COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

Hector Lopez

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

"FACILITATING PEER-TO-PEER ENERGY TRADING THROUGH COOPERATIVE GAMES AND FUZZY INFERENCE SYSTEMS"

March 15, 2024, 3:30 p.m.
Engineering East Building (EE96), Room 405
777 Glades Road
Boca Raton, FL

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ABSTRACT OF DISSERTATION

FACILITATING PEER-TO-PEER ENERGY TRADING THROUGH COOPERATIVE GAMES AND FUZZY INFERENCE SYSTEMS
This dissertation proposes a utility-centric peer-to-peer (P2P) energy trading framework as an alternative to traditional net metering, aiming to resolve conflicts between distributed energy resource owners and utilities. It advocates for practical software services and dynamic payment mechanisms tailored to prosumer needs, offering an alternative to reducing net metering incentives. Additionally, it explores game theory principles to ensure equitable compensation for prosumer cooperation, driving the adoption of P2P energy markets. It also builds on demand-side payment mechanisms like NRG-X-Change by adapting it to provide fair payment distribution to prosumer coalitions. The interoperable energy storage systems with P2P trading also presented battery chemistry detection using neural network models. A fuzzy inference system is also designed to facilitate prosumers' choice in participating in P2P markets, providing flexibility for energy trading preferences. The simulation results demonstrated the effectiveness of the proposed design schemes.

BIOGRAPHICAL SKETCH
Born in Miami Florida
B.S., Florida Atlantic University, Boca Raton, FL, U.S. 2008
M.S., Florida Atlantic University, Boca Raton, FL, U.S. 2015
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CONCERNING PERIOD OF PREPARATION
& QUALIFYING EXAMINATION

Time in Preparation: 2021 - 2024

Qualifying Examination Passed: Semester 2020

Published Papers:

- H. Lopez and A. Zilouchian, "NRG-X-Change and Cooperative Game Strategies as an Alternative to Net-Metering for Solar Generation," 2022 IEEE 49th Photovoltaics Specialists Conference (PVSC), Philadelphia, PA, USA, 2022, pp. 1121-1121, doi: 10.1109/PVSC48317.2022.9938790. https://ieeexplore.ieee.org/document/9938790

- H. Lopez and A. Zilouchian, "Peer-to-Peer Energy Trading for PV Prosumers using Fuzzy Logic Inference Systems," 2023 IEEE 50th Photovoltaics Specialists Conference (PVSC), Philadelphia, PA, USA, 2022, pp. 1121-1121, doi: 10.1109/PVSC48317.2022.9938790.
- H. Lopez and A. Zilouchian, “Peer-to-peer energy trading for photo-voltaic prosumers,” Energy, vol. 263, p. 125563, Jan. 2023, doi: 10.1016/j.energy.2022.125563.
- H. Lopez, A. Zilouchian and A. Abtahi, "Dynamic Battery Type Detection Using Neural Networks," 2023 IEEE 20th International Conference on Smart Communities: Improving Quality of Life using AI, Robotics and IoT (HONET), Boca Raton, FL, USA, 2023, pp. 1-5, doi: 10.1109/HONET59747.2023.10374630.
- H. Lopez, A. Zilouchian, " Integrated System Approach for Peer-Peer Energy Trading , Book Chapter in *Integrated System Innovation and Applications*, edited by Reza Alam and Madjid Fathi, Springer , 2023.
- H. Lopez and A. Zilouchian, " Fuzzy Logic Inference Modeling for Prosumer Preference in P2P Trading, Journal of Energy*(submitted).*