

SAUVIM (Semi-Autonomous Vehicle for Intervention Missions)

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The first fully autonomous underwater manipulation in an unstructured environment was demonstrated at the Snug Harbor in Honolulu, Hawaii. An autonomous underwater robot, **SAUVIM** (Semi-Autonomous Underwater Vehicle for Intervention Missions), performed autonomous localization, path planning, navigation and manipulation on repetitious missions. This demonstration presented a technological breakthrough in the field as autonomous manipulation had been a bottleneck issue for underwater intervention missions. Witnesses of this live demonstration included representatives from the Federal and State Governments, the University of Hawaii research entities, private companies, the Department of Defense as well as foreign scholars.

Submerged in the water, SAUVIM first performed a self-calibration routine, initializing its subsystems. After the calibration step, SAUVIM began its given mission - to search and tag an underwater object. The object's location was randomly given. Once the vehicle reached the area around the object, it starts a scan of the area using its DIDSON camera to locate and identify the target. Once the object is detected, SAUVIM approaches the target area and positions itself for optimized manipulation. While the vehicle is hovering (station-keeping) in the water column, using the unified coordinated motion control of the vehicle and manipulator system, the vehicle performed an autonomous manipulation task by applying a device to the object for tagging. After completing the mission, the vehicle comes back to the dock by using feature-based navigation. The whole sequence is autonomously accomplished and a similar mission is successfully repeated multiple times. SAUVIM was developed jointly by the Autonomous Systems Laboratory (ASL) of the University of Hawaii at Manoa and its spin-off company, MASE, Inc. (MASE, Inc.) with funding from the Office of Naval Research (ONR). SAUVIM also includes some basic research work partially funded by the National Science Foundation (NSF).

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