Ahmad Abdal Qader

Personal Information

Ahmad Abdal Qader
Georgia Institute of Technology & Emory University - Atlanta, GA
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Education

Georgia Institute of Technology & Emory University — *Atlanta, GA*
PhD in Biomedical Engineering - Computational Neural Engineering — *Aug 2022 - Present*
Jointly advised by Dr. Chethan Pandarinath and Dr. Ellen Hess

University of Rochester — *Rochester, NY*
BS in Biomedical Engineering - Signals And Systems — *Aug 2018 - May 2022*

Research Experience

Graduate Researcher, Emory University — *Aug 2022 - Present*

- **An application of MoSeq for discovering motor disorder therapeutics:** Our goal was to leverage the capacity of an unsupervised, sub-second, state-of-the-art behavioral segmentation pipeline to a genetic mouse model of dystonia to evaluate causal links between pathology and exhibited behavior, and assess the efficacy of potential therapeutics. I built the tracking system guided by published literature, designed the experiments, processed large-scale recordings, and trained complex machine learning models. Manuscript is currently in progress.
- **Uncovering neural dynamics underpinning motor disorders in the striatum:** The goal of this project was to apply and adapt computation-through-dynamics models to the firing statistics of striatal projection neurons to uncover neural activity patterns underpinning motor disorders mediated by the basal ganglia, such as dystonia and Parkinson's Disease. I developed preprocessing pipelines to handle proprietary data and applied state-of-the-art source extraction algorithms to isolate low signal-to-noise ratio transient signals from large-scale calcium imaging recordings. As part of the project, I created a simulation module for one-photon calcium imaging recordings with customizable parameters, enabling controlled testing and analysis.

Research Assistant University of Rochester — *May 2021 - May 2022*
Advised by Dr. Krishnan Padmanabhan

- **Spatially dynamic source extraction of transient signals:** I Implemented dynamic segmentation algorithms to extract spatially-varying transient signals from fluorescence microscopy recordings tracking the activity of morphing cells. I built in-house tools for data acquisition and analysis with presets that improved efficiency and usability. On the experimental side, cultured and maintained multiple human step cell lines, performed viral transfections, conducted imaging experiments.

Research Assistant University of Rochester — *Jun 2020 - Aug 2020*
Advised by Dr. Kenneth Henry

- **Signatures of hidden hearing loss:** I was tasked with improving the existing experimental apparatus accuracy at delivering reward during behavioral conditioning experiments. I built analog signal conditioning circuits to detect and report positive-reinforcement reward delivery, and designed 3D printed parts that enhanced the functionality of the apparatus. I also conducted all of the behavioral conditioning experiments on avian models of hidden hearing loss.

Teaching Experience

Biomechanics, Georgia Institute of Technology — *Fall 2023 & Spring 2024*

- Led the Problem Solving Studio section for 50 undergraduate students, facilitating collaborative learning in groups of 4-5.
- Introduced complex biomechanics problems, provided real-time guidance, and conducted solution reviews to reinforce key concepts.
- Designed and implemented grading rubrics for exams and quizzes, ensuring consistency in evaluation. Graded and proctored exams and quizzes
- Supervised and coordinated undergraduate teaching assistants responsible for grading quizzes, providing oversight and quality control.

Conferences Attended

- BrainGate Annual Summit, *Atlanta* — *Aug 2023*
- Simons Foundation Anunal Workshop On Calcium And Voltage Analysis, *NYC* — *Feb 2023*
- CRCNS Collaborative Research in Computational Neuroscience Meeting, *Atlanta* — *Oct 2022*
- Simons-Emory International Consortium on Motor Control, *Atlanta* — *Oct 2022*

Awards

Computational Neural Engineering Training Program Scholar *Aug 2022*
Selected as a T32 training grant scholar.

UWC Davis Scholar *Aug 2018*
As a Davis Scholar, received an $80,000 award to cover my tuition at the U of R.

International Baccalaureate Scholarship *Aug 2018*
Received a $40,000 scholarship for outstanding performance in the IB Diploma.

Aurora 100Lives Gratitude Scholarship *May 2016*
Received $70,000 award to attend United World College Dilijan in Armenia.

Work Experience

AS&E Information Technology Center *Rochester, NY*

- **IT Lead and Training Coordinator** *Aug 2019 - May 2022*
  Supervised, mentored, and trained a team of student IT workers, ensuring efficient daily operations and knowledge transfer through modular training materials. Managed team schedules, ensuring adequate coverage and effective time management. Worked closely with management to plan and execute the transition to remote operations during the COVID-19 pandemic. Maintained oversight of complex technical tickets and provided advanced troubleshooting support as needed.
- **Operations and End-User Support Consultant** *Aug 2018 - Aug 2019*
  Managed and resolved complex IT support tickets and coordinated ongoing projects using Jira. Diagnosed and repaired hardware and software issues across university, faculty, and student devices. Supported the maintenance and troubleshooting of the wired network infrastructure.

Course Projects

- **Biologically-inspired simulation of non-linear functional neuronal systems:** Simulated 5D Hodgkin-Huxley conductance models in MATLAB using Rinzel's parameter approximations to model coincidence-detector neurons in the MSO.
- **Wearable cervical spine tracker:** As a part of my capstone project, designed and built a wearable device that tracks and stores user's scapular posture, adapt to their baseline posture, detect prolonged periods of poor posture, and notify user using haptic feedback and provide insights via a smartphone interface
- **Kinematic Analysis of simulated sports collisions:** Analyzed kinematic data from a human test dummy during simulated collisions, comparing conditions with and without a football helmet to assess potential risk factors for neck injuries.

Skills

- **Concepts:** deep learning, unsupervised & self-supervised learning, computer vision & segmentation, various neural recording modalities, experimental design.
- **Data modalities:** time series, images, point clouds.
- **Packages:** tensorflow, pytorch, wandb, numpy, pandas, matplotlib, jupyter, scipy, scikit-learn.
- **Hardware** circuit design, real-time data acquisition, microcontrollers.
- **Soft skills:** growth mindset, communication, critical thinking, leadership, mentorship, emotional intelligence.