WELCOME

PROJECT PRESENTATION
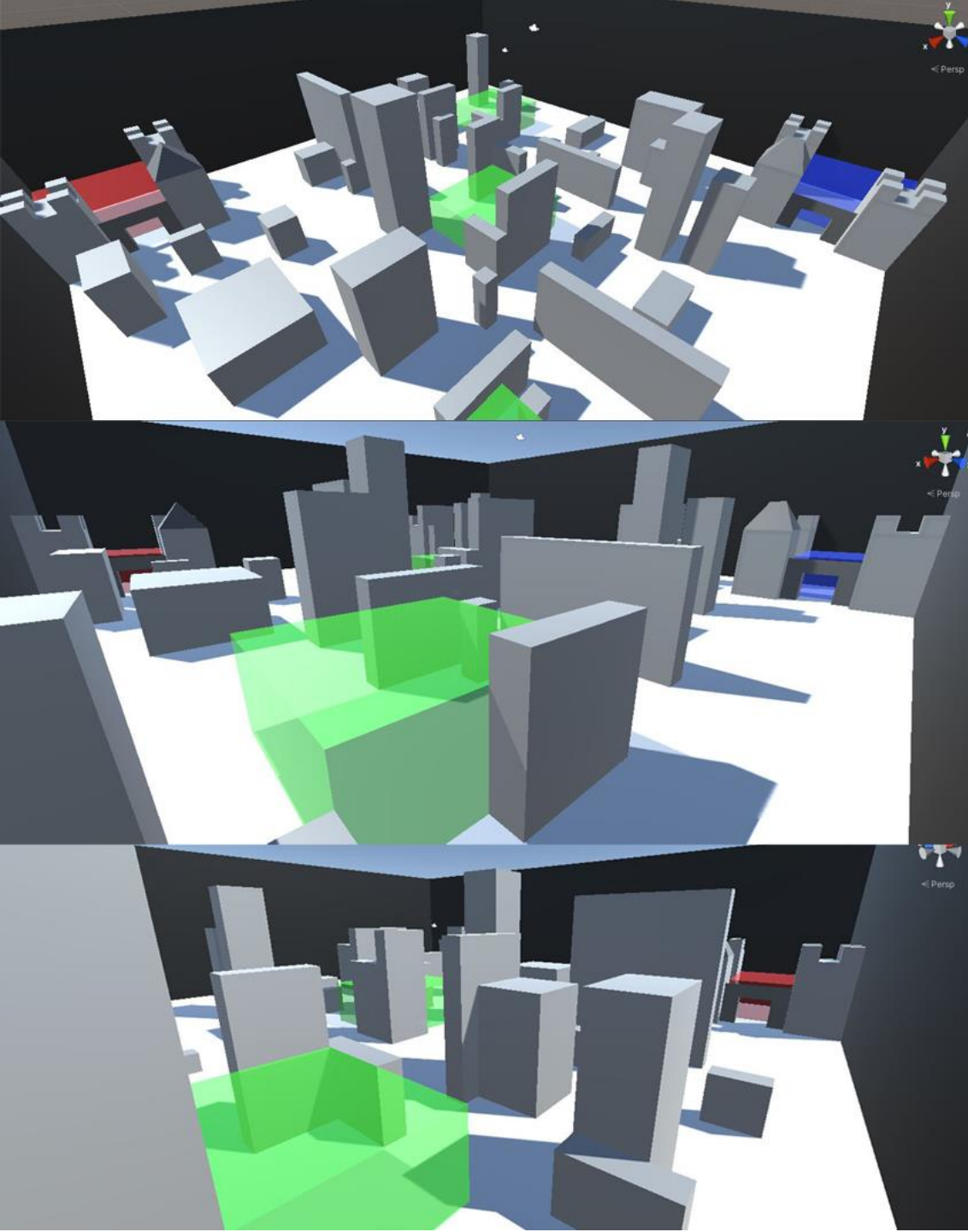
INVESTIGATING AI APPROACHES AND HOW THEY CHALLENGE RESOLUTIONS:

STATE AI VS MACHINE LEARNING IN A GAME OF HARDPOINT

WHAT IS A HARDPOINT GAME?

