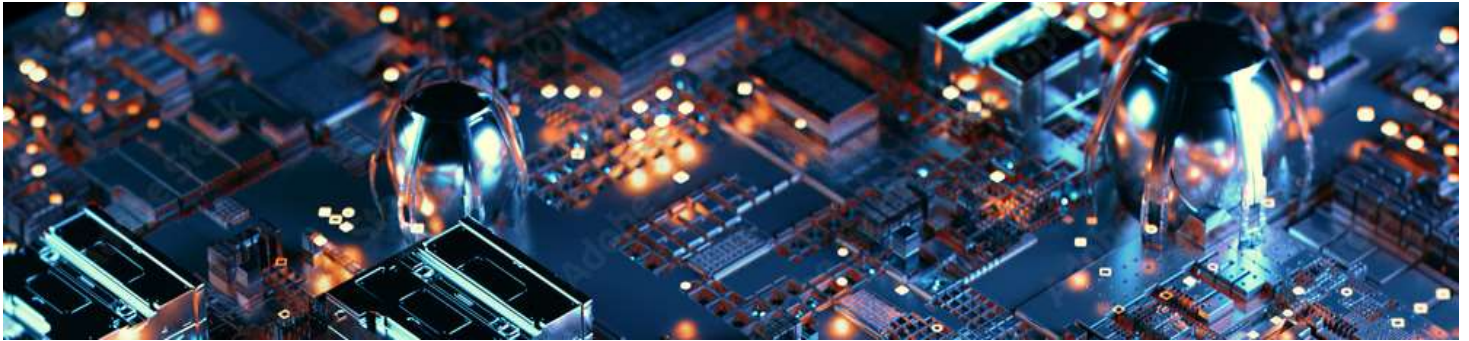


Undergraduate Research Project Proposal

Electrical Circuit Modelling of Wave Energy Converter (WEC)



A Wave Energy Converter (WEC) is a promising device that harnesses energy from ocean waves. Traditional development and testing of WECs can be complex and expensive, particularly in the absence of specialized tank testing facilities.

Project Focus: This project focuses on the established practice of using electrical circuit analogies to model WECs, providing a more approachable and cost-effective means of exploring this technology.

Method: The project will begin with extensive simulations, relating terms in the force equations of wave energy to their electrical equivalents—such as equating force with voltage, velocity with current, and mechanical impedance with electrical impedance. These simulations aim to provide an intuitive understanding of WEC dynamics and pave the way for the subsequent phase. Following the simulations, attention will be directed towards

constructing an experimental electrical circuit to emulate the modelled WEC system. This two-step approach not only facilitates the study of WEC performance without expensive tank testing but also enables a tangible exploration of design possibilities.

Goals: By bridging theoretical simulations and experimental realization, this project seeks to deepen insights into WECs and contribute to the broader field of renewable energy systems. The outcomes of this study are expected to enhance the efficient design and implementation of wave energy converters, supporting ongoing global efforts to diversify and expand sustainable energy sources.

Special requirements: Matlab/Simulink. No ethical approval is required.

Supervisor: Dr. Erivelton Nepomuceno

Cosupervisor: Thalita Nazaré (PhD Student)

Contact: thalita.nazare.2023@mumail.ie