



## **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: Leni Le Goff (Email: [l.legoff2@napier.ac.uk](mailto:l.legoff2@napier.ac.uk))
- 2<sup>ND</sup> SUPERVISOR: Emma Hart

**Subject Group:** Computer science

**Research Areas:** Computer Science

**Project Title:** Adaptive Robot Behaviours in dynamic and outdoor settings

**Project description:**

In controlled settings such as factories, robots are able to achieve many tasks efficiently and accurately. However, it is still a challenge to enable robots to operate in unstructured, dynamic and outdoor environments. In such settings, changes can occur that can render the skills and knowledge of the robot ineffective. Robots must therefore be able to adapt previously learned behaviours to new tasks and settings. The approach proposed to be investigated is in two steps. First, existing resource intensive algorithms will be applied to learn robust behaviours and perceptual representation for the robot to tackle complex tasks and environments. In this first step the environments will be static. Then, light weight algorithms, i.e. with fast convergence, will be explored to adapt quickly these learned behaviours and

representations to face dynamic environments. The ultimate goal of this project is to enable robots to achieve complex task in outdoor settings where the conditions can change suddenly or progressively. Using mobile legged robot such as dog or hexapod robot, the Ph.D. work will focus first on testing the viability of the methods in simulation before eventually testing them on a real robotic platform.

**References:**

## **Candidate characteristics**

**Education:**

A first-class honours degree, or a distinction at master level, or equivalent achievements in Computer Science, Robotics/Engineering

**Subject knowledge:**

- Machine Learning and/or Reinforcement Learning

**Essential attributes:**

- Excellent programming skills in C++ and Python
- Excellent writing skills