Amirreza Bahramani

+98 9128509635 | bahramani.github.io
bahramani77@gmail.com | bahramani@ipm.ir
linkedin.com/in/amirreza-bahramani | github.com/bahramani

Education

Master of Science | ***Electrical Engineering, Micro and Nanoelectronics Devices*** Sep. 2022 – Present
Sharif University of Technology, GPA: 15.76/20 Tehran, Iran

- **Thesis**: Vocal Perception in Zebra Finches: Analysis of Measured Neural Responses to Variety of Auditory Stimuli Using Neural Probe
- **Supervisors**: Dr. Ali Ghazizadeh and Dr. Mehdi Fardmanesh

Bachelor of Science | ***Electrical Engineering*** Sep. 2017 – Feb. 2022
K. N. Toosi University of Technology, GPA: 15.54/20 Tehran, Iran

- **Thesis**: Design and Implementation of a Fully-Digital Neuromorphic Processor (Link)
- **Supervisor**: Dr. Amir M. Sodagar

Work Experience

Resident Researcher Sep. 2022 – Present
Birds Lab, School of Cognitive Sciences, Institute for Research in Fundamental Sciences (IPM) Tehran, Iran

- **Neuroscience**; Trying to investigate the neural mechanism of vocal communication in zebra finches through electrophysiology and behavioral experiments.
- **Electrophysiology**; Performing surgery on zebra finches in order to record single-unit and LFP activity.
- **Data Analysis**; Using different techniques to analyze spiking data and LFP, obtained from zebra finches.

Research Assistant Feb. 2022 – Sep. 2022
Birds Lab, School of Cognitive Sciences, Institute for Research in Fundamental Sciences (IPM) Tehran, Iran

- Setting up a single-unit recording system in zebra finches for the first Birds Lab in Iran.
- Training for performing avian surgery needed for neural data acquisition.
- Implementing costume software for online spike detection and processing using MATLAB.

Internship Jul. 2021 – Feb. 2022
Research Laboratory for Integrated Circuits and Systems (ICAS), K. N. Toosi University of Technology Tehran, Iran

- Utilizing Spiking Neural Networks in Python for English handwritten digit recognition.

Research Interests

- Systems Neuroscience
- Neuroethology of Songbirds
- Neurobiology of Learning & Memory
- Computational Neuroscience
- Neurobiology of Vocal Communication
- Neurobiology of Decision-Making

Publications

*: Equal contribution

Safarcharati, Z.*, **Bahramani, A.***, Amjad, P. M., Ravanbakhsh, M., Raoufy, M. R., & Khademian, M. (2024). *Context-Dependent Modulations in Acoustic Features of Zebra Finch Distance Calls: Insights from a Novel Goal-Directed Vocalization Paradigm* (p. 2024.09.24.614738). bioRxiv. https://doi.org/10.1101/2024.09.24.614738 (Poster of this work)

Abolghasemi, M.-M., Shirsavar, S. R., **Bahramani, A.**, & Yekani, M. (2024). *An affordable solution for investigating zebra finch intracranial electroencephalography (iEEG) signals* (p. 2024.08.29.610238). bioRxiv. https://doi.org/10.1101/2024.08.29.610238 (protocols.io)

Naghdabadi, Z. & **Bahramani, A.** (2024). Simultaneous representation of decision variable and saccade direction in the parietal cortex. Preprint.

Irandoost, A., Mohajeri, R., **Bahramani, A.**, Ghazizadeh, A., & Fardmanesh, M. (2023). Fabrication of a Low-cost Multi-electrode Neural Probe for Brain Signal Recording. *2023 30th National and 8th International Iranian Conference on Biomedical Engineering (ICBME)*, 47–51. https://doi.org/10.1109/ICBME61513.2023.10488585

Skills

Languages: Persian (Native), English (TOEFL iBT: 111/120 (R: 29, L: 30, S: 25, W: 27))
Wet Lab Skills: Electrophysiology, Stereotaxic Surgery
Programming: MATLAB, Python, R, C++
Software Packages: Plexon Offline Sorter, Scikit-learn, TensorFlow, PyTorch, EEGLAB, Brainstorm, Brian2
Simulators: PSpise, HSpice, Proteus
Hardware Description Languages (HDL): VHDL, Verilog
Document Creation: Microsoft Office Suite, LaTeX

