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Type: **Student Talk**

Enhancing Autonomy of Unmanned Surface Vehicles through Integrated Perception and Control

Wednesday, February 7, 2024 9:20 AM (20 minutes)

The Sonobot Unmanned Surface Vehicle (USV), developed by EvoLogics, is a system platform tailored for hydrographic surveying in inland waters. Despite its integrated GPS and autopilot system for autonomous mission execution, the Sonobot lacks a collision avoidance system, necessitating constant operator monitoring and significantly limiting its autonomy.

Recognizing the untapped potential of USVs for integrating advancements in autonomous vehicles, machine learning, and control theory, we propose a two-layered system: a perception layer for object detection and an algorithmic layer for collision-free path selection. The novelty of our perception layer lies in the integration of a Stereo Camera, LiDAR, and Front Looking sonar for robust obstacle detection.

For the algorithmic layer, we engineered a simple yet powerful cost function. Our preliminary results demonstrate the ability to calculate a collision-free trajectory for the Sonobot using this cost function in conjunction with a Model Predictive Controller (MPC).

We invite discussion on the potential of testing the MPC against Reinforcement Learning and the possibility of combining MPC and RL to further enhance the autonomy and efficiency of USVs.

Possible contributed talk

Yes

Are you a student?

Yes

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