PhD position in Artificial Intelligence Systems and Microbial Hydroponics

The AI Research Unit (AIRU) at the University of Cape Town (UCT) is looking to recruit an outstanding candidate to take up a PhD in AI Systems working on the EU Horizon Microbial Hydroponics (Mi-Hy) project. The position is attached to the DSI-NRF/UCT SARChI Chair in Artificial Intelligence (AI) Systems hosted in the unit. The Chair conducts research on architectures and frameworks for human-centred AI systems with a focus on monitoring and understanding dynamic physical, social and virtual systems including sensor-based applications in smart home, personal health monitoring, energy and finance.

Mi-Hy is an EU Horizon EIC Pathfinder project that integrates Microbial Fuel Cells (MFCs) with hydroponics to convert wastewater into electricity and plant nutrients in a circular bioelectrochemical system designed for urban agriculture. The system creates a "prosthetic rhizosphere" using bacteria in MFCs to mimic soil microbes for soilless plant growth, while generating renewable electricity and recovering nitrogen and phosphorus from wastewater. UCT's role on the project is to lead and coordinate the modelling, digital integration and AI aspects. UCT will establish an AI driven smart hydroponics modelling, simulation and control platform combining mathematical and physics based models, with deep learning, ontologies, and Bayesian networks and render this in a 3D digital twin environment for online simulation, and interactive knowledge discovery, control and decision-making.

Research focus:

- Developing deep neural networks for predictive modelling and anomaly detection using sensor data from hydroponics systems, including the exploration of physics informed deep neural networks and spatial-temporal graph neural networks
- Using knowledge based AI approaches, including ontologies and Bayesian networks to represent and reason about scientific knowledge of plant physiology and plant growth
- Building AI-driven control systems for biological optimisation using real-time sensor data with plant physiology models.
- 3D digital twins of circular bioelectrochemical systems, including integration of mechanistic models, data-driven components and 3D visualisation.

The PhD candidate will work under the supervision of A/Prof Deshen Moodley, the SARChI Chair holder and Mi-Hy Principal Investigator and AI and digital modelling lead. The candidate will have opportunities to work closely with European consortium partners including KU Leuven, Sony Computer Science Labs Paris, University of the West of England, University of Southampton and the Spanish National Research Council.

Further details about the project and project partners are available on the project website: https://www.mi-hy.eu/

Value and Tenure:
The value of the fellowship is between R 315 000 per annum for three years in the form of a tax free scholarship to be used for PhD studies. The position is a full-time in person position based in Cape Town.

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Conditions and Eligibility:
Both South African and foreign candidates are eligible. Applicants must have completed (or be nearing completion of) a Master's degree in a relevant discipline.

The applicant will be expected to have a strong academic background in Computer Science, Engineering or Biology with research experience and skills in artificial intelligence. We are particularly looking for candidates with:

- A Master's degree in Computer Science, Applied Mathematics, Physics, Engineering, or related natural sciences.
- Demonstrated experience in scientific programming and machine learning frameworks (e.g., PyTorch).

The successful candidate will be expected to publish at least three conference or journal publications during the fellowship tenure.

The successful candidate will need to satisfy the requirements and register for a PhD in Computer Science at the University of Cape Town and enter into a Memorandum of Agreement with the University and a Memorandum of Understanding with their supervisor.

Application deadline and requirements (as a single pdf document):
The first deadline is 12:00 on **15 April 2026**. The call will remain open until a suitable candidate is found.

Applications must include the following:

- A covering letter explaining the candidate's suitability, research interest and experience, as well as their availability.
- A brief research statement (1-2 pages) describing the candidates interests and how they align with the research focus of the position.
- The applicant's full curriculum vitae and a full list of publications (if any).
- The names and contact details of at least two academics who have taught, supervised or worked alongside the applicant.
- Certified copies of all academic transcripts (undergraduate, Honours (if applicable), Masters) showing all courses completed with results.

Applications must be submitted to the AIRU administrator, Mrs Tharien Potgieter (tharien.potgieter@uct.ac.za). Enquiries about the position can be made to Dr Henok Moges (Henok.moges@uct.ac.za).

The University of Cape Town reserves the right to make no awards at all, to cancel the award if the conditions are not met, and to effect changes to the conditions of the award. The University of Cape Town reserves the right to disqualify ineligible, incomplete, and/or inappropriate applications.