# Keir Simmons

Machine Learning · Applied Scientist · Japanese Speaking (N2+) · Japan Resident

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## Summary

As an Applied Scientist at Amazon, I lead a team improving the efficiency of the logistics network via NLP for address recognition. Having developed an improved address validation and hierarchical mapping system at scale, Amazon can now deliver more packages in less time, resulting in an annual uplift of 400,000,000 USD in Japan alone.

Prior to Amazon, I led numerous projects at *Ascent Robotics* with the goal of developing fully autonomous vehicles for Japanese roads, requiring methods in adversarial search, computer vision, and deep reinforcement learning. I also completed a research internship at the internationally-renowned *AI Research Center* & AI energy company *Informetis* in Tokyo, been awarded the prestigious *Daiwa Scholarship*, and hold Master's degrees with the highest possible merit from three top 10 universities around the world.

My passion is to improve everyday-life via automation by pushing and challenging the frontiers of machine learning research and application. With over 15 years of daily development experience in a vast array of languages, an exemplary background both academically and in industry, I hope to further aspire towards these goals throughout the rest of my personal career.

## Experience

### Amazon — *Tokyo, Japan*

Applied Scientist II - International Technology, Applied Machine Learning Team — *Apr. 2020 - Present*

- Leading three projects within Amazon Logistics to increase efficiency of the delivery network via AI-based automation in address recognition, validation and hierarchical mapping. This accounts for an estimated annual uplift of 400,000,000 USD in JP alone.

### Ascent Robotics — *Tokyo, Japan*

Research Engineer | **Team Lead from Apr. 2019** — *Nov. 2018 - Feb. 2020*

Intern — *May 2017 - Aug. 2017*

- Exposed and proposed solutions to incapabilities in the vehicle AI during simulation before proceeding to in-car testing via an array of advanced Bayesian Optimisation-based adversarial search methods in our main project, *DOJO*, as the leader of the *Adversary* team.
- Led multiple end-to-end machine learning-based projects specifically with the goal of training our vehicles to adopt a human-like behaviour. The results of these projects have been used in publications at leading conferences worldwide.
- Created a full end-to-end stack which clusters driving behaviours of vehicles on Japanese roads from raw 4K HD top-down drone video data.

### Informetis — *Tokyo, Japan*

Research Engineer | **UCL Master's Thesis** — *June. 2018 - Sept. 2018*

- Solved the *peak-demand* problem where the electrical grid cannot generate enough energy during peak times, completion of which formed my Master's thesis at *UCL* for the MSc in *Computational Statistics & Machine Learning* and earned the highest possible classification.
- Tackled the problem through the use of peak-shifting; using reinforcement learning (PPO) to find an optimal control policy of purchasing and storing energy in a battery to shift consumer's demand for energy outside of peak times.
- Achieved perfect peak-shifting and a reduction in energy consumption and cost of utility bills by over 20%.

### AI Research Center - National Institute of Advanced Industrial Science & Technology — *Tokyo, Japan*

Machine Learning Researcher | **Courtesy of the Daiwa Scholarship** — *Oct. 2016 - Mar. 2017*

- Completed a research placement as the only non-doctorate ever to be admitted on the team, solely based on my academic performance.
- Learned and implemented fundamental machine learning algorithms, covering supervised, unsupervised and reinforcement learning. This included reproducing Google DeepMind's results from their Atari paper, and performing hyperparameter optimisation to improve the results.
- Led a seminar in reinforcement learning with a vision of enabling other researchers to apply it to their own field of research.

### The Daiwa Anglo-Japanese Foundation — *Tokyo, Japan*

Daiwa Scholar — *Aug. 2015 - Mar. 2017*

- An extremely competitive one-of-a-kind scholarship programme for potential leaders in their field with a strong academic background, consisting of an intensive language course and relevant work placement. Approximate value of 11,000,000 JPY.
- Selected as 1 of 6 scholars from an initial pool of approximately 300+ candidates to represent the UK in the machine learning field.
- Conducted a research placement at the *Artificial Intelligence Research Center* after achieving business-level fluency in Japanese (JLPT N2).

### National University of Singapore — *Kent Ridge, Singapore*

Undergraduate Researcher — *Jan. 2014 - Jun. 2014*

- Programmed a bespoke sound pressure level meter application for Android devices using Java to allow monitoring of aircraft engine noise. Included a real-time graphical frequency analyser adhering to aviation industry standards.

