Post-doc position

"Development of automatic image analysis, with a focus on biofouling in the field of Offshore Renewable Energies"

N/Ref: FEM-SAS-2020-003

Company Description

FRANCE ENERGIES MARINES (FEM), the national research institute dedicated to Offshore Renewable Energy (ORE), supports the nascent ORE industrial sector with the means and skills that increase competitiveness by mutualizing R&D costs, reducing risks and accelerating the acquisition of data and knowledge. FEM activities are founded on Research and Development projects based on a broad public-private partnership involving large groups, SMEs, regional authorities, advanced research and training institutions and competitiveness clusters, and with the support of the national *Investing for the Future* program. FEM collaborators are scientifically and technically involved in these projects thanks to their high level of scientific expertise. The headquarters of FEM are located in Plouzané (Brest area), France.

Job Description

A post-doctoral position is open within the ABIOP+ project, which is dedicated to fill knowledge gaps regarding the biofouling process on floating offshore wind turbines (FOWT) and its potential effects on specific FOWT components. In particular, methodological approaches to characterize biofouling in this context will be developed where image surveys and analyses offer a promising path to achieve these objectives.

The successful candidate will work both at the University of Nantes (UN) in the Institute for research in civil engineering and mechanics (GeM, UMR CNRS 6183), under the supervision of Pr. Franck Schoefs (80%) and at France Energies Marines under the supervision of Dr. Nolwenn Quillien, research fellow in Marine Ecology in the Environmental Integration Program team, Guillaume Damblans, Technological Research Program Manager, and Dr. Morgane Lejart, Environmental Integration Program manager (20%).

Both institutes - UN and FEM - work together on the main objectives of studying bio-colonization in a FOWT context in order to develop tools and methodologies allowing an improved characterization of its effects.

In this context, the postdoctoral candidate will:

- Use and test algorithms that enable the automatic recognition of species that compose biofouling to measure 2 important variables (coverage and roughness) of an image data basis built from work in the ABIOP+ project;
- Assimilate and compare two algorithms developed by UN in order to analyze the advantages of the different algorithms focusing on deep-learning as an alternative of the initial model based on texture analysis;

- Measure the detection capacity of the algorithms by testing them within virtual settings following the protocol developed by UN and collaborators[1, 2].

The final objective is to enhance the measure of crucial biofouling variables based on image analysis, especially the roughness of the bio-colonization, within different environments (e.g. variable lightness, turbidity).

To address this program, the candidate will have access to an *in situ* image base. Also, the candidate will work within the ABIOP+ project multidisciplinary consortium which will provide complementary expertise in probabilistic modelling, fluid-structure interactions, benthic ecology, marine biology, material characterization, biocorrosion and the development of anti-fouling coatings. The consortium also includes ORE developers and operators.

Required Qualifications, Skills and Experience

Essential:

- PhD degree in Computer Science, Numerical ecology, Mathematics (applied to biology);
- Clear interest to investigate image analysis algorithms;
- Knowledge of marine biology topics;
- Report writing and publications in scientific journals;
- Strict scientific rigor and critical analysis.

Desirable:

- Knowledge of ORE systems;
- Good communication skills in both French and English (oral, written).

Candidate Profile

The candidate should:

- have scientific curiosity and a real taste for research activities;
- be autonomous, organized and like to go beyond what is expected;
- enjoy teamwork in a multidisciplinary spirit.

Practical Information

Starting date, location: **between June and September 2020**, for a temporary position of **18 months** (French "CDD") at the University of Nantes, France:
GeM, UMR CNRS 6183
2 rue de la Houssinère
44100 Nantes

Periods of work are to be expected at the France Energies Marines headquarters in Brittany (Bâtiment Cap'Océan, 525 Avenue Alexis de Rochon, 29280 Plouzané).

[1] O'Byrne M., Ghosh B., Schoefs F., Pakrashi V. (*under review* in JMSE). Virtual Reality as a Planning and Training Tool for Underwater Inspections.
[2] O'Byrne M., Pakrashi V., Schoefs F., Ghosh B. (2018) Semantic Segmentation of Underwater Imagery Using Deep Networks Trained on Synthetic Imagery. JMSE, 2018, 6(3), 93; doi: 10.3390/jmse60300

Final date for applications: June 1st, 2020

Please send your CV and cover letter to the following electronic address: contact@ite-fem.org

In case of an expected secondment of the candidate by a member of France Energies Marines, the application should mention the agreement of the present employer.