

# Swarm Robotics: Exploration and Mapping in Simulated testing Environments

Charlie Anthony [candNo: 246537]

Supervisor: Dr Chris Johnson

Project Proposal

Computer Science and Artificial Intelligence BSc



**UNIVERSITY  
OF SUSSEX**

Department of Informatics and Engineering

University of Sussex

October 2023

# Contents

<b>1</b>	<b>Aims and Objectives</b>	<b>2</b>
<b>2</b>	<b>Relevance</b>	<b>2</b>
<b>3</b>	<b>Resources Required</b>	<b>2</b>
<b>4</b>	<b>Timetable</b>	<b>2</b>

# 1 Aims and Objectives

Aim:

To understand and showcase the principles of swarm robotics in the realm of navigation and mapping. This project is driven by a fascination with swarm robotics and its potential in autonomously navigating and mapping unknown environments.

Primary Objectives:

- Design and develop a basic simulation environment representing an unknown environment.
- Implement swarm intelligence principles to allow a group of agents to collaboratively navigate and map the environment.
- Evaluate and refine the agent behaviours for effective navigation and territory mapping.

Extensions (if time allows):

- Optimise agent behaviour for efficiency in discovering the quickest route to a goal point within a maze-like environment
- Investigate the challenges associated with transitioning from simulation to real-world application (the sim-to-real gap)

## 2 Relevance

This project integrates principles of artificial intelligence, robotics and simulation, making it highly relevant to my degree in Computer Science and Artificial Intelligence. The exploration of swarm robotics in navigation can provide insights into optimizing algorithms for real-world challenges.

## 3 Resources Required

This project will require the use of lab computers, and should the extensions be carried out, the occasional booking of seminar rooms/study rooms for carrying out physical experiments. Should it be required, the project will also be aided by a small degree of funding to allow purchase of physical components which may be required for constructing agents. While the purchase of such components may not be essential, it would allow a more in-depth and thorough review of the swarm behaviours implemented.

## 4 Timetable

Here is a simplified version of my timetable:

Mon	Tue	Wed	Thur	Fri
9:00	project/cw	Lecture		project/cw
10:00	project/cw	Lecture	Lecture	project/cw
11:00	project/cw	Lecture	Lecture	project/cw
12:00				
13:00	Lecture			Lab
14:00	Lecture			Lab
15:00	Lab			
16:00				
17:00				