

Haotian Teng

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Personal Website: <https://haotianteng.github.io/>

EDUCATION

University of Queensland, Queensland, Australia

M.S., Bioinformatics

2016 – Present (expected Dec. 2017)

- GPA: 6.6/7; Top 1%
- Advisor: Prof. Lichlan Coin, Institute of Molecular Bioscience, University of Queensland
- Co-Advisor: Prof. Geoffrey Goodhill, Queensland Brain Institute, University of Queensland
- Core courses: Advanced Bioinformatics (7/7) / Directed Study in Molecular Genetics (6/7) / Concepts in Bioinformatics (7/7) / Advanced Protein Technology (6/7) / Computational Statistics (7/7)

Peking University, Beijing, China

B.S., Physics

2011 – 2015

- Major GPA: 86/100
- Graduate Thesis: 94/100
- Core courses: *Topics on Nonlinear Physics (84), *System and Computational Neuroscience (86), *Introduction to Biophysics (87.7), *Quantum Mechanics(II), *Quantum Theory of Many-Body Systems (93), *Group Theory, Method of Mathematical Physics (89), Thermodynamics and Statistics (86), Numerical Methods (81), Fundamentals of Electronic Circuits and Experiments (89). (* Graduate course)

RESEARCH EXPERIENCE

Master Research Project, Using Machine learning algorithm in Nanopore Basecalling

2016.12 – Present

Advisor: Prof. Lachlan Coin, Institute for Molecular Bioscience, University of Queensland

- Build a deep learning-based basecaller *Chiron* using Tensorflow, for Oxford Nanopore sequencer basecalling, achieved state-of-art performance.
Program page: <https://github.com/haotianteng/Chiron>
- Prepared training dataset of DNA and RNA Nanopore basecalling reads, using Nanoraw and graphmap to label the data.
- Constructed pipeline in Google Cloud and Google Compute engine for end-to-end genome analysis.

Internship and Winter Scholar, The development of spontaneous neural activity in the zebrafish

2016.3 – 2016.7

Advisor: Prof. Geoffrey Goodhill, Queensland Brain Institute, University of Queensland

- Built a pipeline for laboratory automation and data analysis in Zebrafish neuron experiment with Aduino, LabVIEW and MATLAB.
- Constructed PHANTOM toolbox for projecting visual stimulation with conformal transformation to correctly presented image on a convex surface with Psychtoolbox-3 in MATLAB, used for zebrafish tectum research. Program page in Github: <https://github.com/haotianteng/PHANTOM-toolbox>
- Numerical simulated the spontaneous activity using I&F model in zebrafish tectum.
- Developed algorithm for functional connectivity reconstruction using regularization method under scale free assumption, correct the false positive correlation due to common input, transition connection and latent common input.

Internship, Feedback in AIY neurons in Thermotaxis behavior of C.elegans

2015.7-2015.12

Advisor: Prof. Aravinthan D.T. Samuel, Center for Brain Science, Harvard University, Boston

- Studied thermotaxis in C.elegans with tracking and multi-neuron fluorescent marked. Mainly focus on the AFD neuron and the downstream AIY, RIM neurons.
- Cross & keep the worm, experiment using a spinning disk confocal microscope and the afterwards data acquisition & processing with combination of ImageJ (Miji) and Matlab
- Testified and confirmed the derivation dependence between AFD neuron and temperature, designed and conducted the experiment to measure the parameters of the AFD-temperature relationship with temperature signal input under different shape.

Research Assistant, Locomotion and PH sensing mechanism in C.elegans & fast reaction tracking System development

2012.7-2015.6

Advisor: Dr. Louis Tao, Center for Bioinformatics, Peking University, Beijing

- Marked GCaMP6 into the C.elegans ASH, AWC, ASE neurons to testify and determine the neuron responsible for PH sensing.
- Developed a neuro-muscle model of C.elegans motor system and proved the theoretical prediction of gait adaptation in C.elegans.
- Recorded and analyzed long-term locomotion parameter of C.elegans by using a tracking and photographing system.
- Developed a visualization tools with OpenGL to describe and simplify the neuron network in C.elegans, and enabled the tools to search the whole neural pathway through any two given neurons.
- Built a tracking system as one of the contributors, which could realize high-precision (accuracy below 1 micron) tracking and photographing and simultaneous data collection & processing

- Developed a high-robust and high-precision algorithm using in *C.elegans* center line extraction with an improved “snake” model.

