Deliverable H

Owen Tyman – 300354168 – *Owen Tyman*

Sam Hrycenko – 300434119 - *Sam Hrycenko*

Jacob Pavone – 300414361 - *Jacob Pavone*

Lucas Schuyler — 300436010 - *Lucas Schuyler*

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Trello Board: https://trello.com/b/p8ZWMdHe/gng1103-project

Abstract

This deliverable focuses on the development of the third and final prototype for the Robomaster S1 and The Unbeatable Red-Light Green Light-game. Prototype three aims to refine the previous iteration of the game by improving efficiency, addressing multitasking problems, and enhancing the rules of the game. Further testing of the games systems have validated the systems functionality as well as explored player behaviour, ensuring the game plays successfully and highlights the ethical concerns of LAWS. Lessons learned from previous prototypes have informed code optimization and improved the system reliability.

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3. Introduction

The purpose of this document is to demonstrate the teams third and final prototype for the Red Light to Lethal Autonomous Weapons (LAWS): The Unbeatable Red-light Green-light Game. The purpose of the game is to cause players to leave confused and unable to understand why the Robomaster S1 eliminated them, when they don't think they should be eliminated. Our goal is to demonstrate at least three ethical concerns, to help our clients, Mines Action Canada and Craidel, convince the public that LAWS should be pre-emptively banned. Some of the ethical concerns that were tested for in previous prototypes are:

1) Algorithmic bias, as the Robomaster Targets players wearing different coloured pinnies at different times.
2) An inability to explain what happened or why, as the Robomaster is playing on different rules to the ones that the player is told.
3) A lack of Accountability, as the players will be frustrated for being eliminated, but will have no one to blame but technology.

The rest of this document will cover our third and final prototype, what has changed since the last prototype, the tests we conducted on prototype three, the results, and our future task plan. Finally, the project is summarized as a whole, with lessons learned and the significance of this project.

4. Final prototype

4.1. Prototype III

Description:

In the third prototype of the code, it contains fine-tuning of some aspects of the second prototype. In most aspects, the second and third prototypes are quite similar, while most of the changes are small, done to increase efficiency and understanding of the code. This prototype is the full game, which consists of the robomaster alternating between chowing red and green, and players trying to get to the end to rescue a toy dinosaur by walking on green. However, the robot is playing on different rules and all players must be eliminated before reaching the end. The overall objective of this prototype is to ensure a working code with relative ease of use and consistent performance when running. The random targeting system represents the algorithmic bias, as all are targeted equally, regardless of the threat they pose, but they are also targeted at different times. The elimination of all players regardless of threat level also represents the growth in distrust of technology, as players will feel that they won't be able to trust the lights to tell them when to move.

