Msc Thesis

Title: **Marine Acoustic Signature Recognition using AI**

Requirements: Numerical Methods, Linux, Python, DataScience (AI/ML/DL)
Duration: 6-9 months
Location: IST and/or WavEC-Offshore Renewables (www.wavec.org) (Lisbon, Portugal)
Supervisors: **Prof. João Sousa (IST), Dr. Guilherme Vaz (WavEC), Eng. Gonçalo Fonseca (WavEC)**

Objective

Development of a data processing tool that recognizes, offline and in real time, vessels and marine life thought their acoustic signatures using remote sensors.

Context

This master's thesis is the result of the SeaScout project, a multi-sensor buoy that started operating in 2019 at the mouth of the river Sado. This buoy can acquire and send, in real time, data from several sensors, including a hydrophone. This thesis will be focused on this sensor, capable of registering frequencies ranging from 1Hz to 50kHz, in a period to be defined. Given the amount of data generated by this sensor and in order to make the data analysis process viable from a technical and commercial point of view, it is an objective to devise an algorithm that will analyze the raw data and classify it according to each sound acquired. The usage of other sensors than the hydrophone is also possible and desirable. Also, correlation with open-source AIS databases should be considered. There are several uses for this data, e.g. monitoring of cetaceans, fishes, surface vessels and submarines.

Key tasks

- Identify the various existing methods for analyzing data time-series, offline and online, and identify advantages and disadvantages (see [1] for similar work);
- Collect vessel signature data, and AIS data, and correlate it with the data collected by the hydrophone. At this stage, the candidate should use the methods that shown to be adequate;
- Analyze and quantify the hydrophone coverage area;
- Apply the methods developed to the buoy existing data (offline). Apply the methods to the data being measured by the buoy hydrophone (real-time)
- Verify and validate the methods.

Teamwork and Results:

The candidate will work closely with different teams within WavEC. It is also in the interest of WavEC to use the results of this master's thesis in future projects that require data processing. Upon good performance of the candidate the work may be presented in a conference and / or in a Journal.

Bibliography:

[1] https://www.researchgate.net/publication/286268965_Marine_vessel_recognition_by_acoustic_signature