Internship, Micro-fluid chip preparation for *C.elegans* PH sensing experiment

2014.3-2014.10

Advisor: Prof. Huang Yanyi, Biodynamics Optical Imaging Center, Peking University

- Designed, fabricated and tested a micro-fluid chip for fast generating stable linear gradient field.
- Designed, fabricated and tested a micro-fluid chip to achieve temporal change separately in 6 rooms, realizing record the temporal responses of *C.elegans* 6 worms at the same time
- Developed a Computational Fluid Dynamics (CFD) module for the micro fluid chips fluid field calculation in Fluent, which could draw the flow field from the CAD design sketch.

PUBLICATIONS

- **H.Teng**, M. Cao, M.B. Hall, T. Duarte, S. Wang, L. Coin. “Chiron: Translating nanopore raw signal directly into nucleotide sequence using deep learning.” *PLOS computational biology* (Submitted)
- A. Day, D. Benson, M.B. Hall, **H. Teng**, P. Kaul, S.H. Nguyen, T. Duarte, M. Cao, L. Coin. “Steraming infection intervention using Nanopores, Deep Learning, and Cloud Computing”, *Genome Informatics meeting, Cold Spring Harbor Laboratory* (Submitted)
- L. Avitan, Z. Pujic, J. Mölter, M. Van De Poll, B. Sun, **H. Teng**, R. Amor, E.K. Scott and G.J. Goodhill. “Spontaneous Activity in the Zebrafish Tectum Reorganizes over Development and Is Influenced by Visual Experience.” *Current Biology*, 27(16), pp.2407-2419. 2017. (IF: 8.851)
- **H. Teng**. “A neuron-muscle circuit model of *C.elegans*’s locomotion.” *Bachelor of Science Thesis: Peking University*, 2015

HONORS AND AWARDS

- The 1st Prize at 27th Chinese Physics Olympiad, Zhejiang Province (rank 1/1232 in theory part) 2011
- The Silver Medal at 27th Chinese Physics Olympiad, Finals 2011
- The 1st Prize at 29th Parts of the National College Students Physics Competition 2012

ACTIVITIES

Workshop in Concepts in Bioinformatics, University of Queensland, Queensland, Group Leader

Feb 2016 –July 2012

- Led a team of 5 members in python programming for sequence analysis and phylogenetic analysis.
- Constructed phylogenetic tree and determined the protein family based on UPGMA, reconstructed ancestral protein sequences based on ASR methods and evolutionary models.
- Given a new protein weighting matrix constructed based on DNA codons and a modified Sankoff algorithm of ASR.

Final project contest in Methods of Mathematical Physics, Beijing, Group Leader

Oct 2012 – Jan 2013

- Led a team of 5 members to do numerical simulation and theoretical analysis of energy level in hydrogen atom.
- Calculated the asymptotic behavior of radial equation (confluent hypergeometric equation) and verified it with the numerical simulation.
- Derived the analytical solutioun of the confluent hypergeometric which truncated by certain quantum number
- Studied the ionization state, calculated asymptotic behavior and the phase shifting analytic expression.

SKILLS

- Experiment skill: Molecular cloning, Microinjection
- Programming: Python, C, C++, Matlab, R, Linux, LaTeX,
- Packages&Platforms: Tensorflow, MXNet, Caffe, CUDA, cuDNN, OpenGL, BWA, SAMtools, Velvet, DIAMOND, BLAST+, Minimap2, H5py, Psychtoolbox, LabVIEW, Arduino.
- Software: PyMOL, Fluent(ANSYS), Origin, AutoCAD, Primer Premier, DNA Man, Microsoft Office,
- Language: Chinese(Mother Language), English(Fluent), Spanish(basic), German (basic)
- TOEFL: Cumulative 103 (R 29, L 29, S 23, W 22); GRE: V 150, Q 169, AW 3.0
- Proficient in Piano playing, accomplished the Piano highest-grade (grade 10) in 2005, learned since 6 years old. Skillful in saxophone.