

UNIVERSITY OF YORK

MASTERS THESIS

Augmented Reality Debugging System for Robot Swarms

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Declaration of Authorship

I, Alistair JEWERS, declare that this thesis titled, “Augmented Reality Debugging System for Robot Swarms” and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

Date:

“Thanks to my solid academic training, today I can write hundreds of words on virtually any topic without possessing a shred of information, which is how I got a good job in journalism.”

Dave Barry

University of york

Abstract

Faculty Name
Department of Electronic Engineering

Master of Engineering

Augmented Reality Debugging System for Robot Swarms

by Alistair JEWERS

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

Acknowledgements

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

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List of Figures

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List of Abbreviations

LAH List Abbreviations **Here**
WSF What (it) Stands For

Physical Constants

Speed of Light $c_0 = 2.997\,924\,58 \times 10^8 \text{ m s}^{-1}$ (exact)

List of Symbols

a	distance	m
P	power	W (J s ⁻¹)
ω	angular frequency	rad

For/Dedicated to/To my...

Chapter 1

Introduction

1.1 Overview

Brief intro to swarm robotics.

1.2 Project Concept

Debugging swarm robotics is hard. Real time real world systems present issues. Can we make it easier for people by developing this piece of software?

Chapter 2

Literature Survey

Brief intro to literature review.

2.1 Swarm Intelligence and Robotics

General swarm robotics literature

2.2 Human Swarm Interaction

HRI, HSI

2.3 Debugging Robotics

Debugging is hard

2.4 AR and swarm

Augmented reality is cool, robots live in AR

2.5 AR Debugging for Swarm Robotics

The real stuff

Chapter 3

Problem Analysis

3.1 Problem Outline

Summarise the problem

3.2 Proposed Approach

Explain the proposed approach

Chapter 4

Aim and Objectives

4.1 Project Aim

Summarise the project aim as a statement.

4.2 Objectives

Itemize the objectives.

4.3 Revision Since Initial Report

Comment on any updates to the objectives following the initial report.

Chapter 5

Pre-implementation Survey

5.1 Survey Overview

Contextualise the survey. Purpose, target audience, etc.

5.2 Questions

The questions on the survey

5.3 Response Data

The actual response data

5.4 Analysis and Comment

Comment on the results, how they will impact impl.

Chapter 6

Implementation

6.1 Plan

Plan.

6.1.1 Revisions Since Initial Report

Comment on revisions to the plan.

6.2 Organisation

Software development stuff (github, agile)

6.3 Implementation Details

The actual stuff

Appendix A

Frequently Asked Questions

A.1 How do I change the colors of links?

The color of links can be changed to your liking using:

```
\hypersetup{urlcolor=red}, or
\hypersetup{citecolor=green}, or
\hypersetup{allcolor=blue}.
```

If you want to completely hide the links, you can use:

```
\hypersetup{allcolors=.}, or even better:
\hypersetup{hidelinks}.
```

If you want to have obvious links in the PDF but not the printed text, use:

```
\hypersetup{colorlinks=false}.
```

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like

“Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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