



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 Neil Urquhart (Email n.urquhart@napier.ac.uk)
- 2ND SUPERVISOR: tbc

Subject Group: Computer Science

Funding status: Self funded

Project Title: Data Driven Cities

Project description:

Towns and cities have structures which have evolved around human activities, in some cases for centuries, their style and form being dictated by the requirements of those who live there and events affecting the city. This project will use a range of data sources, principally Open StreetMap, but also data from property taxation, censuses or transport networks to build models of cities in order to analyse their structure and support development by suggesting possible changes.

The principle development task within this project will be to develop a simple software metric capable of assessing the range of facilities available to a household by various travel modes and within a range of time and distance constraints, using Open Streetmap data. For example the tool may be asked to identify all of the points of interest within a 15 minute walking distance of an address or all of those within a 30 minute public transport ride of an address. Copies of the tool, when deployed in parallel, onto a high performance cluster will be able to assess many addresses with

many criterion and build up a model of how the city supports neighbourhood living and how accessible resources are to households.

Once you have modelled the city you will then go on to apply optimisation techniques to suggest the next round of developments that will improve the quality of life for those who live there, by better locating resources within the city, as well as potentially altering transport networks. You will develop optimisation techniques based on Illumination Algorithms which will suggest possible changes to the planners and highlight the costs and benefits of changes to planners. The techniques employed for optimisation will be based on earlier work described in [Urquhart-2019].

You will be expected to contribute to, and co-author at least one peer-reviewed academic publication as a result of this work.

Candidate characteristics

Education:

A first degree (at least a 2.1) in Computer Science, Mathematics or a related field.

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:

- Confident software development
- Excellent communication and writing skills
- Good time management and a willingness to learn new skills

Desirable attributes:

- Python development skills
- An interest in urban development
- Experience of working with geo-spatial data
- Experience of working with high performance computing clusters

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)