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 Libu Manjakkal (Email: l.manjakkal@napier.ac.uk)
- 2ND SUPERVISOR: tbc

Subject Group: Cyber Security & Systems Engineering

Funding status: Self funded

Project Title: Development of soft and flexible 3D structured electrodes for electrochemical applications

Project description:

For low cost energy storage device and sensors electrodes production various printing technologies including screen printing, 3D printing and ink-jet printing are widely implemented. However to achieve an efficient material patterning technology with reduction in material waste and low cost material for electrode fabrication are great challenges. Additive manufacturing or 3D printing are widely reported to overcome these issues and fabrication of energy storage electrodes in various architectures. The electrode development by printing technology through additive manufacturing have significant opportunity in next generation of electronics. In electrochemical devices designing 3D porous electrodes can be an efficient way to improve the mass loading of active materials while maintaining short ions/electrons transport distances and fast reaction kinetics. 3D-shaped electrodes are designed with specific consideration given to a high-surface area and uniform porous structure to enhance performance of various devices.

The main aim of this project *is to design and develop 3D structured layered electrodes for sensing and energy systems.* For this the student will focus on design of new structure for 3D printed electrodes and preparation of 3D printable ink. Using our soft material printable 3D printer the project will be design various shapes of both flexible and stretchable electrode. In this project the student will be focussed on the development of a soft and flexible 3D printed electrodes for various electrochemical applications. The student will be part of the Sustainable Materials Research & Technologies (SMART) Group@Napier (https://smartnapier24.wixsite.com/napier). The student will prepare new 3D structured electrodes and its properties will be investigated.
If you undertake this research project you will work for 12 months full-time or 20 months part-time and will spend the early weeks refining the project to fit your interests and aspirations

Candidate characteristics

Education:
A first degree (at least a 2.2) ideally in materials engineering, physics, chemistry, electrical and electronics engineering with a good fundamental knowledge of electronics and materials.

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 materials, electronics, sensors and its characterisation
- Competent in literature review, report writing and statistical and/or qualitative analysis
- Knowledge of wearable sensors
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Application checklist:

- Completed application form
- CV
- 2 academic references, using the Postgraduate Educational Reference Form (download)
- A personal research statement (This should include (a) a brief description of your relevant experience and skills, (b) an indication of
- What you would uniquely bring to the project and (c) a statement of how this project fits with your future direction.)
- Evidence of proficiency in English (if appropriate)