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: Abdelfateh Kerrouche (Email: A.Kerrouche@napier.ac.uk)
- 2ND SUPERVISOR:

Subject Group: Cyber-security and system engineering

Research Areas: Electronic Engineering

Project Title: Optical fiber sensors for overhead conductor line sag monitoring in smart grid

Project description:
Electrical energy can be transferred from power plants to consumers via overhead power lines. With the advancement in sensors and communication technologies, traditional power systems have undergone a transformation towards smart grid systems. Conductors and overhead cables are constantly exposed to a vertical load from their own weight, wind and ice build-up load. In a transmission line, sag is intentionally arranged to relax the tension on the wire between two terminals. However, thermal stress and extreme weather conditions can cause increases in transmission line sag, which can sag to an unacceptable level and damage transmission line infrastructures. These transmission conductors are located in

remote areas which may require a person walking long distances over difficult and often mountainous terrain to address issues.

This project will design and manufacture a variety of different optical fibre sensors to deal with the overhead conductor line sag measurement. The sensing schemes will be integrated with digital technology of cloud-based data storage and innovative risk-based inspection with novel artificial intelligence (AI) algorithms for informed decision and preventive maintenance. The portable prototype system will be designed for in-situ, continuous, quantitative measurements of the overhead conductor lines.

References:

Candidate characteristics

Education:
A second class honour degree or equivalent qualification in Computer Science, Electrical/Electronic Engineering, Mechanical engineering

Subject knowledge:
- Embedded systems, IoT sensors and devices

Essential attributes:
- Strong AI, machine and deep learning background
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:
- Optical sensors.