"Lizardbot"

A reptile-inspired model of a robot optimised for navigating rough terrain

Abstract
Insert abstract here

Submission Year - 2022
Candidate Number - 198732
Project Supervisor - Simon Bowes

Contents

1 Introduction

Add in the intro pretty much directly from the interim report here

2 Project Aims

Why is the robot being modelled instead of physically built?
Why did I choose to use Unity?

2.1 Primary Objectives

2.1.1 Robot Design

Get from interim report - explain overall design and why those decisions were made e.g. simplistic design

2.1.2 Robot Movement

Basic overview of why each component will move the way it does. Tie each point back to how they are founded (or not founded) in natural algorithms.
Include jumping here

2.1.3 Terrain Generation

The terrain will be static - why?
Why will I have three separate terrains? - Octopus
What is the importance of having a smooth terrain?

2.1.4 AI

How will the AI work? Genetic algorithm outline
Dynamic systems theory
Damage minimisation
How do I want the AI to manipulate the relationship between the body and movement?
Why do I want there to be a relationship between the two? - article Simon sent
How am I going to test the relationship?
How will the robot be measured?

2.2 Extension Objectives

2.2.1 Vision

How would a rudimentary visual system reduce damage to the robot?
How would this move the AI from a reactive to proactive mechanism?

2.2.2 Terrain Friction

How do snakes work with different frictions?

2.2.3 UI

How could a UI help lower the threshold to the project and make it easier to 'work with' the AI?

2.2.4 Flexible Tail

What are the advantages of having a flexible tail?

3 Project Relevance

3.1 Salamandra Robotica II

Insert from interim report

3.2 Agama Robot

Insert from interim report

3.3 tbc

Find a team that have modelled a robot vs building one

4 Requirements Analysis

Insert from interim report - needs some work
Add section on the constraints of this project

5 Professional and Ethical Considerations

Insert from interim report with more reference to code of conduct

6 Implementation

6.1 Body

Insert from progress log & CPG log
The velocity that should be applied to this section is calculated using

$$\overrightarrow{v_i} = v_{i-1} + \frac{m}{2}\overrightarrow{w}$$

For modules $i = 0, ..., m$, where $m \in n$, the value of w will be calculated by alternating between S and C.

$$S : \overrightarrow{w} = sin\overrightarrow{\theta_{i-1}} + sin\overrightarrow{\theta_i}$$

$$C : \overrightarrow{w} = cos\overrightarrow{\theta_{i-1}} + cos\overrightarrow{\theta_i}$$

6.2 Tail

Insert from tail log

$$L = \sum_i^n r_i m_i \overrightarrow{v_i}$$

$$\overrightarrow{v_t} = \frac{L}{r_t m_t}$$

6.3 Legs

6.4 Terrain

Insert from terrain log

6.5 Performance

Insert from trapped algorithm log

7 Results

8 Conclusion

9 References

10 Appendices

10.1 Code of Conduct