

Presentation Title:

Towards Hierarchical Scene Representations for Robot Perception and Action

Student Name:

Frank Gallagher

Supervisor Names:

Prof. John McDonald

Dr. Marco Cignetti

Abstract:

In order for robots to operate autonomously, they must be able to reason about their surroundings and strategically explore to discover mission-specific aspects of the scene. This research aims to advance robotic cognition by integrating perception, action, and past experience into a unified framework for goal-directed exploration in complex, real-world environments.

Inspired by human cognition, the framework leverages both the concept of Active Perception and recent developments in hierarchical semantic mapping. In Active Perception, planning policies choose actions that not only guide the robot toward its goal but also maximise the acquisition of task relevant information. Hierarchical semantic mapping techniques provide robots with a representation that enables them to reason about the environment at different levels of abstraction. The framework also probabilistically models relationships between different elements in the scene allowing robots to make predictions about partially observed environments leading to efficient exploration and informed decision making.

This talk (i) specifies the research problem being addressed (ii) provides an overview of the related work (iii) describes the progress made to date and (iv) outlines the plan for completion of the research.