

# ZIYI GONG

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## EDUCATION

**University of Pittsburgh**

**2017 - 2021**

**Bachelor of Science in Computer Science, Minor in Neuroscience and Mathematics**

Cumulative GPA: 3.946 / 4.000; Major GPA: 3.984 / 4.000

## TECHNICAL SKILLS

**Machine Learning & Analysis:** deep neural networks, Bayesian inference and Bayesian network, reinforcement learning, GLM, HMM, Non-ANN-based clustering and classification algorithms, spike sorting, descriptive and inferential statistics, frequency analysis, phase plane analysis, etc.

**Computational Neuroscience:** neuron models (LIF/NLIF, Hodgkin-Huxley model, SRM, GLM), networks (SNN, RNN such as Wilson-Cowan model, Hopfield network and CANN), learning (Hebbian, BCM, STDP, etc.), neural encoding

**Programming:** Python (Scipy, Pandas, Pytorch, etc.), C/C++, Matlab, R, Java, HTML & CSS, Debian

## RESEARCH EXPERIENCES

**Independent Research / CS Major Capstone**

**2019/09 - 2020/12**

Advisor: Dr. Paul Munro

University of Pittsburgh

Modeling the Evolution of Retina Neural Network

- Proposed a way to encode biophysical retina network structure and dynamics, and adapted the genetic algorithm to simulate the evolution of retina neural networks
- Discussed the potential impacts to evolutionary AI

**Independent Research**

**2019/09 - 2020/07**

Advisor: Dr. Nathan Urban

Urban Lab, University of Pittsburgh

Analyzing and Modeling Mouse Trajectories during Olfactory Navigation

- Applied exploratory data analysis to real mouse trajectories, and attempted to apply multi-order HMM to elucidate the decisions underlying the trajectories
- Proposed and implemented a model combining decision tree and infotaxis

**Independent Research**

**2019/04 - 2020/03**

Advisor: Dr. Bradly Alicea

Orthogonal Research and Education Lab

Modeling Neural Plasticity with Multisensory Braitenberg Vehicle

- Proposed and constructed a Hebbian Braitenberg vehicle that associates stimuli of one sense with the “preference” of another sense in a virtual two-sensory environment
- Implemented Li-Hopfield network and Hebbian associative memory network

**Summer Research Fellowship**

**2018/05 - 2018/08**

Advisors: Dr. Yanhua Huang and Dr. Yao Wang

Huang Lab, University of Pittsburgh

Developing Optogenetic Tools for Studying Sleep-mediated Reward Processing

- Constructed Cre-dependent luciferase and channelrhodopsin, and learned to do patch clamp
- Led journal discussions, participated in weekly observational clinical trainings at UPMC

## PREPRINTS & PUBLICATION

**Gong, Z., Munro, P. (2020).** Modeling the Evolution of Retina Neural Network. *In submission*.  
Preprint available at *arXiv preprint*. arXiv:2011.12448.

Dvoretzskii, S., **Gong, Z.**, Gupta, A., Parent, J., and Alicea, B. (2020). Braitenberg Vehicles as Developmental Neurosimulation. *arXiv preprint*. arXiv:2003.07689.

Alicea, B., Dvoretzskii, S., Felder, S., **Gong, Z.**, Gupta, A., and Parent, J. (2020). Developmental Embodied Agents as Meta-brain Models. *DevoNN Workshop, Artificial Life 2020*.

## **SELECTED CLASS PROJECTS**

### **Reconstruction of Visual Patterns From V4 Firing and Local Field Potentials**

Course Instructors: Dr. Aaron Batista and Dr. Bistra Iordanova

Wrote detailed mock NIH grant for my proposal on applying generative adversarial network to reconstruct seen visual patterns from macaques' V4 spiking activities and local field potentials

### **Generative Model for Visual Storytelling with Stick Figures**

Course Instructor: Dr. Adriana Kovashka

Proposed and implemented a stacked generative adversarial network to randomly create series of moving stick figures that tell stories via their bodily interactions

## **HONORS**

- Center for Translational Mental Health Research (CTMHR) Summer Research Fellowship 2018
- Dean's List (all semesters)

## **OTHER ACTIVITIES**

### **Peer Tutor, Pitt CUSA**

**2018/08 - 2020/08**

Volunteered to assist Chinese freshmen in adapting to campus life, getting used to university policies, and making course plans

### **Scientific Writer (Chinese), ibrain-talk**

**2019/05 - 2019/07**

Wrote for non-professional Chinese readers 2 introductions of recent interesting papers published on neuroscience-related journals, and a detailed historical review on phrenology