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An Off-Road Autonomous Ground Vehicle Testbed

Acknowledgements

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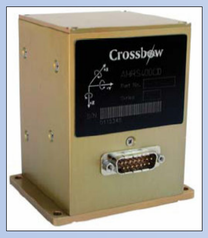
OVERBOT

Hardware

The Overbot uses five main sensors to analyze its state and the surrounding environment.

1. SiCK LiDAR to generate a localized terrain profile

2. Novatel GPS to triangulate global position



3. Crossbow AHRS to determine roll, pitch, and yaw

4. Eaton VORAD to detect “car-sized” obstacles directly in front of the vehicle

5. Dickey-John Radar Sensor to determine vehicle velocity.

Overview

The Overbot is an autonomous vehicle originally designed for the DARPA Grand Challenge. It is capable of navigating GPS defined courses autonomously while avoiding obstacles. The UCSC autonomous systems lab intends to use the Overbot as a testbed for researching the effectiveness of different configurations of hardware and control algorithms.

Baskin School of Engineering

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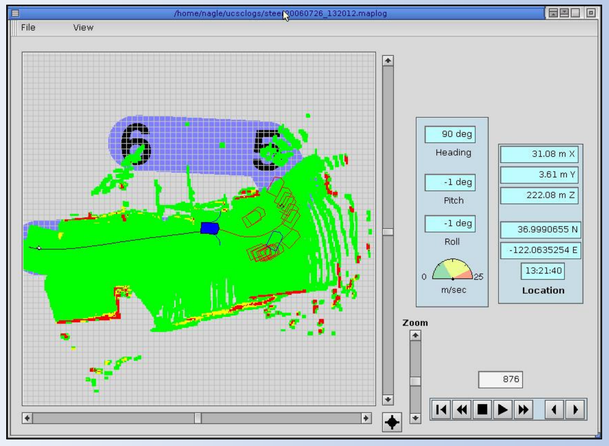
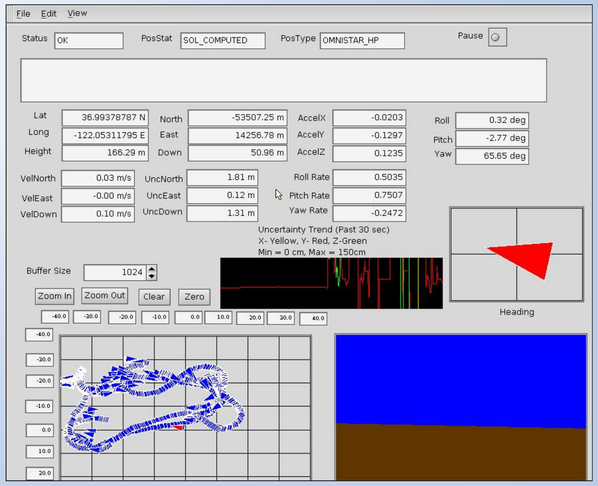
Path Planning

The destination goals are specified in a GPS way point file. The file includes the desired coordinates along with the maximum speed (in MPH) and radial tolerance (in feet) for each section of the course.

The Overbot generates many possible paths using circular arcs. It then attempts to take the most direct path to the next waypoint while keeping a safe distance away from obstacles.



The SiCK LiDAR is used to generate a map of the surrounding area, color coded to indicate the traversability of the terrain.



The NAV VIEWER maps position, pitch, roll and yaw data. The recorded data can then be analyzed back in the lab, to asses how well the vehicle navigated the course.