LIM, JING XUAN

*A*STAR NSS (PHD) SCHOLAR*
JHU NEUROSCIENCE GRADUATE STUDENT

jlim56@jhmi.edu

Profile

I am a graduate student in the neurosciences. My research interest is in attaining a quantitative description of the neural computations underlying information processing, encoding, storage and retrieval in the brain, and to understand the biophysical mechanisms that support them. At Johns Hopkins Neuroscience, I plan to pursue a PhD at the intersection of systems and computational neuroscience.

Skills

Calcium imaging

Whole-brain functional imaging of the zebrafish brain using light-sheet and two-photon microscopy during fictive navigation in virtual environments. Craniotomy, stereotaxic viral injection, fiber implantation and *in vivo* calcium fiber photometry in freely-moving mice.

Neural modeling

Development, simulation and analysis of multiscale models of biological neuronal networks in NEURON, using NetPyNE. Compartmental modeling of neuronal morphologies. Generalized Linear Models (GLMs) for spiking activity and animal behavior.

Electrophysiology

Rodent surgery and preparation of acute brain slices using both the vibratome and the manual tissue chopper, *in vitro* patch clamp (AxoGraph, Patchmaster) and field recordings (Intracell), and data analysis using Stimfit, Neo IO and Clampfit. Biocytin labelling and post hoc recovery of cell morphologies using Neurolucida.

Education

Johns Hopkins University, United States of America

PhD Neuroscience **2017-present**

Scholarship: National Science Scholarship (PhD) from A*STAR, Singapore

University College London, United Kingdom

BSc Neuroscience **2012-2015**

Classification: First Class Honours
Thesis: Patch-clamp analysis of miniature synaptic currents in layer 5 cortical pyramidal cells of a Bardet-Biedl Syndrome mouse model
Scholarship: National Science Scholarship (BS) from A*STAR, Singapore

Hwa Chong Institution (College), Singapore

GCE ‘A’ Level **2008-2009**

Overall Grade: AAA/A
Scholarship: Edusave Entrance Scholarship for Independent Schools from the Ministry of Education, Singapore

Nan Hua High School, Singapore

GCE ‘O’ Level **2004-2007**

Overall Grade: 8As (nation’s top 5 percentile)

Experience

Johns Hopkins University :: Prof Shreesh Mysore

Graduate Rotation Student **Jan 2018-present**

Zanvyl Krieger Mind/Brain Institute, JHU :: Prof Ernst Niebur

Graduate Rotation Student **Aug 2017-Dec 2017**

State-space models for gambling behaviour in monkeys

Co-supervisor: Dr Pierre Sacre, Institute of Computational Medicine

To better understand gambling behaviour in monkeys made to perform a multiattribute decision-making task, I constructed a generalised linear encoding model with present and past trial return and risk as covariates.

Janelia Research Campus, HHMI:: Dr Misha Ahrens

Graduate Rotation Student **Jun 2017-Aug 2017**

Role of Neuropil 4 oscillatory dynamics in heart rate and swim

To draw functional connections between oscillations in Neuropil 4 and physiology, I performed two-photon calcium imaging at various planes spanning Neuropil 4 while electrophysiologically recording heart rate and fictive behaviour while the zebrafish performed a visuomotor response task. I also performed whole-brain light sheet imaging in order to characterize oscillations in Neuropil 4 with neural activity dynamics in other areas.

National University of Singapore :: Prof Fu Yu

Research Officer **Dec 2016-Jun 2017**

Role of ventrolateral hypothalamic SST neurons in feeding behaviors

I developed a custom data visualization and acquisition software for fiber photometry and used it to investigate the effects of sleep-wake cycle on the activity of GCaMP-expressing ventrolateral hypothalamic SST neurons, whose activity controls feeding behaviour.

Nanyang Technological University :: Prof George Augustine

Research Officer **Jun 2015-Dec 2016**

Reconstruction and simulation of the claustral network

Co-supervisor: Prof William Lytton, SUNY Downstate Medical Center

I developed an *in silico* model of the claustrum with simplified integrate-and-fire spiking neurons tuned to intrinsic electrophysiological properties of different cell types and with connectivity based on optogenetic circuit-mapping data. I then performed a multitude of simulations in exploration of the dynamical features of the network. I presented this work at Society for Claustrum Research Annual Symposium 2016 and RIKEN Brain Science Institute Summer Program 2016.

Wolfson Institute for Biomedical Research, UCL :: Dr Beverley Clark

Undergraduate Thesis Project Researcher **Sep 2014-Apr 2015**

Patch-clamp analysis of miniature postsynaptic currents in cortical pyramidal cells of a Bardet-Biedl Syndrome mouse model

Co-supervisor: Dr Christoph Schmidt-Hieber, Institut Pasteur

I performed whole-cell patch clamp on L5 cortical pyramidal neurons to investigate the functional changes in cortical wiring of the Bardet-Biedl Syndrome 5 knockout mouse, which were found to have decreased spine density. I also stained the neurons with biocytin and recovered their morphologies posthoc using Neurolucida in order to check for other structural deficits. This work culminated in the writing of a dissertation and a talk given to faculty and peers.

