Department	School of Engineering and the Built Environment
Supervisors	Dr Abdelfateh Kerrouche
Project Title	Optical fibre 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.

Perspective applicants are encouraged to contact the Supervisor before submitting their applications. Applications should make it clear the project you are applying for and the name of the supervisors.

Academic qualifications
A first degree (at least a 2.1) ideally in Computer Science, Electrical/Electronic Engineering, Mechanical engineering with a good fundamental knowledge of Embedded systems, IoT sensors and devices.

English language requirement
IELTS score must be at least 6.5 (with not less than 6.0 in each of the four components). Other, equivalent qualifications will be accepted. Full details of the University's policy are available online.

Essential attributes:
- Experience of fundamental Strong AI, machine and deep learning background
- Competent in Optical sensors
- Knowledge of Biomedical Optics
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:
Practical research expertise in an optical lab and/or a clean-room environment

Indicative Bibliography	Kerrouche, A.; Najeh, T.; Jaen-Sola, P. Experimental Strain Measurement Approach Using Fiber Bragg Grating Sensors for Monitoring of Railway Switches and Crossings. *Sensors* **2021**, *21*, 3639. https://doi.org/10.3390/s21113639
Enquiries	For informal enquiries about this PhD project, please contact Dr Abdelfateh Kerrouche: a.kerrouche@napier.ac.uk
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