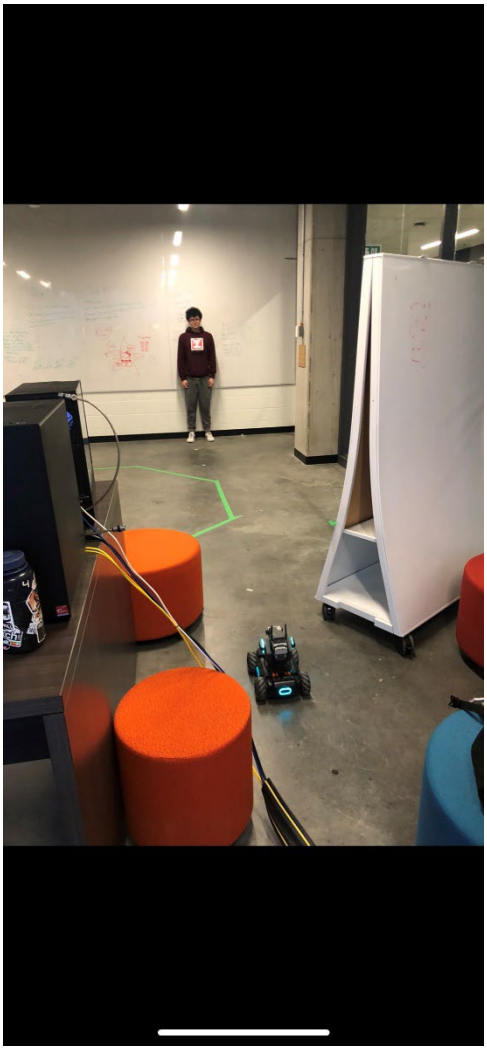

Figure 3 - Testing

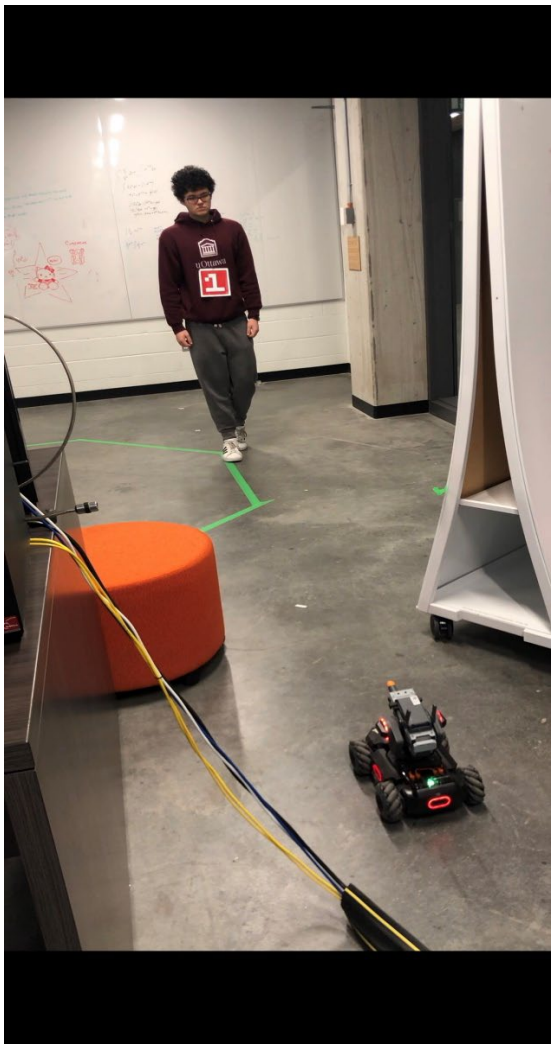

Figure 4 – Testing (2)

