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A Web Based Application for Remote Controlled Lunar Exploration Robotics Using AI

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Introduction

The project is to develop a web-based application to simulate the control of lunar exploration robots, using the Lego Mindstorms EV3 robotic kits. The development will incorporate AI to simulate the communications delay, and for pathfinding and anti-collision measures. This could be used to train operators whom control real-life remote controlled robots.



Figure 1: Lego Mindstorms EV3 logo [1]



Figure 2: Lunar exploration robot [2]

Project Aims

The project aims are as follows:

- A literature review to determine any existing simulators, and how they work
- To create a simulator based upon the research conducted, incorporating AI aspects to simulate communications delay and hazard awareness, based on data from sensors
- To design and create multiple Lego robots to determine the best one for testing purposes
- To test the simulator on the Lego robot, and analyse and evaluate the Lego simulator

Development

This project will follow a feature driven development (FDD) methodology, an agile approach, as it allows for easier design, development and testing. This allows for the possibility of adding additional features at a later stage, if time constraints allow. It will be developed using Lego Mindstorms kit and the Java language.

Risk Analysis

These include, but are not limited to:

- Access to academic texts/resources
- Programming Language - Java - will need to learn it as it is new
- Resources - Java and Lego Mindstorms kits
- Time and failure of the project - personal risk

Expected Results

- At least 70% software testing success rate
- Incorporate AI for communications delay
- Incorporate AI for hazard perception
- Be a realistic simulation and an easy to use UI

References

- [1] NeXTSTORM, 'LEGO MINDSTORMS EV3 - Announcement Day', YouTube, 2013. [Online]. Available: <https://www.youtube.com/watch?v=urpXeGRD8TA>. [Accessed: 03-Oct-2017].
- [2] B. Dunbar and NASA, 'NASA - Lunar Rover Field Tests', NASA, 2008. [Online]. Available: https://www.nasa.gov/centers/ames/multimedia/images/2008/amos_lake.html. [Accessed: 03-Oct-2017].