

# Andrew Erskine

5 Hampden Road · London · United Kingdom

☎ (+44) 7360109224 | ✉ [erskine94@gmail.com](mailto:erskine94@gmail.com) | 🌐 [robodoig.github.io](https://robodoig.github.io) | 🏠 [andrewerskine.uk](https://andrewerskine.uk) | 🤖 RoboDoig

## Summary

- Proficient in quantitative methods including building data analysis pipelines for large, heterogeneous data sets and improving large codebases.
- Exceptional engineering and science knowledge, including scientific communication tools (jupyter, matplotlib).
- Dedication to writing clean, production-quality code and comfortable with unit testing, efficient version control, and common DevOps practices.
- Experience working on multiplayer games and familiarity with common networking architectures and patterns.
- Research-oriented software engineering skills, including fluency with libraries for scientific computing, deep learning and machine learning (Keras, TensorFlow, scikit-learn). Ability to rapidly acquire new technical knowledge and skills.

## Experience

### NeuroGEARS Ltd.

London, United Kingdom

SENIOR SOFTWARE ENGINEER

April 2022 - Present

Software / consulting company developing the Bonsai-Rx language and custom software tools for neuroscience research.

- Improved and extended the popular open source bonsai-rx language for visual reactive programming. Built and released Bonsai libraries for sensor interfaces (Tinkerforge), networking (ZeroMQ, Zyre, Lsl), streaming (FFmpeg) and Unity integration.
- Developed Unity VR environments in collaboration with clients in research and industry. With partners in clinical and sociological research, developed environments based on real-world city locations that participants can explore in VR while having key biophysical and attention signals monitored (heart-rate, galvanic skin response, eye-tracking, gaze fixation).
- Worked with NeuroGEARS team to provide bespoke software tools to clients including user interfaces and documentation. Used reactive extensions in .NET and asynchronous programming to produce Bonsai-Rx workflows controlling complex neuroscience experiments. Communicated engineering process and requirements to non-technical clients.

🔧 Bonsai · C# & .NET · Python · MATLAB · Unity · ZeroMQ · Avalonia · Windows Forms · MAUI · Git

### The University of Southern California

Los Angeles, California

POSTDOCTORAL SCHOLAR

May 2018 - April 2022

Investigating somatosensory processing in neural circuits with 2p imaging and 3D optogenetics.

- Reduced manual analysis time by modifying DeepLabCut for Google Cloud, allowing for fast, parallel usage on TB size whisker tracking datasets and speedup of data processing.
- Applied deep neural network models with dimensionality reduction methods to analyze neural population responses in high-dimensional space.
- Designed and deployed machine-learning pipelines to increase analysis throughput in the lab (Google Cloud, Colab).
- Mentored graduate and undergraduate students and provided training in data analysis and programming.
- Employed all-optical techniques to investigate neuronal ensemble recruitment in somatosensory cortex.

🔧 Python · MATLAB · Keras · tensorflow · numpy · pandas · jupyter

### The Francis Crick Institute / University College London

London, United Kingdom

PHD STUDENT

September 2013 - May 2018

Building automated systems for mouse behavioral studies and investigating the temporal component of olfaction.

- Redesigned high throughput mouse behavior system (AutonoMouse), that was based on an outdated software solution, using Python – including sensor interfaces, experiment control and database.
- Developed several auxiliary Python libraries that became standard tools: daqface for communicating with National Instruments ADCs and PulseBoy for designing complex digital command patterns.
- Designed a novel odor-delivery device and software package for flexibly generating complex valve patterns with modular design (PulseBoy).

🔧 Python · MATLAB · Qt · nidaqmx

## Education

### University College London

London, United Kingdom

PHD IN NEUROSCIENCE

2018

- Thesis: Perception and representation of temporally patterned odor stimuli in the mammalian olfactory bulb

### University of Manchester

Manchester, United Kingdom

MNEUROSCI, FIRST CLASS HONOURS

2013

- Thesis: Representation of whisker kinematic parameters in the trigeminal ganglion of awake, behaving mice

## Publications

---

- 2021 **Fast odour dynamics are encoded in the olfactory system and guide behaviour.**, Ackels, T., Erskine, A., Dasgupta, D., Marin, A. C., Warner, T. P. A., Tootoonian, S., Fukunaga, I., Harris, J. J., Schaefer, A. T. *Nature*
- 2020 **Behavioral and neural bases of tactile shape discrimination learning in head-fixed mice.**, Kim, J., Erskine, A., Cheung, J. A., Hires, S. A. *Neuron*
- 2019 **AutonoMouse: High throughput operant conditioning reveals progressive impairment with graded olfactory bulb lesions.**, Erskine, A., Bus. T., Herb, J. T., Schaefer, A. T. *PLOS ONE*
- 2016 **Prediction of primary somatosensory neuron activity during active tactile exploration.**, Campagner, D., Evans, M. H., Bale, M. R., Erskine, A., Petersen, R. S. *eLife*
- 2015 **Microsecond-Scale Timing Precision in Rodent Trigeminal Primary Afferents.**, Bale, M. R., Campagner, D., Erskine, A., Petersen, R. S. *JNeurosci*

## Writing

---

### A practical guide to RNNs for neuroscience research in Keras

2021

Article covering practical implementations and applications of recurrent neural network models for neuroscience research.

### Unity multiplayer: bottom to top

2021

Tutorial outlining the development of a full-stack multiplayer unity app. Now featured as part of the official documentation for the DarkRift multiplayer framework.

## Projects

---

### andrewerskine.uk

Portfolio website featuring my personal projects in games, AI, UI and networking

✏ Unity · Blender · DarkRift · HTML, Javascript, CSS · Multiplayer networking · Computer vision