National University of Singapore :: Prof Sajikumar Sreedharan

Undergraduate Researcher **Jul 2014-Sep 2014**

Molecular events underlying hippocampal LTP

I performed field and patch-clamp recordings on organotypic slices to investigate the effects of various pharmacological agents on LTP and plasticity thresholds in CA1 pyramidal neurons. I also performed densitometric measurement of western blots using ImageJ to quantify the effects of LTP on protein phosphorylation levels.

Singapore Institute for Clinical Sciences :: Dr Anne Rifkin-Graboi

Undergraduate Researcher **Jul 2013-Sep 2013**

The relation between temperament, distractibility and heart rate in toddlers

I performed extensive analysis on Lab-TAB (Laboratory Temperament Assessment Battery, for the assessment of behaviour, emotion and attention), EEG, eye-tracking and heart rate data.

Duke-NUS Graduate Medical School :: Prof Adam Claridge-Chang

Assistant Laboratory Officer **Jan 2012-Mar 2012**

I performed laboratory technician duties such as keeping stocks, collecting virgins, setting up and scoring crosses and cooking fly food. I also learned how to perform brain dissection on the *Drosophila melanogaster* and various molecular biology techniques such as gene cloning, cDNA library building, RNA isolation, Q-PCR, miniprep and gel electrophoresis. Finally, I designed and set-up an optogenetics-enabled behavioural rig for the movement tracking of fruit flies for the investigation of anxiety circuits.

Awards

Fellowships

A*STAR National Science Scholarship (BS)	Full financial support for undergrad studies	**2012-2015**
A*STAR National Science Scholarship (PhD)	Full financial support for PhD studies	**2017-2022**

Travel Scholarships

RIKEN BSI Summer Program Travel Award	Full financial support for the summer program	**2016**

Publications

Journal Articles

Jing Xuan Lim, Salvador Dura-Bernal, George J. Augustine, William W. Lytton. **Computational models of claustrum subnetworks.** *Manuscript in preparation.*

Posters

Jing Xuan Lim, Salvador Dura-Bernal, George J. Augustine, William W. Lytton (2016). **Computational models of claustrum subnetworks.** *Society for Claustrum Research Annual Symposium 2016* https://jingxlim.github.io/scr16.pdf

Jing Xuan Lim, Salvador Dura-Bernal, Rena Orman, Christoph Kayser, George J. Augustine, William W. Lytton (2016). **Reconstruction and simulation of claustral microcircuitry based on optogenetic mapping.** *RIKEN Brain Science Institute Summer Program 2016.* https://jingxlim.github.io/riken16.pdf

Theses

Jing Xuan Lim and Beverley A. Clark (2015). **Patch-clamp analysis of miniature synaptic currents in layer 5 cortical pyramidal cells of a Bardet-Biedl Syndrome mouse model.** *BSc dissertation, University College London.* https://jingxlim.github.io/ucl15.pdf

Coursework

Research programs

RIKEN BSI Summer Program	RIKEN Bran Science Institute	**2016**

Conferences

47th Annual Meeting	Society for Neuroscience	**2017**
46th Annual Meeting	Society for Neuroscience	**2016**
Deep Learning Summit Asia	RE•WORK	**2016**

Coursework

Neurobiology, Neural Systems and Behaviour

Neuroscience and Cognition I & II	Hopkins
The Cellular Basis of Brain Function	UCL
Neural Basis of Motivation and Learning	UCL
Physiology of Sensory Transduction	Hopkins
Perception, Attention and Action	UCL
Pain	UCL
Synaptic Pharmacology	UCL
Systems Neuroscience	UCL
Structure and Function of Nervous Systems	UCL
Cellular Neurophysiology	UCL
Human Neuroanatomy	UCL
Introduction to Neuroscience	UCL

Neural Computation and Neuroengineering

Theoretical Neuroscience	Hopkins
Models of the Neuron	Hopkins
Neural Implants and Interfaces	Hopkins (ongoing)
Quantitative Methods for Brain Sciences	Hopkins (audit, ongoing)

Computer Science and Applied Mathematics

Mathematical Foundations of BME	Hopkins (ongoing)
Linear Algebra and Differential Equations	Hopkins
Statistics for Laboratory Scientists I & II	Hopkins (ongoing)
Programming for Everybody	U Michigan (Coursera)
Python Data Structures	U Michigan (Coursera)
Introduction to Python for Data Science	Microsoft (edX)

Biology

General and Systemic Pharmacology	UCL
Molecular Biology	UCL
Mammalian Physiology	UCL
Cell Physiology and Developmental Biology	UCL
Chemistry for Biology Students	UCL
Biochemistry and Molecular Biology	UCL
Introduction to Genetics	UCL

Miscellaneous

Sociology of Science	UCL
Learning How to Learn	UC San Diego (Coursera)

Language

Python	MATLAB	Bash
tcsh	HOC	NMDOL
Emacs Lisp	Markdown	Org Mode
HTML	CSS	

Software

Linux	Git	Mercurial (hg)
GNU Emacs	Spyder	X2Go
ImageJ / Fiji	Photoshop	Lightroom
Illustrator	InDesign	

References

George Augustine

Research Supervisor
+65 6778 2012
george.augustine@ntu.edu.sg

William Lytton

Research Supervisor
+1 718 270 6789
bill.lytton@downstate.edu

Beverley Clark

Thesis Supervisor
+44 020 7679 6955
b.clark@ucl.ac.uk