

## **Machine Learning for Offshore Wind Power Prediction and Optimization**

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### **Field of Research:** Renewable Energy, Machine learning, Data Analytics **Project Summary:**

There is a growing momentum in the United States for tapping the potential of offshore wind energy, in line with the ongoing construction of the first U.S. large-scale offshore wind farm off of the shore of New Jersey. The PI of this project has just acquired dozens of Gigabytes of offshore wind farm data provided by an industrial wind farm operator in Europe. The data contains measurements collected at a fleet of offshore wind turbines for environmental variables (wind- and wave- related), as well as power output, turbine control settings, and other engineering variables. The goal of this project is analyze these large amounts of data by implementing and testing a series of machine learning models that would allow us to (i) better predict the power output of an offshore wind turbine given large amounts of noisy wind farm data collected over time and space, and (ii) quantify the effect of individual turbine control settings on the total power output of an offshore wind farm, and possibly provide insights into optimal turbine control strategy that would maximize the total wind farm output.

**Applicant GPA and other requirement(s):** N/A

**Student researcher's daily tasks:** each day the student will be asked to spend several hours analyzing industrial wind farm data using the R software. Tasks will vary from basic statistical analysis to more advanced modeling and analysis of the data. Collectively, and depending on the tasks, the daily working load is between 2-4 hours/day. Additionally, student will work towards a brief set of slides to report his/her progress each week.