COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

Adriana McKinney

for the degree of Doctor of Philosophy (Ph.D.)

"SMALL UNMANNED MARINE HYDROKINETIC PLATFORMS FOR POWER GENERATION IN COASTAL AND TIDAL WATERS"

March 2024, 4:00 p.m.
Team Meeting Link

DEPARTMENT:
Ocean & Mechanical Engineering

ADVISOR:
Manhar Dhanak, Ph.D.

PH.D. SUPERVISORY COMMITTEE:
Manhar Dhanak, Ph.D., Chair
Hassan Mahfuz, Ph.D.
Tsung-Chow Su, Eng. Sc. D.
Siddhartha Verma, Ph.D.

ABSTRACT OF DISSERTATION

SMALL UNMANNED MARINE HYDROKINETIC PLATFORMS FOR POWER GENERATION IN COASTAL AND TIDAL WATERS
The feasibility and optimization of small unmanned mobile marine hydrokinetic (MHK) energy platforms for harvesting marine current energy in coastal and tidal waters are examined. A case study of a platform based on the use of a free-surface waterwheel (FSWW) mounted on an autonomous unmanned surface vehicle (USV) was conducted. Such platforms can serve as recharging stations for aerial drones (UAVs), enabling extension of the UAVs' autonomous operating time. An unmanned MHK platform potentially meets this need with sustainable power harvested from water currents. For the case study, six different waterwheel configurations were field-tested in the Intracoastal Waterway of South Florida in support of determining the configuration that produced the most power. Required technologies for unmanned operations of the MHK platform were developed and tested. The data from the field-testing were analyzed to develop an empirical relation between the wheel's theoretical hydrokinetic power produced and the mechanical power harnessed by the MHK platform with various waterwheel configurations during field-testing. The field data was also used to determine the electrical power generated by the FSWW configurations during field-testing. The study has led to the development of standardized testing procedures. The empirical relation is used to examine predicted power production through scaling up different physical aspects of the waterwheel.

BIOGRAPHICAL SKETCH
Born in Richland WA
B.S., Washington State University, Richland, Washington, 2020
M.S., Florida Atlantic University, Boca Raton, Florida, 2021
Ph.D., Florida Atlantic University, Boca Raton, Florida, 2024

CONCERNING PERIOD OF PREPARATION
& QUALIFYING EXAMINATION

Time in Preparation: 2021 - 2024

Qualifying Examination Passed: Fall 2021

Published Papers: "A Low-Flow Marine Hydrokinetic Turbine for a Floating Unmanned Mobile Platform," "Site-selection for Field-testing of a Marine Hydrokinetic Turbine Platform to Serve as a Floating Unmanned Mobile Recharging Station for Aerial Drones," "Full Scale Experimental Verification of A Mobile Marine Hydrokinetic Platform for Power Generation in Tidal Flows (Sau under preparation)"