Two teams fight to control all three hardpoints at once

Capturing:

- A player must eliminate all enemies from within the walls of the hardpoint and wait 3 seconds to capture it and gain points

Defending:

- A player must wait within the walls of an allied captured hardpoint for 10 seconds to gain points

Congested Hardpoints:

- If players from both teams are within the hardpoint at the same time it becomes congested. During this, neither team will gain any points from the hardpoint. One team must eliminate all enemies from the area before it will become un-congested.

Respawning:

- Players can be killed by the enemy team. They respawn in a designated area for their team shortly after dying.

3

Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider "smart".

[1] FORBES

Machine Learning is a current application of AI based around the idea that we should really just be able to give machines access to data and let them learn for themselves.

[1] FORBES

Hierarchical State Machines
[2] Newcastle University

STATE AI VS MACHINE LEARNING

STATE

State AI has a finite number of states it can perform at a given time. These states are determined using fixed figures as the AI unit reacts to the state of the world it is in.

MACHINE LEARNING

Machine Learning is where the AI unit is given data and it will learn and try to predict future movements based on what it knows from the data.
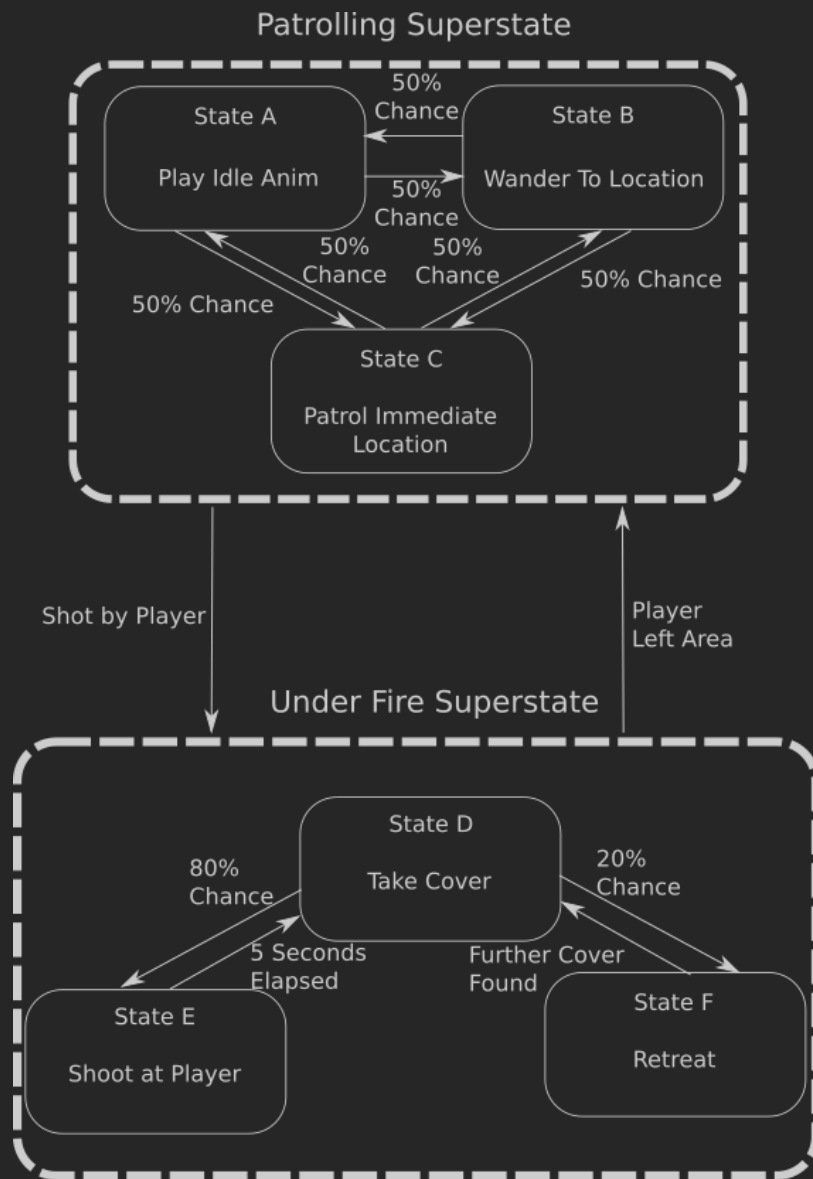
SO WHO WOULD WIN?

