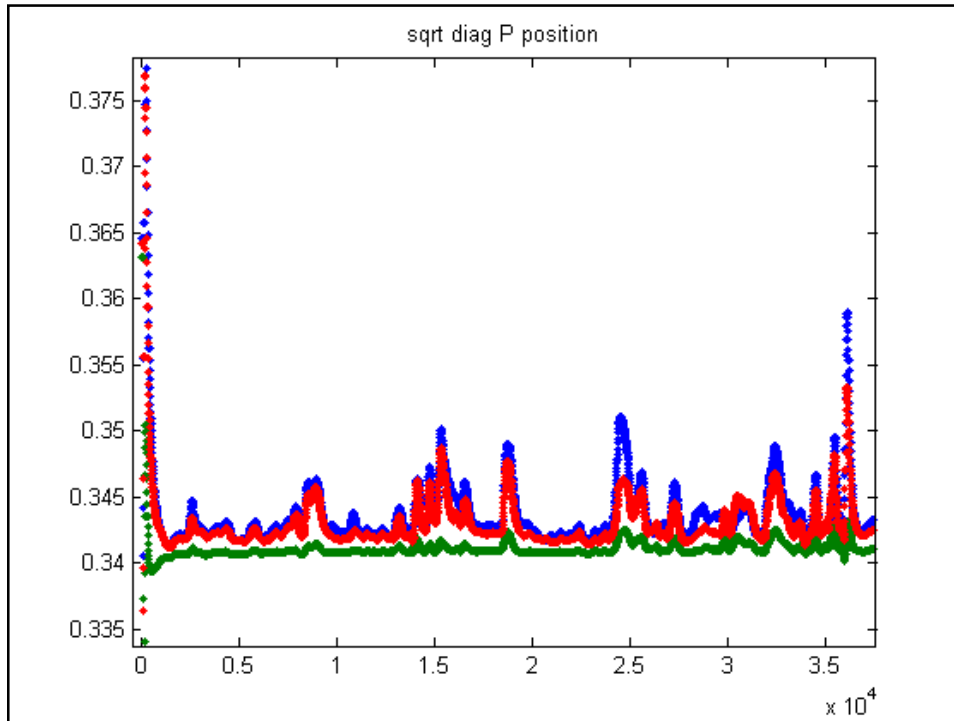
Tommy downloading the ArduPilot at the end of the lake run. See the RC boat still in the lake (boys playing).











Comments

- In the last report on the ArduPilot, it was seen to track acceptably (with excursions) at walking speed (1m/s) in hand
- In this report it is seen to track very well on a slow vehicle (3-4m/s), that is, about the speed of a seismic vessel surveying
- In a neighborhood lake with mild chop and light wind, however, the Ardupilot does not fare as well as an integrated positioning device
- With this Kalman filter, alignment of this (consumer-grade) IMU requires motion and the IMU does not seem to hold its alignment for long
- Marine-grade IMUs are the top grade of IMU for a reason, their ability to hold alignment for long periods without aiding, though at the expense of alignment procedures and zero-velocity updates
- On the other hand, this IMU, disciplined as weakly as it was during the exercise on the lake, does report useable pitch and roll
- Thus, the ArduPilot serves its purpose as a hobby-drone autopilot with GPS alone for position, IMU for pitch and roll, and magnetometer for yaw.
- We are asking much more of the ArduPilot by integrating its IMU and its GPS in a Kalman filter to improve positions and to provide velocity and better P&R
- It can work, but a requirement of that integration seems to be motion at an adequate speed to achieve and maintain alignment