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

PHD STUDENT PROJECT

Application instructions:
Detailed instructions are available at :
https://www.napier.ac.uk/research-and-innovation/doctoral-college/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: Dr Nazmi Sellami (Email: n.sellami@napier.ac.uk)
- 2ND SUPERVISOR: Dr Firdaus Muhammad Sukki

Subject Group: Engineering & Mathematics

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

Project Title: Building integrated Photvoltaic for existing buildings

Project description:

As the quest for sustainable building increases, Building Integrated Photovoltaics (BIPV) promises to be a viable energy source that easily blends with modern architectural materials. BIPV provides an aesthetically pleasant application of PV in buildings while providing clean energy and offsetting the cost of original building material. Technically, BIPVs replace conventional building materials; hence, there is no clear difference. The advantages are numerous, therefore making it a worthwhile venture. Some identified advantages are cost efficiency, aesthetics, energy-producing ability, noise reduction, sun protection, land space-saving, and privacy screen, among other safety features.

Many solutions exist for integrating photovoltaic cells into the envelope of different types of new buildings. These solutions include static concentrators, semi-transparent photovoltaic, thin-film solar cells and glass-glass PV panels. However,

these solutions remain limited, considering the surface areas available on the envelopes of existing buildings.

This project explores design solutions for integrating PV into all existing buildings, including traditional and historic buildings.

It is expected to use simulation and experimental studies to investigate different types of BIPV solutions while assessing the economic, societal, aesthetic and power performances.

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

References:

[1] Alrashidi, H., et al., Performance assessment of cadmium telluride-based semi-transparent glazing for power saving in façade buildings. Energy and Buildings, 2020. 215: p. 109585.

[2] Alrashidi, H., et al., Thermal performance evaluation and energy saving potential of semi-transparent CdTe in Façade BIPV. Solar Energy, 2022. 232: p. 84-91.

[3] Awuku, S.A., F. Muhammad-Sukki, and N. Sellami Building Integrated Photovoltaics—The Journey So Far and Future. Energies, 2022. 15, DOI: 10.3390/en15051802.

[4] Sellami, N. and T.K. Mallick, Design of nonimaging static solar concentrator for window integrated photovoltaic. AIP Conference Proceedings, 2012. 1477(1): p. 106-109.

Candidate characteristics

Education:

A second class honour degree or equivalent qualification in Mechanical Engineering

Subject knowledge:

- Renewable energy

Essential attributes:

- EMechnaical Engineering applied to renewable energy devices
- Energy conversion
- Solar energy
- Good written and oral communication skills
- Good time management

Desirable attributes:

- Knowledge of Photovoltaic conversion and efficiency