Investigation and Implementation of Biologically Inspired Flocking Behaviour in Swarm Robotics

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Declaration

I, Helmi Fraser, confirm that this work submitted for assessment is my own and is expressed in my own words.

Signature:

Helmi Fraser

Acknowledgements

My acknowledgements

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Chapter 1

Abstract

This is the introduction to the thesis.[1] The conclusion is in Chapter 4 on page 6.

1.1 About the logo

Figure 1.1 shows the logo for the University of Sussex.[2] This is consistent with Special Relativity (Einstein, 1905). $E = mc^2$.

Here is some Latin.

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[1] And this is a footnote.

[2] This is a URL: `http://www.sussex.ac.uk`

Figure 1.1: The logo for the University of Sussex.

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Chapter 2

Introduction

2.1 Aim

Something about aim

2.2 Objectives

Aims and objectives are different, somehow

2.3 Relevance

Swarm shit is cool

Chapter 3

Literature Review

Nature has provided examples of outwardly complex biological systems which are often efficient, fluid and resilient to partial breakdowns. Colonies of ants are able to forage for food and build complex structures. Fireflies are able to synchronize their flashing. Flocks of birds and schools of fish exhibit fluid and efficient group movement. In the majority of cases, nature has achieved these utilizing very little to no communication between individual creatures and in the absence of a higher level director or supervisor. The animals react only to environmental stimuli, either the strength or type of pheromones in the case of ants or the positions of other individuals in the case of fish and birds.

This is defined as emergent behavior, the rise of previously unpredicted, complex behavior through the interaction of simple rules.

From an engineering perspective, mimicking these systems could provide better solutions to a multitude of problems across various industries. One way that is gaining major interest from academics and the industry alike is the application of swarm robotics. Swarm robotics is a relatively new field of multi- robotics, in which the aim is to co-ordinate a large number of robots in a decentralized manner, similar to the natural systems mentioned previously. In order to carry out this project, a thorough understanding of the concepts and mechanisms that underpin swarm robotics systems will need to be achieved, as well as a strong working understanding of various tools used in their implementation such as simulation software and higher level programming.

3.1 Aim

Something about aim

3.2 Objectives

Aims and objectives are different, somehow

3.3 Relevance

Swarm shit is cool

Chapter 4

Conclusion

I was right all along.

4.1 What was I right about?

I was right about the following things.

4.1.1 Previous theories were wrong

People thought they understood, but they didn't.

4.1.2 My new idea is right

Of course.

Bibliography

Einstein, A. (1905). Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig? *Annalen der Physik*, 323:639–641. 1

Appendix A

Code

```
10 PRINT "HELLO WORLD"
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