STATE OR ML?

AIMS

Investigate how different AI approaches can change the outcome of a hardpoint game and examine the learned behaviour of the AI units over time

OBJECTIVES

Develop a prototype that can host AI units and run a Hardpoint game which can be watched and observed

Gain familiarity and competency in using Unity to generate self playing games using AI Agents and machine learning

Explore and research how different AI approaches are implemented, focusing on Unity

Gather, evaluate and discuss the behavioural patterns developed by the AI units

TECHNOLOGIES

Unity Technologies:

Unity Machine Learning Agents

Unity Physics Engine

C#

Research Technologies:
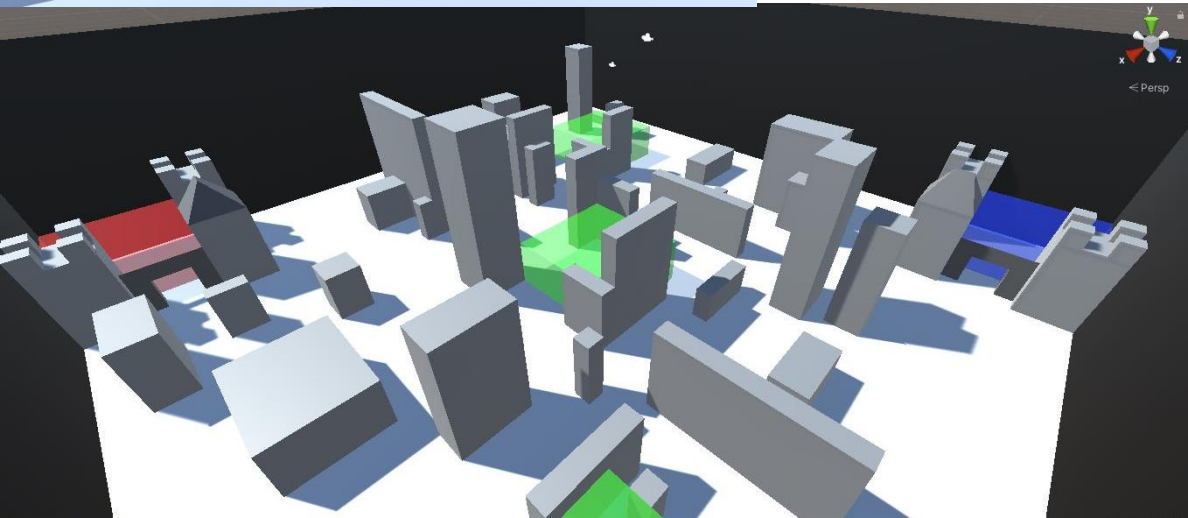
Unity.com Tutorials

