Underwater Robotics: Manipulation and Photogrammetry

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The United Nations Decade of Ocean Science for Sustainable Development supports naval innovators to promote marine biodiversity, generate sustainable energy, and stabilize the climate crisis. Our robot completes challenges simulating real problems faced in reaching the goals of this initiative to provide team members with the skills needed to solve these problems as we enter the workforce at the end of this decade. The robot and its manipulators were all designed in the 3D CAD software OnShape. During the design process, we analyzed possible stress points and calculated the thrust made by each of the six thrusters to ensure stability. Almost all components of the current robot and its manipulators were manufactured at our school, using our CNC router and 3D printers to allow complete control over the designs. Our robot's photogrammetry uses a ZED camera and a custom app to make a mesh of the underwater landscape and a coral head. We tested these features in a local pool under different conditions, including varying brightness levels, current patterns, and depths. After modification of the center of buoyancy/ballast and some features of the manipulators, they completed tasks such as anchoring a simulated solar panel array to the pool bottom, placing a tent over an artificial coral head, surveying a marine habitat, and more. These tasks directly relate to real-world challenges that must be addressed to ensure the health of our planet for years to come, and our robot provides possible solutions for them.

Awards Won:
NC State College of Engineering: Alternates (not read aloud)