Teaching Experience

MATLAB Teaching Assistant — *Tehran University of Medical Science*
TA for a hands-on and comprehensive MATLAB course — Oct. 2024 – Present
- Biomedical signal processing with MATLAB by Dr. Mohammad Reza Raoufy

Teaching Assistant — *Sharif University of Technology*
Teaching assistant for neuroscience courses during my master's
- Fundamentals of Neuroscience by Dr. Reza Ebrahimpour (Oct. 2024 – Present)
- Learning in Brain and Machines 1 by Dr. Reza Ebrahimpour (Oct. 2024 – Present)

Computational Neuroscience Teaching Assistant — *Neuromatch Academy*
TA at NMA CN course (Link to Materials, Certification Link) — July 2024

Neuroscience Teacher — *IPM, Sharif University*
Teaching *Principles of Neural Science 6th ed.* Parts: 1, 4, 5, 8 — 4 times in 2023 & 2024

Neuroscience Teacher
Teaching fundamentals of systems neuroscience to students. (Link to Materials) — Oct. 2023 – May 2024

Teaching Assistant — *K. N. Toosi University of Technology*
Teaching Assistant for various engineering courses during my bachelor's
- Electronics 2 by Dr. Hesam Zandi (Sep. 2021 – Jan. 2022)
- Digital Systems 1 by Dr. Hesam Zandi (Feb. 2021 – Jul. 2021)
- Electronics 1 by Dr. Hesam Zandi (Sep. 2020 – Feb. 2021)
- Electric Circuits 1 by Dr. Ali A. Razi-Kazemi (Feb. 2020 – Jul. 2020)

Talks & Presentations

The Neuroethology of Songbirds — *In many different meetings*
In Persian (Link) — 2024

Why to Study Songbirds as a Model for Vocal Communication? — *IBRO 2024*
In English — 14th May 2024

Introduction to Neuromorphic Computing — *K. N. Toosi University of Technology*
In Persian (Link) — 7th December 2021

Honors and Awards

Best Poster Award at IPM 2024 Retreat (Daneshast) — Aug. 2024
Selected as the best poster which was based on my research. — Download Here

Best Poster Award at Sharif University, School of Electrical Engineering — Jan. 2024
Selected as one of the four best posters based on my master's thesis. — Download Here

Best Paper Award at Iranian Conference on Biomedical Engineering (ICBME 2023) Dec. 2023
For the "*Fabrication of a Low-Cost Multi-Electrode Neural Probe for Brain Signal Recording*" paper. Link to Paper

Iranian Graduate National Entrance Exam in Electrical Engineering Summer 2022
Ranked 115 among 10k participants.

Best Internship Award at K. N. Toosi University of Technology Dec. 2021
My internship was at ICAS lab, on neuromorphic computing which led to my bachelor's thesis.

Iranian Undergraduate National Entrance Exam in Math and Physics (Konkour) Summer 2017
Among 1% top students in total of 150k participants.

Selected Projects (Excluding Published Work)

Vocal Perception of Distance Calls in Natural and Artificial Auditory Scenes (Poster) 2024
Birds Lab, IPM Running

- In this project, I am investigating the impact of environmental noise on vocal communication dynamics through distance calls. The project encompasses both electrophysiology and behavioral studies.

Surgery Protocol for Acute Recording in Anesthetized Zebra Finches | ***Protocol*** Winter 2023
Birds Lab, IPM Protocol Link

- Detailed protocol needed for the surgery of anesthetized zebra finches to record neural activity.

Analysis of Neural Data from Songbird Auditory Regions | ***MATLAB*** Summer 2023
Birds Lab, IPM GitHub Link

- I developed the needed codes for the analysis of spiking and LFP data recorded from zebra finch auditory areas, all from scratch.

Stimulus Presentation Effect on Neural Variability | ***MATLAB*** Spring 2023
Advanced Topics in Neuroscience Course, Sharif University GitHub Link

- As the final project of this course, I investigated the effect of stimulus presentation on neural variability in different datasets.

Course Projects in Systems Neuroscience | ***MATLAB*** Winter & Spring 2023
Advanced Topics in Neuroscience Course, Sharif University

- Visual Modeling and Sparse Representation
- Modeling Evidence Accumulation
- LFP Analysis and Traveling Wave (GitHub Link)
- Analysis of Area 7a Population Response (GitHub Link)
- Modeling the Irregularity of Neuronal Activity (GitHub Link)

Online Spike Detector Software for Neural Recording | ***MATLAB*** Summer 2022
Birds Lab, IPM GitHub Link

- I developed an online system for processing the raw electrophysiology data; from filtering to spike detection, PSTH, and LFP spectrogram.