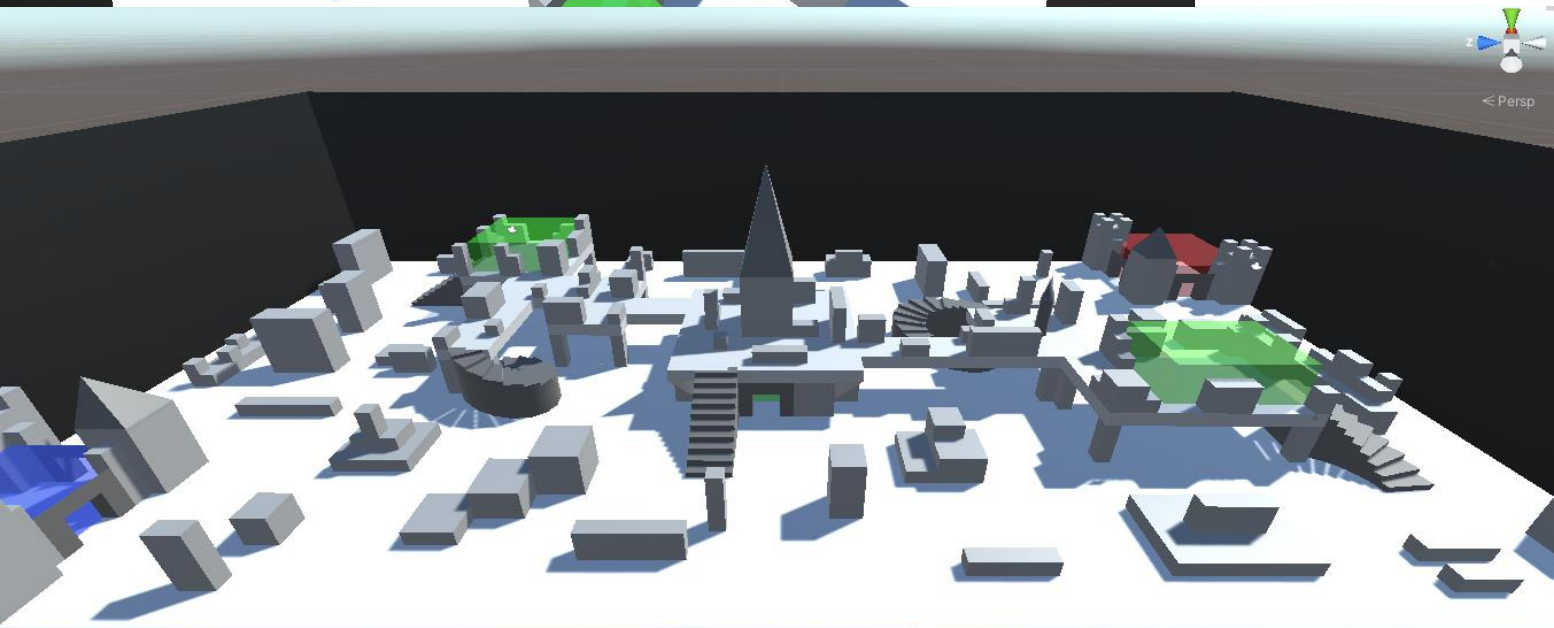Udemy Tutorials

Google Scholar
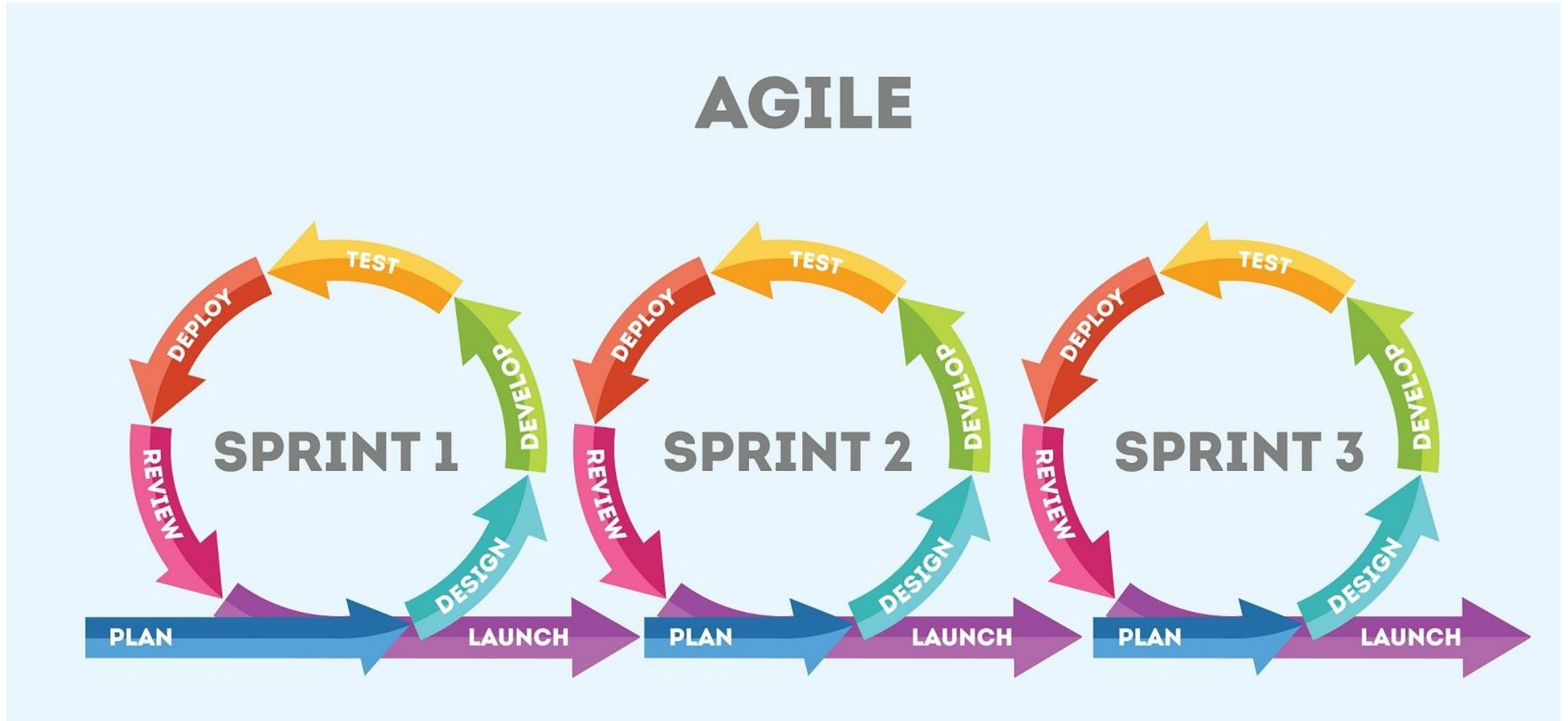
Youtube

- Simple agent design

- Research, looking at a article from Deepmind [3]

- Simple map design with 2 respawn points and 3 hardpoints

- Slightly more complex map with stairs and platforms in addition to the 2 respawn points and 3 hardpoints

DEVELOPMENT STRATEGY

PLAN OF ACTION

28/02/2022	07/03/2022	14/03/2022	21/03/2022
MON WED FRI	MON WED FRI	MON WED FRI	MON WED FRI
RESEARCH ON STATE AI	IMPLEMENTATIONOF STATE AI & DISSERTATION	IMPLEMENTATION STATE AI & DISSERTATION	RESEARCH ON ML & IMPLEMENTATION OF ML & DISSERTATION

