



School of Computing, Engineering, and the Built Environment Edinburgh Napier University

PHD STUDENT PROJECT

Funding and application details

Funding status: Self-funded students only

Application instructions:

Detailed instructions are available at <https://www.napier.ac.uk/research-and-innovation/research-degrees/how-to-apply>

Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.

Project details

Supervisory Team:

- DIRECTOR OF STUDY: Nazmi Sellami (Email: N.Sellami@napier.ac.uk)
- 2ND SUPERVISOR: Fadi Kahwash

Subject Group: Engineering & mathematics

Research Areas: Engineering, Energy Technologies, Fluid Mechanics, Mechanical Engineering, Thermodynamics

Project Title: Solar Atmospheric Water Generation from air

Project description:

1.1 billion people worldwide do not have access to water, and a total of 2.7 billion cannot access clean water for at least one month of the year. Because of this, more than 2 billion people are exposed to diseases such as cholera, typhoid fever, and other water-borne illnesses.

The situation of water scarcity will get worse if we continue at the current consumption rate. It is expected that nearly two-thirds of the population worldwide will face water scarcity by 2025.

Desalination could be the solution to water scarcity. However, it is an energy-demanding process that requires access to a sweater, which is not the case for many locations worldwide.

Atmospheric water generation (AWG) is a process of producing potable water from humid ambient air. Different techniques were studied to extract water from the air; condensation is the most common. The process is independent of any access to water and only requires water vapour, always available in ambient air.

This project aims to investigate a new design of Atmospheric water generation powered by solar. This research will use different techniques to explore energy materials and low-energy processes for water generation.

For more information about the project, do not hesitate to get in touch with Dr Nazmi Sellami N.Sellami@Napier.ac.uk

References:

- [1] Ansari, E., et al., Atmospheric water generation in arid regions – A perspective on deployment challenges for the Middle East. *Journal of Water Process Engineering*, 2022. 49: p. 103163.
- [2] Raveesh, G., R. Goyal, and S.K. Tyagi, Advances in atmospheric water generation technologies. *Energy Conversion and Management*, 2021. 239: p. 114226.
- [3] Salek, F., et al., Energy and exergy analysis of an atmospheric water generator integrated with the compound parabolic collector with storage tank in various climates. *Energy Reports*, 2022. 8: p. 2401-2412.
- [4] Shafeian, N., A.A. Ranjbar, and T.B. Gorji, Progress in atmospheric water generation systems: A review. *Renewable and Sustainable Energy Reviews*, 2022. 161: p. 112325.
- [5] Srivastava, S. and A. Yadav, Water generation from atmospheric air by using composite desiccant material through fixed focus concentrating solar thermal power. *Solar Energy*, 2018. 169: p. 302-315.

Candidate characteristics

Education:

A second class honour degree or equivalent qualification in Mechanical Engineering

Subject knowledge:

- Thermodynamics

Essential attributes:

- Experience in fundamental Mechanical Engineering
- Competent in Computational Fluid Dynamics
- Knowledge of Solar Energy
- Good written and oral communication skills
- Good time management

Desirable attributes:

- Knowledge of photovoltaic conversion and efficiency