



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

### **PHD 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 Brian Davison (Email: [b.davison@napier.ac.uk](mailto:b.davison@napier.ac.uk))
- 2<sup>ND</sup> SUPERVISOR: tbc

**Subject Group:** Computer Science

**Research Areas:** Artificial Intelligence, Computer Vision, Software Engineering

**Project Title:** Talking to robots

#### **Project description:**

These days it is difficult to tell whether a piece of text has been written by a human being or generated by a Large Language Model (LLM) such as ChatGPT. However, the performance of LLMs is limited by their lack of access to information about the physical world. Object recognition techniques can be used to construct a representation of a physical environment that could fill this gap.

This project aims to create an embodied intelligent system that can continuously refine its representation of its physical environment, learn the correspondences between objects and their labels by asking questions, and eventually hold natural language conversations with humans about objects in the world.

**References:**

Yang et al. (2024) LLM-Grounder: Open-Vocabulary 3D Visual Grounding with Large Language Model as an Agent. IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, pp. 7694-7701, <https://doi.org/10.1109/ICRA57147.2024.10610443>

Thisanke et al. (2023) Semantic segmentation using Vision Transformers: A survey. Engineering Applications of Artificial Intelligence 126 Part A. <https://doi.org/10.1016/j.engappai.2023.106669>

## Candidate characteristics

**Education:**

A first degree (a minimum 2:1) in Computer Science

**Subject knowledge:**

Abstract problem modelling and AI

**Essential attributes:**

- Experience of image processing or linguistic processing with artificial neural networks

**Desirable attributes:**

- Knowledge of linguistic structures
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management