



Fully Funded PhD scholarship in Civil Engineering

Project Title:	A physics-informed data-drive framework for real-time condition monitoring of offshore wind turbines		
School / Department:	School of Civil Engineering		
Location	Newstead Building, UCD, Dublin 4, Ireland		
Award Level	PhD	Position Type:	Full time
Supervisor	Dr. Abdollah Malekjafarian Dr. Vikram Pakrashi	Start Date:	January 2023
Research Field:	Civil Engineering/ Wind Energy/ Structural Dynamics		
General enquiries Email:	abdollah.malekjafarian@ucd.ie		

The NexSYS project:

The decarbonisation of the Energy System will play a vital role in reducing greenhouse gas emissions and help mitigate the impacts of Climate Change. The technical and societal challenges inherent in decarbonisation are set to be enduring challenges of the mid-21st century and ones that will require a whole of society approach, encompassing academia, industry, government, and citizens.

NexSys is a newly established All Island SFI Strategic Partnership Programme focussed upon the transition to a net zero carbon energy system. It is a unique partnership bringing together a multidisciplinary research team, industry, and policy makers to tackle fundamental research questions to be addressed as part of the transition to Net Zero. Hosted by UCD Energy Institute, NexSys brings together academics from nine institutions across the Island of Ireland (UCD, TCD, DCU, ESRI, Maynooth University, UCC, NUI Galway, Ulster University and Queen’s University Belfast) to work together to meet the unprecedented scale and complexity of the challenges associated with the energy transition.

PhD role description:

In this project, a Structural Health Monitoring data analytics and interpretation framework for real-time condition monitoring of offshore wind turbines (OWTs) will be developed. This will include processing of currently available data from wind farms and recommendations for installing new sensing systems in future, including using these systems for model updating. The successful candidate will develop robust estimates of structural health monitoring features of interest, their performance, and uncertainties. This will lead to guidelines and recommendations around their applications, interpretation and limitations.

In addition, the developed features will be employed to create a physics-informed data-driven framework where the damages at super-structure and sub-structure levels of OWTs can be detected in real-time. This framework will improve our understanding from the remaining life of the turbine and extend our capability of translating ideas of monitoring to practice. Field experimental data measured

from real wind farms are available for this PhD. Furthermore, data from scaled testing will be collected and assessed where the challenges around scaling for structural health monitoring will be investigated. In-house training and career support will be provided by the research team, along with extensive support through academic and industrial networks in this topic. The member will be working with several researchers on the topic of renewable energy, in a multi-disciplinary and multi-cultural environment.

Essential qualifications/skills knowledge:

- Candidates must have an honours Level 8 degree in science or engineering or a related discipline.
- Good communication and writing skills.
- Good time management skills.
- Aptitude for multidisciplinary research approaches.
- Background in engineering (Civil Structural/Mechanical).
- Fluent in English. UCD Minimum English Language Requirements (<http://www.ucd.ie/registry/admissions/elr.html>)

Desirable qualifications/skills knowledge:

- Masters in Civil/Structural/Mechanical/Engineering with a strong research component or an exceptional undergraduate demonstrating research evidence
- A strong foundation in numerical and statistical methods for both anomaly detection and system identification for inverse problems
- Ability to work with numerical suites (e.g. Matlab, Mathematica, Python, R etc.)
- Background in structural dynamics and vibrations including experimental aspects and fieldwork.
- Academic writing skills.

Behavioural competencies:

- Ability to work as part of a team, including collaboration with other disciplines but also independently.
- Strives for high quality of work and demonstrates commitment to the project.
- Ability to communicate effectively to enable knowledge and technology transfer

Funding: The scholarship will be awarded for maximum period of 4 years and funding will cover the following elements:

- A stipend of €18,500 per annum
- Travel/ Consumables/Materials budget
- EU Tuition fees for 4 years (non-EU fees in exceptional circumstances)

How to apply: Applicants submit their applications by filling the following online form (**Applications received by email will not be considered**):

https://docs.google.com/forms/d/e/1FAIpQLSccMMwBTP3DbjtD-egjdeYmZ2mJRCpAB0hYioXdYmrAfkRkTA/viewform?usp=sf_link

Deadline: The application should be submitted no later than **30 August 2022**.