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| School of Computing  Faculty of Engineering |

Control System (AI) for Wrestling Robot

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Submitted in accordance with the requirements for the degree of  
MSc Advanced Computer Science (AI)

**Session 2019/2020**

The candidate confirms that the following have been submitted*:*

*<As an example>*

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| --- | --- | --- |
| **Items** | **Format** | **Recipient(s) and Date** |
| *Deliverables 1* | *Report* | *SSO (xx/xx/xx)* |
| *Deliverables 2* | *Code and URL* | *SSO (xx/xx/xx)* |
| *Deliverable 3* | *Youtube video URL* | *Supervisor, assessor (xx/xx/xx)* |
| *Deliverable 5* | *User manuals* | *Client, supervisor (xx/xx/xx)* |

Type of Project: Exploratory Software

The candidate confirms that the work submitted is their own and the appropriate credit has been given where reference has been made to the work of others.

I understand that failure to attribute material which is obtained from another source may be considered as plagiarism.

(Signature of student)

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# Summary

*<Concise statement of the problem you intended to solve and main achievements (no more than one A4 page)>*

***<Reminder about basic requirements of layout and format:***

***The report must be in typescript, sequentially page numbered, on A4, single or double-sided, with 1in margins. Point size 11 and one-and-a-half line spacing should be used.***

***Page Numbering: The pages preceding the body of the text, i.e. from "Summary" to "Contents" inclusive, should be sequentially numbered in Roman numerals. All the remaining pages should be numbered in a single sequence of Arabic numerals.***

***Length: The main body of a 60 credit project report must be no longer than 60 pages (i.e. excluding appendices and references). The limit for 40-credit projects is 50 pages.>***

# Acknowledgements

*<This page should contain any acknowledgements to those who have assisted with your work. Where you have worked as part of a team, you should, where appropriate, reference to any contribution made by others to the project.*

*Note that it is not acceptable to solicit assistance on ‘proof reading’ which is defined as “the systematic checking and identification of errors in spelling, punctuation, grammar and sentence construction, formatting and layout in the text”; see* [*http://www.leeds.ac.uk/qat/documents/policy/Proof-reading-policy.pdf*](http://www.leeds.ac.uk/qat/documents/policy/Proof-reading-policy.pdf)*. >*

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# Chapter 1 Introduction

## Overview

Sumo robot league is a very popular international competition, which is two robots attempt to push each other out of the ring. The original idea of this competition comes from sumo, which is the national sport in Japan, and refers to modern Japanese martial arts.

The candidate robots in the league are more like automatic vehicle robot rather than humanoid robot standing with arms and legs. Also, this project is uing the Zumo robot, which is off the shelf. Extra hardware structure and improvement is not considered in the project.

The Zumo 32U4 robot is a complete, versatile robot controlled by an Arduino-compatible Atmega32U4 microcontroller. The Zumo robot has a variety of sensors, two motors and one Atmega32U4 chip as the brain. So the Zumo robot can detect the opponent and run towards or away from it, which satisfy every requirement of a robot in the Sumo league.



Figure 1.1: Main features of the Zumo 32U4 robot

The robots in the wrestling fight are not RC. They are automatic. And that means, once the game has started, human cannot interact with the game and all the decisions and movements are depend on the robot itself. And the robot’s behaviour is depend on it’s control system. Thus, a good strategy from a decision maker is the key of winning the league and also the major aspect of this project.

### Aim and Objectives

The general purpose of this project is to design a fine control system for Zumo robot that can win the competiton by pushing opponent out of the circle.

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# Chapter 2 Tables and Figures

## 2.1 Tables using the ‘table caption’ and ‘table description’ Styles

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## 2.2 Figures using the ‘figure caption’ and ‘figure description’ Styles

Figures can be added using the Illustrations section of the Insert tab.



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# List of References

*<It is expected that the list would reflect the breadth and depth of scholarly research undertaken by the student during the course of the project.>*

# Appendix A External Materials

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# Appendix B Ethical Issues Addressed

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