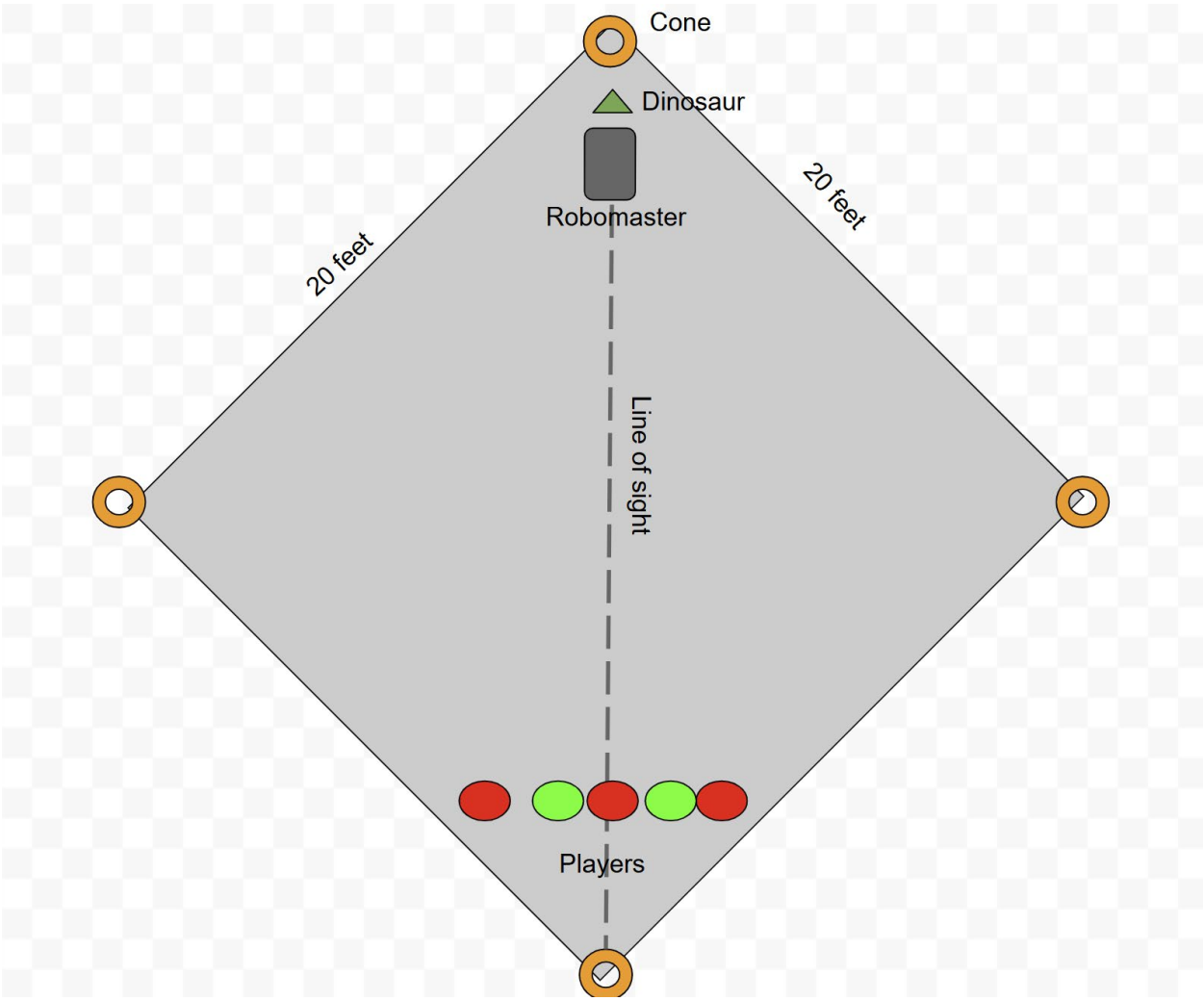

Figure 3 – Playing area

4.2. Changes from Prototype II

Lessons learned:

Throughout the iterative phase and testing of prototype II, we learned that the robot could not perform multiple tasks at the same time and that within the code, we could represent some similar tasks more concisely.

Applications to the current prototype:

Taking these lessons learned into account, the effect they had on the code of the robot included fine-tuning the code, along with removing multitasking areas in the code that caused a breakdown in the code process. Furthermore, by condensing some of the code, we made the program slightly more efficient by combining some pieces of code into a single piece of code.

5. Testing

5.1. Tests conducted

During our testing phase, we ran tests to determine the following:

Objective 1: Does the Robomaster eliminate all players

Objective 2: Will players play the game as intended

For our first test we had all 4 members of our team holding the targets (one person held two) and we ran code on the robomaster that would identify player targets, and if they were identified, would “shoot” the gun, and flash the corresponding color

In our second test, we wanted to ensure that players would play the game as intended and avoid potential loopholes. For this objective, we split it up into two tests. For our first test, we set up the Robomaster ran our code and tried to find areas in which we were able to get by or avoid getting shot. Our second test was somewhat simpler. We went to our peers, roommates, friends etc. We explained our game, showed them a drawing of our board, and asked them to try to come up with ways in which they could “outsmart” the robot and get to the other side.

5.2. Test Results

Test 1: Pass.
Test 2: Pass.
Test 3: Pass.

5.3. Test results analysis

In our first test the Robomaster was able to effectively identify, shoot, and flash the corresponding color of all 5 targets making it a success.

In both tests 2 and 3, we were able to find ways to complete the game, for example, by covering the target, walking backwards, leaving the play area, and standing behind another player. All methods potential users used to bypass the RoboMaster can easily be stopped by adding rules and restrictions on what players can and can’t do. While players were able to complete the game using loopholes, everything they did fell into the “gray” or illegal category and the rules implemented to prevent these loopholes are not unreasonable and do not hinder the playability of the game. For this reason, all Tests were a success.

6. Future Task Plan

Task	Description	Due dates	Roles
Design Day Presentation (Creation)			
Poster board	Create a visual poster board that summarizes our project	Nov. 27th	Jacob
Introduction	Introduce our design and explain the concept	Nov. 24th	Owen
Body	Explain ethical concerns and how the game works	Nov. 24th	Sam Jacob
Conclusion	Summarize project	Nov. 24th	Lucas
Design Day Presentation (Presentation)			
Speaker	Talk about our game	Nov 28th	Sam
Game demonstration	Play demo	Nov 28th	Lucas Owen
Other			
Deliverable K	Construct User manual from content of all deliverables	Dec. 3rd	Owen Lucas Sam Jacob
Peer review	Give teammates feedback	Dec. 1st	Owen Lucas Sam Jacob

Table 2 - Future Task Plan

Conclusion

In conclusion the development and testing of The *Unbeatable Red-Light Green-Light Game* has successfully met the project objectives by illustrating some key ethical concerns of LAWS. Through three prototypes issues such as algophilic bias, lack of accountability, and the inability to explain what happened or why. These align with the goal of raising awareness for the ban of LAWS. The third and final prototype represents the culmination of the game showcasing a more refined game that can display the unfair nature of autonomous decision making. Testing has verified system reliability. The Insite players will gain from this game is the confusion and frustration caused by autonomous decision making. This game reinforces the need to ban these LAWS.