Prodromos - USV Collision Avoidance from ML-Based Perception

A core function Unmanned Surface Vehicle (USV) autonomy is the ability to safely avoid other vessels. The collision avoidance strategy is only as good as the information about the location and trajectories of nearby vessel traffic. The goal of *Prodromos* is to enhance USV collision avoidance capabilities by using Machine Learning (ML) generated perception capabilities derived from rich datasets collected on the Charles River at MIT. The project has three components:

- *Datasets*: The collection of rich datasets of sailboat traffic on the Charles River. During each dataset collection, a number of MIT sailboats will be fitted with a small computer box with GPS, logging ground-truth position, heading and speed of the sailboat. One box per sailboat, for *all* participating boats. The MIT autonomous Boston Whaler, Philos, will operate nearby collecting camera, LIDAR, and radar data of all sailboats within sensor range. Each dataset will be comprised of the time-synchronized data streams and logged data from each sailboat.
- *Machine Learning*: The datasets will be used to train a ML system with the goal of achieving a trained system capable of providing contact position, heading and speed from live sensor data in a deployed USV such as Philos.
- *Autonomy*: MIT collision avoidance behaviors will use the output of the ML-based perception system to generate autonomy decisions for safely avoiding contacts in the field.

The end demonstration goal of Prodromos is to deploy the MIT USV, Philos, to autonomously traverse from Boston to Cambridge through sailboat traffic in a consistently reliable and safe manner.

Status:	Ongoing since May 2021
Sponsors:	Brunswick (Philos USV)
People:	Mike Sacarny, Mike DeFilippo, Mike Benjamin, Maaya Prasad
Robots:	https://oceanai.mit.edu/pavlab/robots/philos