

Analysis of Lab 2 Obstacle Course Acceleration Data

We assembled an automatic underwater vehicle to traverse an obstacle course going from a flat surface laying hoop to a submarine vertical hoop, to another surface laying hoop. The three were arranged in a line.

The robot had the following instructions: a fully powered descent for 5 seconds, a slight descent to counter buoyancy with full thrust forwards for 5 seconds, and full powered ascent for 3 seconds.

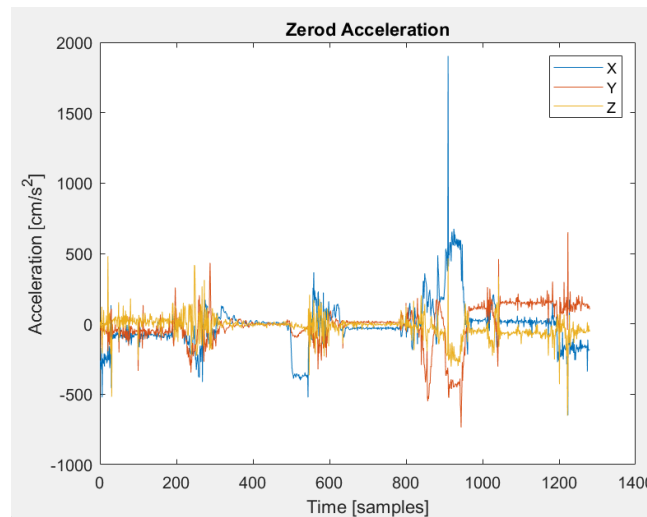


Fig 1: Acceleration data taken during Test 4 from the Tank Room. We remove the acceleration measurements across each axis when the rover was at rest to remove gravity and systematic error in acceleration from each axis.

In the actual experiment, the rover travels down and slightly forwards, hits the bottom of the tank, and becomes entangled in the obstacle course while attempting to finish the rest of its maneuver. We then remove the rover from the water. At Time = 300, the rover was placed in water and allowed to come to rest without bobbing. We then accelerate downwards and forwards, as seen by the spike around in x and y acceleration $t=500$. The rover hits the ground of the tank around $T=580$, after which it bounces between the challenge hoop and the ground. The rover's upwards motor is not sufficient to lift it away from the floor, since it's front end was trapped on the underside of the hoop. It remains in roughly the same position until we pick it out of the water at $t = 800$, and set it on the lab table at $t = 1000$.

