College of Engineering and Computer Science
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Announces the Ph.D. Dissertation Defense of

Sasha Ivana Fung

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

Assessment, Modeling, and Advanced Applications of Marine Renewable Energy Systems

July 3rd, 11:00am
Engineering East, Room 303
777 Glades Road
Boca Raton, FL
https://fau-edu.zoom.us/my/tangyfau

DEPARTMENT: Electrical Engineering and Computer Science

ADVISOR: Yufei Tang, Ph.D.

PH.D. SUPERVISORY COMMITTEE: James VanZwieten, Ph.D., Hanqi Zhuang, Ph.D., Xingquan Zhu Ph.D.

ABSTRACT OF DISSERTATION
Marine renewable energy is unlocking new frontiers for sustainable development. This work pioneers the integration of Ocean Current Turbines (OCTs) and Ocean Thermal Energy Conversion (OTEC) to power clean hydrogen production and offshore aquaculture in tropical regions. A custom-built hardware-in-the-loop (HIL) testbed, combining a dynamometer with an OPAL-RT real-time digital simulator, emulates OCT dynamics under real-world conditions, enabling advanced control testing an d green hydrogen generation. The system reached instantaneous production rates of 0.64 g/s, with Gulf Stream scaling suggesting up to 20 metric tons annually. On the thermal front, a 20-year high-resolution OTEC resource analysis across the Gulf of Mexico and Caribbean reveals abundant near-shore potential. A hybrid OTEC–diesel–battery system was then optimized for offshore aquaculture, showing dramatic improvements in reliability, cost-efficiency, and energy resilience. Together, these innovations demonstrate how marine energy can fuel next-generation hydrogen hubs and climate-smart aquaculture, advancing a thriving, ocean-driven blue economy.

BIOGRAPHICAL SKETCH
Sasha Ivana Fung was born in Miami as a first-generation Guyanese – American. She earned her BS degree at Florida Atlantic University in Electrical Engineering, and continued to pursue a Ph.D. in the field, earning a MS degree along the way. During her Doctoral studies at Florida Atlantic University, she focused on Marine Renewable Energy, specifically Ocean Current Turbines and Ocean Thermal Energy Conversion technologies. Ms. Fung has contributed to the areas of marine renewable energy, smart grid cybersecurity, and remote sensing, and she has presented papers at multiple e nergy c onferences. She plans to continue advancing the field of marine renewable energy through research and contributions in academic environments.

CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION
Time in Preparation: 5 years

Qualifying Examination Passed: Fall 2021

Published Papers:

FLORIDA ATLANTIC UNIVERSITY

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[1] **Fung, S.**, Nichols, C., Tang, Y., Sadoughipour, M., VanZwieten, J., Muljadi, E., and Hong, T., "Numerical Modeling and Simulation of Ocean Current Turbines for Green Hydrogen Production". In: 2025 IEEE Power & Energy Society General Meeting (PESGM). 2025.

[2] Sadoughipour, M., **Fung, S.**, VanZwieten, J., and Tang, Y., "OTEC Supported Energy System for Offshore Fish Farming: A Bi-Level Optimization Approach for Sizing and Operation". In: American Control Conference (ACC25). 2025.

[3] **Fung, S.**, Nichols, C., Tang, Y., and VanZwieten, J., "Design and Testing of a Hardware-in-the-Loop System for a Grid Integrated Ocean Current Turbine". In: Renewable Energy (2024).

[4] Sadoughipour, M., **Fung, S.**, VanZwieten, J., and Tang, Y. "Optimal sizing of a hybrid OTEC-diesel system with battery energy storage for fish farming application". In: University Marine Energy Research Community Conference (UMERC+Mets) 2024. Duluth, MN, Aug. 2024.

[5] **Fung, S.**, Nichols, C., Tang, Y., and VanZwieten, J., "Securing Marine Renewable Energy Systems: Understanding Cyber-Physical Threats and Evaluating Consequences via Hardware-in-the-Loop". In: University Marine Energy Research Community Conference (UMERC+Mets) 2024. Duluth, MN, Aug. 2024.

[6] **Fung, S.**, Nichols, C., Weinberg, E., Tang, Y., and VanZwieten, J., ""Hardware-in-the-Loop Simulation of Ocean Current Turbine for Grid Integration"". In: 2024 IEEE Power and Energy Society General Meeting (PESGM) (2024).

[7] **Fung, S.**, VanZwieten, J., Tang, Y., Grandelli, P., and Hong, T., "OTEC Resource Assessment of Gulf of Mexico and Surrounding Area". In: University Marine Energy Research Community 2023 Conference (UMERC). Durham, NH, USA, Oct. 2023.

[8] **Fung, S.**, Nichols, C., Weinberg, E., Tang, Y., VanZwieten, J., and Alsenas, G., "Hardware-in-the-Loop Simulation of an OCT for Grid Integration". In: University Marine Energy Research Community 2023 Conference (UMERC). Durham, NH, USA, Oct. 2023.

[9] **Fung, S.**, Tang, Y., VanZwieten, J., and Alsenas, G., "Modeling and Real Time Simulation of Ocean Current Turbines for Grid Integration". In: 2023 IEEE Power and Energy Society General Meeting (PESGM). (2023).

[10] Tang, Y., Feng, Y., **Fung, S.**, Xomchuk, V., Jiang, M., Moore, T., and Beckler, J., "Spatio-Temporal Deep Learning-Based Algal Bloom Prediction for Lake Okeechobee Using Multi-Source Data Fusion". In: IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing (2022)

[11] Mohiuddin, S. M., Qi, J., **Fung, S.**, Huang, Y., and Tang, Y., "Deep Learning Based Multi-Label Attack Detection for Distributed Control of AC Microgrids". In: 2021 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm) (2021)