A Second Year Study: Advancement in Autonomous Research Vessel Technology: Real-Time Water Quality Data Collection

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The vast majority of research vessels are restricted by their large size and their need to be captained, making it difficult, if not impossible, for remote, shallow, and hard-to-reach locations to be explored. This project sought to address the challenges of accessing these extremely shallow or narrow areas for marine research by designing and constructing a small, clean, energy-powered autonomous vessel capable of sampling water. The researcher accomplished several goals: 1) Implementing and testing redesigned propulsion and steering system on the vessel, 2) Implementing real-time data collection and reporting systems for water quality parameters such as temperature, turbidity, and total dissolved solids, and 3) Implementing global positioning capabilities for autonomous navigation. A mount was designed in Fusion 360 and cut out of carbon fiber to hold a brushless motor, and machined aluminum steering rudders with servos were used to control the vessel remotely. An Arduino was programmed to receive and retain information on an SD card such as time and location, along with data from a temperature sensor, total dissolved solids (TDS) sensor, turbidity (ntu) sensor. Field testing evaluated the vessel' s performance, operation, and sample collection ability. Optimizing and producing small, autonomous vessels such as this would allow for efficient and cost-effective data collection in remote, never-before-sampled areas. This would facilitate researchers' abilities to collect novel data, such as locating primary sources of harmful algal blooms, that could help inform conservation management plans.

Awards Won: