CAREER: Autonomous Underwater Power Distribution System

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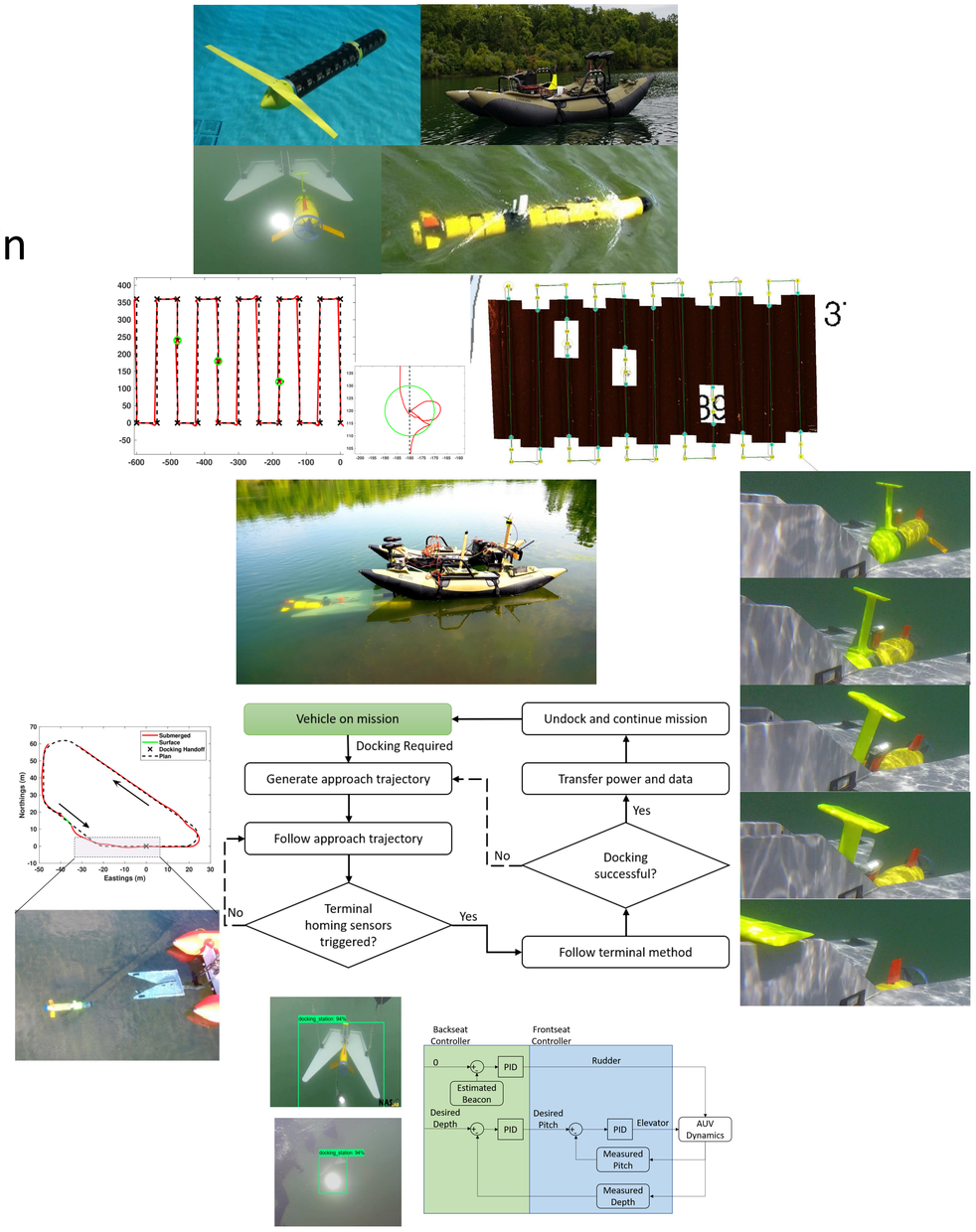
Challenge:

- Collective power management for long-term multi-robot operation.
- Effectively respond to energy needs in the presence of dynamic conditions and environmental uncertainty.

Solution:

Persistence requires coordination and infrastructure co-design.

- Developed the most maneuverable internally actuated underwater glider and switching controller to enable operation in high-risk confined spaces.
- Developed the first adaptable collapsible underwater docking system and navigation algorithm for submerged power/data transfer for a wide range of autonomous underwater vehicles to enable robust long-term missions.



Scientific Impact:

- Task and resource allocation model for persistent mission planning.
- Scalable charging mechanism for mobile power delivery system for undersea.
- Efficient path planning and coordination strategy to accomplish persistent mission plan.

Broader Impact:

- Long-term operation of collaborative fleet of heterogenous autonomous systems without human intervention for variety of applications such as Arctic Observations.
- Developed Low-cost educational platforms and courses for pre-college, undergraduate, and graduate students and training pre-college teachers.
- Engaged 201 high school and middle school students and 122 undergraduate and graduate students in hands-on project-based classes.

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