NC STATE UNIVERSITY

UtahStateUniversity,

NRI: INT: Development of a Customizable Fleet of Autonomous Co-Robots for Advancing Aquaculture Production

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An existing ≈\$14 billion seafood deficit in the US is driving efforts to develop new, larger nearshore marine aquaculture systems to meet national demand. Temporary closures impact industry economics and can cause more than 25% total revenue loss.

Research Theme 1: Integrate hydrologic and hydrodynamic models with a collaborative task-planning strategy for high-resolution process monitoring in aquaculture production zones.

Research Theme 2: Explore aerial and surface vehicle co-robot teaming strategies within a heterogeneous fleet.

UAV-USV Co-Robot Teaming Strategies





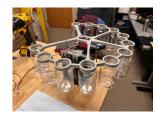








This project integrates **hydrologic** and **hydrodynamic** models of complex, dynamic nearshore coastal systems with task planning algorithms across multiple scales in a novel way for **more optimal** and **information-rich monitoring**, **response**, and **exploration**.



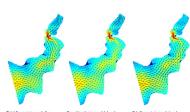


Velocity Magnitud

Vehicle and field

Physically-relevant

software testing





Production closure predictive models Goal-oriented high-level planning Local hydrodynamic models for predicting environmental variability Low-level vehicle controller(s) In situ H₂0 parameters Bathymetry mapping Water sample collection Remote sensing data Decisionmaker(s) Goal-oriented high-level planning Low-level vehicle controller(s) Operators & Researchers

Water sample collection

In situ sensing data

BROADER IMPACTS

This work is important because it is one of the first focused efforts towards developing robotic systems for the near-shore aquaculture industry and engages mariculture stakeholders from both government and industry throughout the project to better position them to adopt these systems.

We utilize the NC Cooperative Extension to include stakeholders in testing and deployment and **engage with rural NC communities.**



2023 FRR-NRI Principal Investigators' Meeting

May 2-3, 2023





