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

USDA NIFA Award ID#: #2021-67021-33451
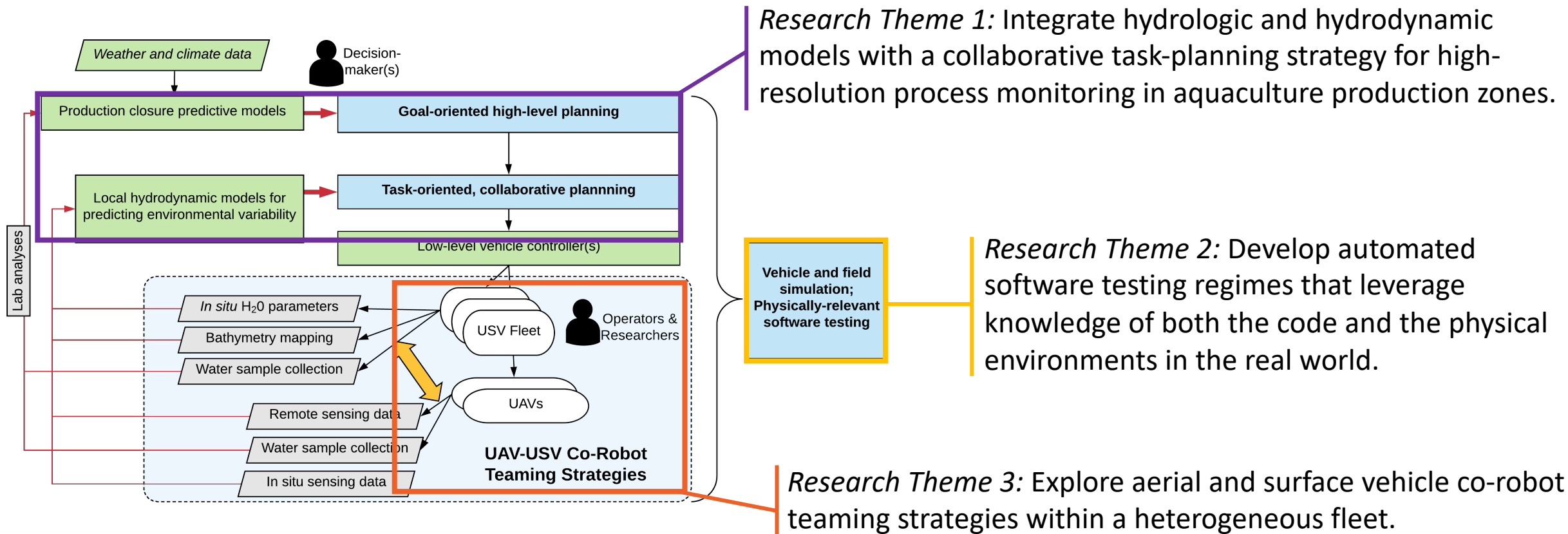
Poster #: 158

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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: Develop automated software testing regimes that leverage knowledge of both the code and the physical environments in the real world.

Research Theme 3: Explore aerial and surface vehicle co-robot teaming strategies within a heterogeneous fleet.

INTELLECTUAL MERIT

This project will **integrate 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**.
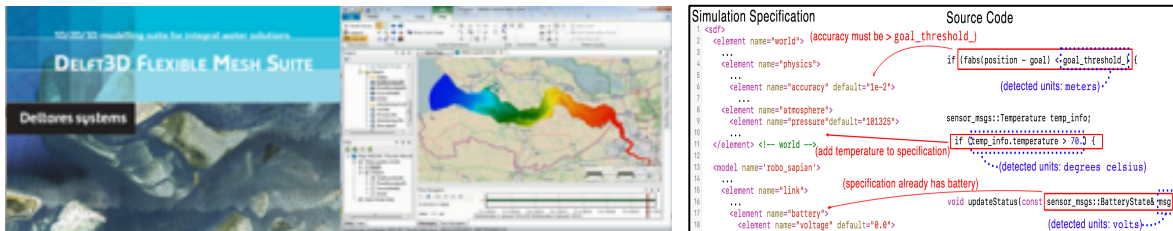
We will also develop **new software analysis methods** to ensure that robotic simulation scenarios address the real-world concerns used in the system's software by advancing the capabilities of program analysis and abstract type inference, resulting in **new tools for system developers**.

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 will **engage mariculture stakeholders from both government and industry** throughout the project to better position them to adopt these systems.

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