Developing a multi-channel wireless neural recording system Summer & Fall 2022
IPM & AUT GitHub Link

- I contributed to developing a lightweight neural recording system designed for wireless single-unit recording of behaving zebra finches. My role involved creating software for real-time data reception and analysis, as well as validating the system's performance on these birds.

Solving MNIST Task Using Spiking Neural Networks | ***Python*** Jan. 2022
Bachelor's Thesis, KNTU

- Implementing SNN using *Brian2* to solve MNIST task based on Diehl & Cook, 2015

Selected Courses

Neuroscience *NMA, Sharif, IPM, KNTU*

Completed various neuroscience courses, ranging from introductory to advanced levels.

- Computational Neuroscience Summer School by *Neuromatch Academy* (Certification Link)
- Advanced Topics in Neuroscience by *Dr. Ali Ghazizdeh*
- Principle of Experiment Design and Analysis by *Dr. Jamal Amani Rad*
- Computational and Systems Neuroscience School by *Many Instructors* (9-month comprehensive course)
- A Comprehensive Course of fMRI in Cognitive Neuroscience by *Dr. Reza Rajimehr*
- Neurobiology of Decision-Making by *Dr. Mehdi Sanayei*
- Attention: From Psychology to Neurobiology by *Dr. Mehdi Sanayei*
- Neurophysiology and Neuroanatomy by *Dr. Mehdi Sanayei*
- Functional Brain Imaging Systems by *Dr. Ali Khadem*
- EEG Signal Recording and Signal Processing by *Ali Motie Nasrabadi* at NBML

Machine Learning *NMA, KNTU*

Completed different advanced ML courses.

- Deep Learning Summer School by *Neuromatch Academy* (Certification Link)
- Statistical Pattern Recognition by *Dr. Hamid Abrishami Moghadd*
- Principles of Intelligent Systems by *Dr. Mahdi Aliyari-Shoorehdeli*

Physics & Electronics *KNTU, Sharif*

Completed various physics and electronics courses, ranging from introductory to advanced levels.

- Electronics 1 by *Dr. Hesam Zandi*
- Electronics 2 by *Dr. Ebrahim Nadimi*
- Electronics 3 by *Dr. Amir M. Sodagar*
- Implantable Biomedical Microsystems by *Dr. Amir M. Sodagar*(Course Description)
- Pulse Techniques in Circuits by *Dr. Hossein Shamsi*
- Communication Circuits by *Dr. Arash Ahmadi*
- Fabrication of Solid-State Devices by *Dr. Bizhan Rashidian*
- Advanced Solid-State Devices by *Dr. Bizhan Rashidian*
- Advanced Solid-State Physics by *Dr. Reza Sarvari*
- Applied Quantum Mechanics by *Dr. Behzad Rajaei Salmasi*

References

Ali Ghazizadeh, PhD (My MSc Supervisor)
Scholar in Residence at Shadlen Lab, Columbia University
Associate Professor at the Department of Electrical Engineering, Sharif University
Former Director at IPM School of Cognitive Sciences (2019-2023)
Links: Google Scholar, Lab Website
Email: alieghazizadeh@gmail.com

Mehdi Fardmanesh, PhD (My MSc Supervisor)
Full Professor at the Department of Electrical Engineering, Sharif University
Links: Google Scholar, Lab Website
Email: fardmanesh@sharif.edu

Amir M. Sodagar, PhD (My BSc Supervisor)
Associate Professor at the Department of Electrical Engineering, K. N. Toosi University of Technology
Associate Professor at the Department of Electrical Engineering, Lassonde School of Engineering, York University
Links: Google Scholar
Email: amsodagar@gmail.com

Mohammad Reza Raoufy, MD, PhD (PI at IPM Birds Lab)
Associate Professor at Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University
Links: Google Scholar, Lab Website
Email: raoufy.mreza@gmail.com

Mahdi Khademian, PhD (Founder and Former PI at IPM Birds Lab)
Former Postdoc at IPM School of Cognitive Sciences
Links: Lab Website
Email: mm.khademian@gmail.com