Its Not a Glider: A propelled autonomous underwater vehicle available to Rutgers engineers and scientists

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Abstract

The ability to test algorithms and sensors under rigorous field conditions can demonstrate application and identify challenges and provides advantage to research funding proposals. The Jacques Cousteau National Estuarine Research Reserve, a state-federal partnership program administered by Rutgers, operates a propeller-driven battery powered REMUS-100 autonomous underwater vehicle (AUV) capable of speeds to 2.6 m/s with precisions depth, altitude-over-bottom, speed, turning, and loiter control for missions up to 12 hours and 65 km. Recent developments provided a hardware/software stack and communications protocol that bridges user needs with the proprietary native navigation system, allowing the development of payload-control by researchers. A recent study of fish telemetry provides an example: Information on the identity, timing, and sound pressure level of detections received from acoustic transmitters implanted in fish, as well as current vehicle state, are used in a decision process for further vehicle action meant to safely create a synthetic aperture to geolocate the transmitter. The AUV is equipped with high-quality side-scan sonar, acoustic Doppler velocity profiler, and other sensors to study the environment and to aid in navigation. Guest ports with power and data flow can host additional novel sensors, including integrated or parasitic test payloads. Additionally, user-designed missions can provide unique data sets and test cases for experiments outside of the robotics and sensor engineering fields, such as multi-label classification and machine learning. The presentation will describe vehicle capability and specifications as well as access and field support for interested users.

Bio

Thomas Grothues is an Associate Research Professor at Rutgers University Department of Marine and Coastal Sciences with interest in the abundance and distribution of fishes relative to physical factors. He received a BA in

in Aquatic Science from the University of California, Santa Barbara in 1988, an MS in Biology from California State University Northridge in 1994, and a PhD in Coastal Oceanography from the University of New York Stony Brook in 1999. Tom has a professional history examining the variation in larval and juvenile fish recruitment relative to both natural and manmade perturbations to their habitat, including power plant mitigation, storms, urbanization of water fronts, and seasonality. In the last 18 years, Dr. Grothues worked extensively with adult stages on movement, migration, and habitat choices. In this, and through exposure to AUVs while serving as the Science Director for the Mid Atlantic National Undersea Research Center of the National Undersea Research Program, he developed an interest in furthering technologies to meet the challenges of studying these larger mobile fish in the ocean, leading to frequent work with autonomous underwater vehicles.

Faculty Host: Kostas Bekris