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://blogs.napier.ac.uk/scebe-research/available-phd-student-projects/

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: Peter Chapman (Email: P.Chapman@napier.ac.uk)
- 2ND SUPERVISOR:

Subject Group: Computer science

Research Areas: Computer Science – HCI, Mathematics - Pure Mathematics (Logic and computability), Philosophy - Other (Logic and Philosophy of Science)

Project Title: Visualisation of Computation

Project description:
In the early to mid-20th century, several separate research teams made advances on computability, producing different ways of thinking about the fundamentals of computation. These include, but are not limited to: Turing machines; lambda calculus; combinatory logic; and game-theoretic semantics. These topics are often covered in undergraduate computer science, mathematics, or philosophy courses. However, they are relatively esoteric and can be difficult to understand. They are notable in that visualisation, an acknowledged tool for enabling understanding, is often entirely absent from standard presentations. In this project, you will seek to

rectify this short-coming by providing effective visualisations for different models of computation.

This project will have a strong focus on effectiveness. Visualisations will only be adopted and widely-used if they either allow insight that textual representation does not (known as free-rides), or otherwise allow users to understand (measured by task performance) the represented context more readily. As such, human-computer interaction and usability experiments will form a necessary component of the project.

The project will also aim to make the produced diagrams widely available, in that drawing algorithms will be implemented. There will thus be an expectation of coding in this project. The ideal candidate will then have a background in one of computer science, mathematics, or philosophy. No candidate would be expected to be expert in all of these areas, and hence a willingness to learn and engage with new areas is essential.

References:

Candidate characteristics

Education:
A first-class honours degree, or a distinction at master level, or equivalent achievements in Computer science, Mathematics, Philosophy

Subject knowledge:
- Logic/computability
- Algorithm design
- Human-computer interaction

Essential attributes:
- Willingness to learn new skills
- High levels of self-motivation