DROP IN MARINE HYDROKINETIC ENERGY GENERATOR DEPLOYMENT AND CAPTURE DESIGN STUDY

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Ocean current turbines (OCTs) will be large, subject to powerful drag forces and installed in the open ocean. It will be challenging and expensive to recover these systems. Designing OCTs to reduce the number of recoveries will be critical for economically competitive ocean current power generation. Florida Atlantic University's Southeast National Marine Renewable Energy Center is working with Ocean Current Energy, LLC to design a novel approach for replacing the coupled generator/rotor systems, known as a "coins", utilized by their OCTs. Instead of recovering OCTs to repair/replace failed coins, these OCTs are being designed such that coins may be replaced at sea without recovering the entire OCT. This technological advancement will greatly reduce the size/class of vessel required for maintenance, and greatly reduce the down time for OCTs with generator/rotor failures. Two projects directly related to the development of these systems were conducted by U.S. Military Veterans during a 10 week research experience hosted at FAU during the 2018 summer.

A scaled prototype system was designed to enable an OCT to catch a coin lowered from a surface vessel and move it into place within an OCT. Models were built using 3D printing and evaluated through bench testing. This mechanism also enables failed coins to be removed from a turbine for recovery to a surface vessel.

A steerable towfish was also designed to lower the coin from a surface vessel to the capture mechanism on an OCT. This towfish was designed such that it can maneuver using actuators down to an OCT to either retrieve a failed coin or deploy a replacement unit. It was required to be controllable both with and without the loadings associated with the coins attached. A prototype towfish was built using 3D printing, and was actuated by servos to simulate control surfaces.

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