# Leo Grant

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## Education

### 2021— 2022: University of Bath MSc Computer Science

**Distinction**

**Semester one** (Distinction in all)

- Software Engineering
- Principles of Programming
- Foundations of Computation
- Databases
- Research Seminar (publication review techniques)

**Semester two** (Distinction in all)

- Research Project Preparation
- Functional Programming
- Artificial Intelligence
- Reinforcement Learning
- Interactive Communication Design

**Dissertation** (Distinction)

For my 3-month dissertation, I implemented three state-of-the-art reinforcement learning algorithms into the BipedalWalker-v3 environment of OpenAI Gym, and tested their comparative learning abilities when using several optimisation techniques.

### 2017—2021: University of Bath Aerospace Engineering BEng (Hons)

**First class honours**

- Overall programme average: 72.44%
- Awarded a Commendation by the University of Bath Board of Examiners for Year 1 examination results.

**Computer Science-focused modules:**

- Final year engineering project—VR-based* 70%
- Modelling techniques, module 1† 74%
- Modelling techniques, module 2‡ 77%

*Note: I took a year out from university, June 2019 to September 2020. During this time, I gained work experience, undertook several coding courses (see UDEMY section below), learned to scuba dive, and gained my A2 motorcycle licence.*

### 2011—2017: Kimbolton School

**A levels**

| | |
|---|---|
| Mathematics | A* |
| Further Mathematics | A* |
| Physics | A* |
| Chemistry | A |

**GCSEs**

8 A* & 2As

## MSc Computer Science projects that included coding

**Dissertation:** I implemented DDPG, TD3 and SAC (three reinforcement learning algorithms) and tested the effects of different optimisations on their learning ability in the BipedalWalker-v3 environment from OpenAI Gym. Further, I developed a Python software package to support manual hyperparameter tuning of these algorithms, and designed a prototype mobile application (with basic navigational logic), using the Unity Game Engine, to further support the testing of these algorithms.

**Dungeon Doom**: I was part of an 8-person team that developed a game using the Unity game engine, along with documentation (user stories, use cases and CRC cards). The development process was in line with AGILE specifically using the SCRUM framework methodology. I was heavily involved in the development and documentation process, and gained valuable experience taking on a more leadership-oriented role in this project. We achieved 80% for this assignment.

**Connect 4**: I debugged and refactored an existing program built in Java that was used to play Connect 4, to better suit the principles of object orientated programming. I achieved 88% for this assignment.

**Saturated Reverse Polish Notation (SRPN) calculator**: This was an investigative assignment, where I was required to observe and test an SRPN calculator and replicate its functionality using Python. I achieved 81% for this assignment.

**Creating a Parser for Context-Free Grammar**: I created a program in Java to determine if a word is accepted by a given context-free grammar (in its Chomsky-Normal Form). I adapted it to automatically create parse-trees for words that are in that language. I achieved 60% for this assignment.

**Database API**: This project involved using Python to create an SQLite 3 database for a manager to keep track of their employees. The project included initial code that needed debugging syntax, runtime, and logical errors, as well as adding and enhancing features. I achieved 89% for this assignment.

**Sudoku:** I coded an algorithm to solve sudokus of varying difficulty in less than 20 seconds. The algorithm I implemented used constraint satisfaction. Specifically it used a backtracking search (combination of depth-first search with constraint propagation). I achieved 66% for this assignment.

*,†,‡ See over

## Undergraduate degree projects involving coding

***Developing a virtual reality application for aircraft stability and control learning:** For my final year project (6-week duration), I developed a virtual reality application for the Oculus Quest/Quest 2 headsets, containing two aerospace engineering lessons. This application was built in the Unity game engine (using C#).

I created a video to demonstrate this project: https://www.youtube.com/watch?v=sraSlU2AtH4.

[†]**Modelling of a shuttlecock trajectory:** Using MATLAB, I modelled the trajectory of a shuttlecock using the forward differencing technique, with air resistance considered. I employed the shooting method to accurately predict the required angle and initial velocity required for a desired shot. I then created a game from this code for a user to aim at targets (like Angry Birds).

[‡]**Modelling of heat transfer through a space shuttle tile:** I modelled the heat transfer through a space shuttle tile upon re-entry using four different solving methods. I created an automatic graph reader to obtain the surface temperature of the tiles from NASA reports, as well as a GUI which allowed the user to select the position of the tile on the spacecraft that was to be analysed.

**Designing a compression panel for an A370 aircraft**: This project involved coding a weight optimisation algorithm into MATLAB for the compression panel of an aircraft wing.

## Online courses

I have completed multiple UDEMY courses (UDEMY is an online course provider):

- 'Complete C# Unity Game Developer 3D' – 34 hours of video tutorial
- 'Build Multiplayer Games with Unity and Photon (PUN 2)' – 11 hours video tutorial
- 'The Complete Web Development Bootcamp 2020' – 55 hours video tutorial (75% completed)

## Skills

- Coding Experience
  - C# → Using Unity to build games and applications as a hobby and for university
  - C → Experience limited, learnt as part of Principles of Programming module during my MSc
  - Python → Originally learnt from a Codecademy course, have since used for university work
  - Java → Learnt during my MSc, main experiences described in projects above
  - SQLite → Learnt during my MSc, experiences during MSc Databases module
  - MATLAB → Learnt and used regularly in my Undergraduate degree
  - JavaScript → Learnt and used during Web Dev. UDEMY course, coding for front (incl. HTML and CSS) and back end (incl. Node.js) development of websites
  - Haskell → Learnt during my MSc, experiences during MSc Functional Programming module
- Experience using version control (specifically GitHub)

## Work experience

- Production Assistant: I worked full-time at Cambridge TV (Signet Court, Swann's Road, Cambridge) as a Production Assistant on a 4-month contract (September to December 2019). This role included tasks such as video editing, assisting on film shoots, interviewing people with learning difficulties and their carers for a documentary and liaising with clients.

  Link to learning difficulties documentary : https://www.youtube.com/watch?v=ivRBi3P-jW4&t=153s

- Video editor: Using the skills I acquired as a Production Assistant, I was engaged as a freelance video editor. I created video content for online romance-writing workshops, and book trailers for a romance novelist based in Los Angeles.

## Hobby Projects

- VR Jetpack Game (Oct. 2022) - I made a simple VR jetpack game in Unity. I created the avatar using 3D assets I modelled in Blender, and used 3D vector mechanics to estimate the elbow position of the avatar.
- Chess Web App (Nov. 2022) - I developed a chess game using front-end web technologies (HTML, CSS, Bootstrap, Javascript, and jQuery).

## Interests/other

- Full clean British driving licence, A2 motorcycle licence
- Currently writing a fantasy novel
- Grade 8 RAD Classical Ballet
- Grade 5 Classical Guitar
- Health and fitness (e.g. Gym / Duathlon)
- Scuba Diving