07/04/2022	14/04/2022	21/04/2022	28/04/2022
MON WED FRI	MON WED FRI	MON WED FRI	MON WED FRI
IMPLEMENTATION OF ML & DISSERTATION	IMPLEMENTATION OF ML & DISSERTATION	DISSERTATION	PROJECT POSTER
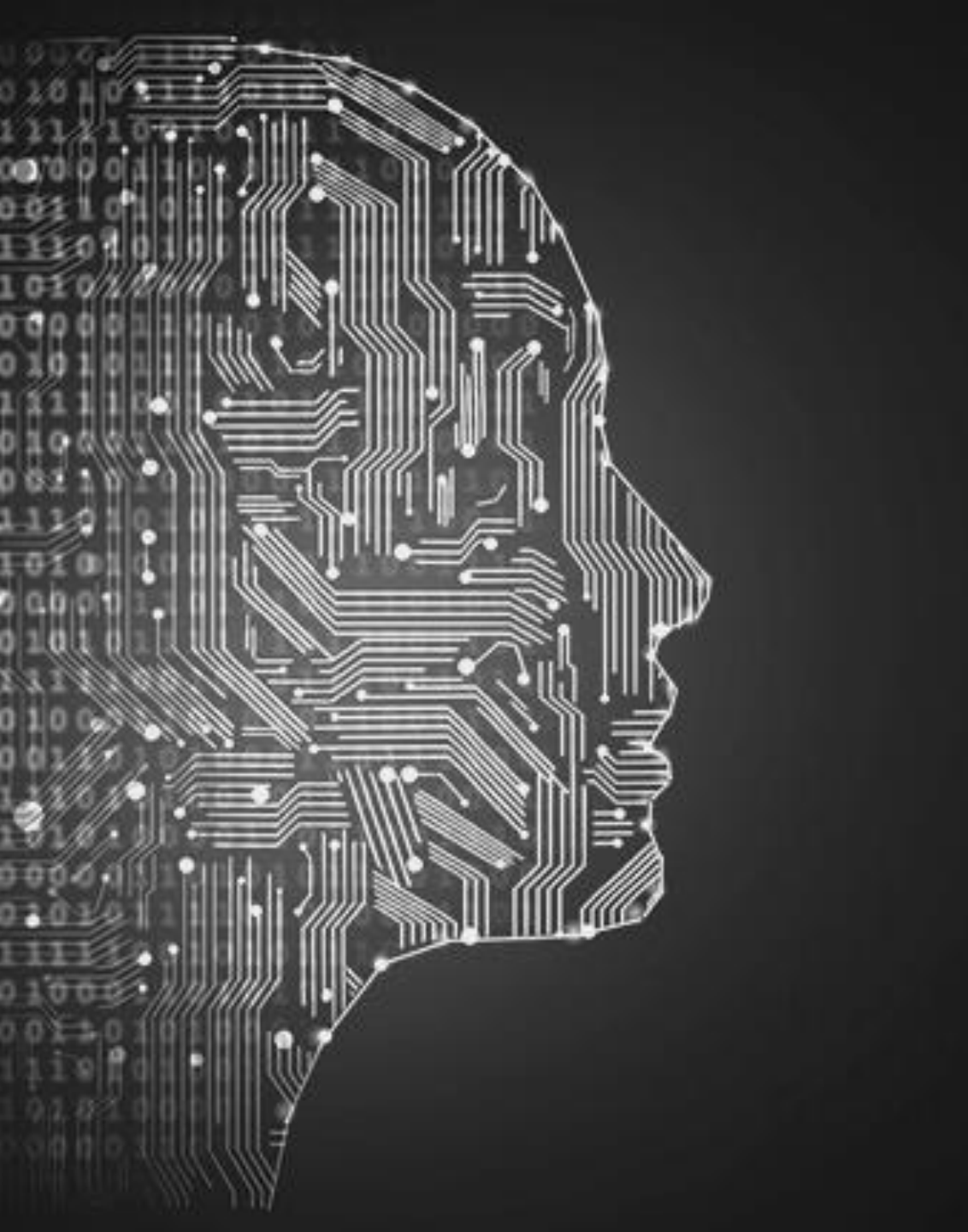
SUMMARY

- Develop a platform in which AI teams will play against each other in a game of Hardpoint using Unity

- Study the outcome of the games overtime and the behaviours developed by the AI agents

REFERENCES

[1] Marr, B., 2016. *What Is The Difference Between Artificial Intelligence And Machine Learning?.* [online] Forbes. Available at: <https://www.forbes.com/sites/bernardmarr/2016/12/06/what-is-the-difference-between-artificial-intelligence-and-machine-learning/?sh=6738fd8d2742> [Accessed 25 February 2022].

[2] Davison, R. and Bergami, G., 2021. *CSC3232: Gaming Technologies and Simulations. AI In Games: Intro To AI And State machines.* [pdf] Newcastle: Newcastle University, p.17. Available at: <https://ncl.instructure.com/courses/39999/files/4887519?module_item_id=2008634> [Accessed 25 February 2022].

[3] Deepmind. 2022. *Capture the Flag: the emergence of complex cooperative agents.* [online] Available at: <https://deepmind.com/blog/article/capture-the-flag-science> [Accessed 25 February 2022].

Thank You