### Volunteering — *London, UK*

Web Developer — *Jan. 2007 - Dec. 2014*

- Created over 100 advanced open-source modifications in JavaScript and PHP for use with the popular message-board services *Invision Power Board* and *ZetaBoards*, including one that was used by over 1,000,000 people. 20% of these projects have now been ported to *GitHub*.

# Education

### University College London (UCL)
*London, UK*

MSc Computational Statistics and Machine Learning (CSML) | **Distinction** *Sept. 2017 - Sept. 2018*

- Taught by leading *DeepMind* researchers including *David Silver* on the *Advanced Deep Learning & Reinforcement Learning* course.
- Completed large-scale projects in NLP, reinforcement learning and machine vision, including advanced language modelling, sentence ordering for coherence, biomedical feature extraction and augmented reality tracking, using Python and TensorFlow.
- Developed a strong mathematical foundation in statistical modelling and machine learning, which I applied in my thesis and numerous projects throughout the degree, resulting in achieving the highest possible classification.

### Imperial College London
*London, UK*

MEng Aeronautical Engineering with a Year Abroad | **First Class** *Oct. 2011 - Jun. 2015*

- Achieved a strong 1st class with honours (80% average) with a final grade in the top 5%.
- Specialised in computational methods, achieving 100% credit in *Computational Fluid Dynamics* and *Numerical Analysis* coursework.
- Completed my Master's thesis titled *Design Synthesis of Small Unmanned Aircraft*, focusing on numerical optimisation in Matlab for appropriate selection of aerodynamic properties of an autonomous drone, resulting in a staggering 9% weight saving of the final design.

### National University of Singapore (NUS)
*Kent Ridge, Singapore*

MEng Aeronautical Engineering with a Year Abroad | **First Class** *Aug. 2013 - May. 2014*

- Achieved the highest ever received grade of 4.5/5.0 as the first student to be selected for this exchange programme based on academic merit.
- Self-taught Java in order to take two advanced *MIT*-based modules in *Programming Methodology* (A) and *Data Structures and Algorithms* (A-).

# Professional Development

### Deep Reinforcement Learning Bootcamp
*UC Berkeley, USA*

On-site: intensive lectures and labs delivered by leading professors and industry experts in RL. *Aug. 2017*

### Convolutional Neural Networks image for Visual Recognition (CS231n)
*Stanford, USA*

Online course: mathematically-rigorous course covering state-of-the-art methods for visual recognition. *Feb. 2017 - Mar. 2017*

### Introduction to Reinforcement Learning
*UCL, UK*

Online course: solid mathematical formulation of state-of-the-art RL algorithms and practices. *Dec. 2016 - Feb. 2017*

### Machine Learning
*Stanford, USA*

Online course: learned the fundamentals of machine learning, completing all assignments with 100% credit. *Sept. 2016 - Dec. 2016*

# Skills

## Technical

**Expert** Python, JavaScript, jQuery, HTML

**Proficient** PyTorch, Spark, Tensorflow, AWS, Kubernetes, OpenCV, Google Cloud, Matlab, MySQL, git, PHP, LaTeX, CSS, MS Office

**Familiar** C++, R, Java, FORTRAN, ROS

## Miscellaneous

**Core Related Skills** Machine learning, end-to-end deployment, computer vision, adversarial search, NLP, reinforcement learning

**Natural Languages** English (native), Japanese (conversational; N2)

# Honours & Awards

**Junction Tokyo Hackathon (Winner of both Softbank Robotics & IBM BlueMix paths) - 400,000 JPY** *Tokyo, Japan*

Hacked SoftBank's Pepper robot into a smart personal sales assistant using machine learning (image recognition & recommendation systems). Asia's largest international hackathon. *2017*

**Aeronautics Scholar - Imperial College London** *London, UK*

Achieved a 1st class result every year throughout the 4 year degree. *2015*

**SumoBot Champion - National University of Singapore (*CS1101S Contest*)** *Kent Ridge, Singapore*

Awarded 1st place against 100 other students in an AI-powered sumo-style robot showdown. *2013*

**Best AS Student & Best A2 Student - The Hollyfield School & Sixth Form Centre** *Surrey, UK*

Achieved the best A level grades in the college's history (A*A*AA, 520 UCAS points). *2011*

**Excellence in Mathematics & Excellence in Physics - The Hollyfield School & Sixth Form Centre** *Surrey, UK*

Achieved the best A level grades in Mathematics and Physics in the college's history (A*A*). *2011*