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

MRes 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 Chan Hwang See (Email c.see@napier.ac.uk)
- 2ND SUPERVISOR: Dr Naser Ojaroudi Parchin

Subject Group: Cyber Security & Systems Engineering

Funding status: Self funded

Project Title: Microwave Simultaneous wireless power and data transfer (SWPDT) for Wireless EV Charging Applications

Project description:

Wireless electric vehicle (EV) charging has become increasingly popular in recent years due to its numerous advantages. With wireless EV charging, the driver's involvement in the charging process is minimized as it is done automatically. This makes the charging of an EV a more convenient and comfortable process. As a result, extensive research is currently being conducted to develop a design that effectively replaces traditional conductive charging with wireless charging.

The primary objective of this MRES project is to design and improve a component of the SWPDT system specifically designed for wireless EV charging applications. One of the main challenges faced by SWPDT is optimizing performance despite varying power levels and the likelihood of significant misalignments, including scenarios where the EV is in motion. The project will assess the effectiveness of various system configurations in three key scenarios: achieving maximum efficiency,

ensuring synchronization for bidirectional wireless chargers, and facilitating dynamic charging capabilities.

This project is suitable for applicants with interests and good background in electromagnetics, battery/power management theory, cyber security and microwave engineering particularly in electromagnetic wave propagation, antennas, rectennas and antenna arrays for communication systems. Indicatively, applicants should have good performance in the following subjects: Electromagnetic Theory and Fields, Microwave and mm-Wave Transmission Systems and Devices, Sensors, Communication Principles/Theory, power/battery management and storage, Engineering Mathematics.

Candidate characteristics

Education:

A first degree (at least a 2.1) ideally in B.Sc. degree with distinction in Electrical & Electronic Engineering, with a good fundamental knowledge of Electromagnetism, antenna, battery, supercapacitor, renewables energies, circuit theories, cyber security, radio propagations and microwave theory.

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 with CAD tools
- Experience of fundamental antenna design and modelling
- Good understanding of circuit theory
- Competent in Electromagnetics Theory and Fields
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills
- Good time management and a willingness to learn new subjects

Desirable attributes:

- Experience of fundamental on Microwave Engineering and Antennas
- Knowledge of Radio Frequency Energy Harvesting and Energy Storage
- Competent in Signal Processing

Application checklist:

- Statement no longer than 1 page describing your motivations and fit with the project
- Recent and complete curriculum vitae. The curriculum must include a declaration regarding the English language qualifications of the candidate.
- Supporting documents will have to be submitted by successful candidates.
- 2 academic references, using the Postgraduate Educational Reference Form (download)