NSF:NRI: FND: Extending Autonomy in Seemingly Sensory-Denied Environments Applied to Underwater Robots

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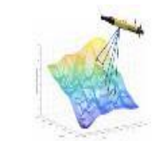
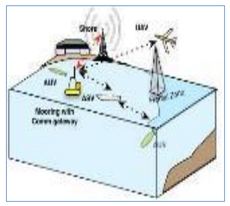
http://users.cis.fiu.edu/~jabobadi/extendingautonomy/

Enabling accurate localization and navigation using novel strategies and map representations for effective human-robot communication and targeted intelligent sampling.

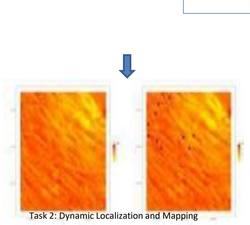
Approach



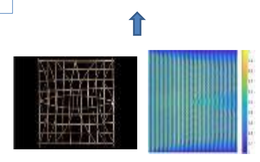
Task 1: Developing and Extending 3D Representations



Task 4: Experimental Validation and Testing



Task 2: Dynamic Localization and Mapping



Task 3: Novel Representations for Co-Robot Human Interaction

Challenge: Overcome theoretical and technical barriers to performing intelligent sampling in a sensory-denied, spatiotemporally dynamic environments focused in the aquatic domain

Scientific Impact: Novel strategies to perceive the surrounding environment and enable navigation devoid of a geographical reference model in dynamically evolving environments.

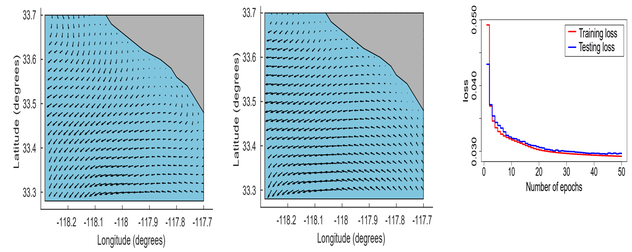
Examine and implement alternative approaches to map representation, localization, navigation, enabling effective robot-human communication that can be applied broadly to mobile robot systems

Solution: **1)** Enable localization for navigation within dynamically-evolving environments

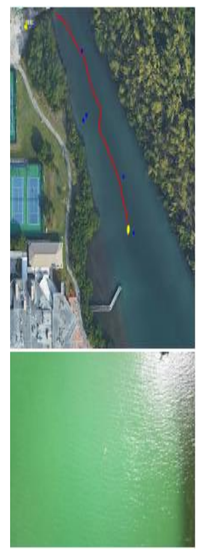
2) Show utility of novel representations for planning on-board and between humans and robots

3) Experimentally validate research outcomes through simulations, laboratory tests, and field trials.

Current Progress:



Learning ocean dynamics for navigation with uncertainty and moving obstacles. (Submited to RA-L)



Test-bed in Key Biscayne, FL

Broader Impacts: **1)** High- many important applications, impact applications: Advances including the assessment of in this project will enable cost- reef ecosystem health and algal effective data collection for bloom monitoring.

2) Research Involvement of students from historically underrepresented groups involved in cutting-edge robotics research.

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