Andrew **Erskine**

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Summary

- PhD in systems neuroscience with a focus on olfactory perception and behavior.
- Extensive experience in designing and implementing experiments on the psychophysics of sensory perception.
- Research-oriented data analysis (Python, Jupyter) and 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.
- 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.
- Proficient in quantitative methods for analysis of neurophysiological and behavioral data.

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.

- Contributor to the popular open source Bonsai-Rx language for visual reactive programming.
  Built and released Bonsai libraries for sensor interfaces (Tinkerforge), networking (ZeroMQ, Zyre, Lsl), and Unity integration.
- Supported Bonsai users through documentation and training.
  Produced and contributed to several deployed documentation webistes (docfx) containing autodocumented code reference and tutorials. Trained lab members of academic collaborators in effective Git practices for managing open-source software projects. Engaged in technical support of Bonsai users via support forums.
- 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) in 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

Courses

Cold Spring Harbor Laboratory
Cold Spring Harbor, New York

Imaging structure and function in the nervous system — *2019*

- Intensive training in advanced optical methods including spatial-light modulation, temporal focusing, light-sheet, acousto-optical deflectors, remote-focusing, SLAP, SCAPE.

SysMIC
London, United Kingdom

SysMIC course — *2015*

- Advanced training in practical applications of mathematics and computing in biology. Final project: MATLAB implementation of FitzHugh-Nagumo model of single neuron activity.

Bernstein Center Freiburg
Freiburg, Germany

Analysis and models in neurophysiology — *2014*

- Instruction in computational neuroscience theory and application relating to electrophysiological data.

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

Bonsai ZeroMQ integration
Bonsai library and documentation website for the ZeroMQ networking library

Bonsai · C# & .NET · Networking · docfx

Bonsai Tinkerforge
Bonsai library for communication with Tinkerforge devices

Bonsai · C# & .NET

DLC CloudML
Port to Google Cloud of DeepLabCut for distributed model training on cloud GPUs

Google Cloud · Python

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

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