PAMNSys: An Integration of Novel Machine Learning and Reinforcement Learning Algorithms To Accurately Predict and Optimize Electrical Energies Within Heaving Point Absorbers Based on Placement, Implementation and Real-Time Control

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Over the past 100 years, the earth has been increasingly affected by the production of energy through toxic means, in particular - fossil fuels. However, recently wave energy has emerged as a potential renewable energy resource. Waves, unlike many other forms of renewable energy, are consistent and reliable, thus extracting energy from these waves can serve as a game-changer for replacing fossil fuels with renewable energy. My project utilized PAMN which stands for a point absorber collaborative modular neural network, a machine learning algorithm, to optimize and predict the amount of electrical energy with heaving point absorbers, a type of wave energy device. I utilized the East Atlantic SWAN dataset as well as self-produced constant variables. The performance of PAMN--my novel collaborative neural network--is compared against a Linear Regression model and an Artificial Neural Network. While the Artificial Neural Network performs significantly better than the Linear Regression model, PAMN outperforms both by a significant margin. This means that PAMN is highly accurate when predicting and optimizing electrical energy. This network served as a novel creation and improvement upon existing networks by utilizing a novel neural network architecture not previously used in wave energy and environmental science.

Awards Won:
Fourth Award of $500