



PhD Studentship: Development of Distributed Machine Learning models for real time Anaerobic Digestion monitoring & control

University College/ Management Unit	UCD College of Science
University School/ Unit	School of Computer Science
Project Title	Development of distributed Machine Learning for real time Anaerobic Digestion monitoring & control
Post Duration	4 Years
Supervisors/ Mentors	Dr. Fatemeh Golpayegani
Main Location for project	UCD
Provisional start date	1/1/2025
BiOrbic Challenge alignment	Digitalising the Bioeconomy
Salary	€22,000 tax free per annum plus university fees

Summary

The optimal and as such sustainable operation of many bioprocesses, requires that the concentrations of important analytes within the process be monitored and controlled accurately and in real-time. At present, the control of many bioprocesses is hampered by the lack of cost-effective, accurate and rapid monitoring of individual analytes. Consequently, many bioprocesses operate inefficiently without any monitoring, or use inferences from inaccurate observations in determining a control strategy.

To address this industry wide issue, a biosensor platform technology is being developed in UCD that consists of a range of cost-effective biosensors each of which is specific to a single analyte. These sensors are being designed to enable multiple analytes to be simultaneously monitored in real time. Using these sensors a suit of Dynamic Machine learning models will be designed to better understand the inter-dependencies of such analytes and how we could monitor them to improve the operation of bioprocesses.

As Ireland's National Renewable Energy Action plan has committed to Ireland producing 5.7 TWh of indigenous biomethane by 2030, which will require towards 200 20 GWh AD units the need for real time monitoring and control systems is evident. The focus of this PhD studentship will be towards designing an AI-based real time monitoring and control system for Anaerobic Digestion, deployed over UCD's biosensor platform.

To achieve this goal the PhD student will be required to (1) develop an extensive suite of Machine learning algorithm trained on the real dataset collected by the biosensors platform. (2) develop a comprehensive knowledge graph that represent the heterogeneity of the data in

this field and finally (3) develop a Recommender system that integrates these components to better inform the operator.

Requirements

BSc and MSc degree in Computer Science and Experience in Bioinformatics.

Knowledge, skills, experience

The successful candidate will be self-motivated with experience in working on research projects and will have: -

- Expertise in Machine Learning
- Experience in Bioinformatics.
- Experience in Recommender systems development
- Expert in Python and Java.
- Excellent written and oral communication and interpersonal skills
- Excellent qualitative and quantitative research skills

Application Procedure

Applicants should [Submit their application here](#): a cover letter setting out your motivation for applying for the role and how your skills meet the requirements set out in this document and can contribute to achieving listed key objectives AND a full Curriculum Vitae to include the names and contact details of 2 referees (including email addresses), by **October 24th 2024** 17:00 (GMT).

Any questions about this position can be sent to Dr Fatemeh Golpayegani.

Fatemeh.golpayegani@ucd.ie

BiOrbic

“This project is funded by BiOrbic, Ireland’s National Bioeconomy Research Centre. BiOrbic is a national collaboration of researchers, focused on the development of a sustainable, circular economy. Encompassing 100+ researchers from twelve institutions in Ireland, along with International collaborators, BiOrbic is focused on training and developing the next generation of Bioeconomy leaders.”