

**DRAFT**



**Computer Games Development SE607**  
**Technical Design Document**  
**Year IV**

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[Declaration form to be attached]

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## **Acknowledgements**

I would like to thank the following people who assisted in completing this project including;

X of Y who kindly agreed to ...

I would also like to thank Y for use of ....

Use this template when writing your research report. As a rule of thumb, the report should be of the order of 10 pages (about 250 words/page).

## **Project Abstract**

The Real Time Strategy Game Genre has provided a concrete and effective method to allow researchers to introduce and study complex algorithms that adapt its evolving landscape. The popular RTS game StarCraft (SC) and its sequel StarCraft II (SC2) has been utilised as a basis for developing Machine Learning algorithms to further the research on Artificial Intelligence. Previous researchers have constructed a framework to build from that allows others to create and expand their own algorithms as they see fit with great success.

This project focuses on creating an entirely new, smaller scale RTS game that implements a Back Propagation Neural Network as a core concept for an opponent. The idea is to create a basic environment that allows the algorithm to achieve a simple goal through the mechanics of the game. In the end I want it to be able face off against a human opponent and to see how it adapts.

Developed using the Unity engine as an easy to use application to apply the project to.

## **Project Introduction and/or Research Question**

With the advancement of artificial intelligence, most efforts have been placed on training neural networks to recognise images, understanding and reinterpreting data

The purpose of this project is to create a simple but expandable neural network from an entirely new game from the ground up. This will allow me to experiment with the environment the algorithm is present in and create new challenges for it to overcome.

Replace this text with an appropriate Project Introduction.

Present relevant background or contextual material and define any terms or concepts when necessary.

Here you present to the audience what you are doing and why it is important. In essence, please provide an introduction to the project, why was it chosen, the potential impact of this research. You should state a research question (if any) and present the project objectives. This will most likely be a concrete question probably from one specific area, such as AI, Networking, Graphics etc.

E.g., Research Question Example (Networking): What is the effect of threshold size in the dead reckoning approach on player performance and player experience?

Summarize the main contributions of the project.

## **Literature Review**

### ***Artificial Intelligence and Learning Algorithms***

The implementation of learning algorithms for expanding the research of artificial intelligence has woven its way into video games. With the cooperation between Blizzard entertainment and Deepmind, they have developed the SC2LE (StarCraft 2 Learning Environment), a program that introduces a Reinforced Learning Algorithm into the complex and chaotic game. Though initially created in controlled “mini-game” environments, it has allowed other researchers to expand the scope of the algorithm to encompass the entire game. Different researchers have created AI Agents to compete against StarCraft 2’s built in cheat level built in AIs with great success.

Though most have mainly focused on SC2LE, a different project was developed to create a smaller scale RTS that featured a machine learning algorithm. Micro RTS, developed by Santiago Ontañón, is a small implementation of a real time strategy game which is used to observe and perform AI research. The implementation of such is X

### ***A new game environment***

Replace this text with an appropriate Literature Review.

The literature review places your research in context. You aren’t the first person to investigate or research a particular topic. Present a short literature review with the following goals:

- Give the reader a good overview of the key concepts;
- Describe the most relevant work (in your own words) that other people have done in this area;
- Use proper academic writing with references.
- Show how the existing work influenced your project.

## **Evaluation and Discussion**

Replace this text with Results and Discussion.

Describe the results using diagrams such as graphs etc. as appropriate, and discuss what the results mean.

Example: Results indicate that once the threshold gets over a certain point it significantly reduces player performance and player experience

## **Project Milestones**

Replace this text with Project Milestones.

Key project milestone dates and measurement on schedule, was project schedule adhered to, effectively planned for delivery on-time or ahead of schedule if appropriate.

## **Major Technical Achievements**

What are your major technical achievements?

## **Project Review**

What went right? What went wrong? What (if anything) is still outstanding/missing (i.e., still left to do)? If starting again, how would you approach this project differently? What advice would you have for someone attempting a similar project in the future? Were your technology choices the right or wrong ones? If you chose the wrong technology, provide justifications for why you think this. What were the implications of your technology choices?

## **Conclusions**

summarise your work and findings.

## **Future Work**

Indicate what might be some next steps to try (if a student next year was going to undertake a project in this area what might be an interesting thing for him/her to examine?).

## **References**

## **Appendices**

Replace this text with Appendices.

This might include ethics application and other relevant material e.g. copy of any questionnaires used.