

Alisha Kodibagkar

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EDUCATION

Johns Hopkins University

Master of Science in Engineering (M.S.E), **Biomedical Engineering**
Computational Medicine Focus Area, Graduate GPA: 4.0

Baltimore, Maryland
August 2020 - May 2021

Johns Hopkins University

Bachelor of Science (B.S.), **Biomedical Engineering**
Computational Medicine Focus Area, Undergraduate GPA: 3.54, Graduated with Honors

Baltimore, Maryland
August 2017 - May 2021

SKILLS

Programming Languages: Python, Matlab, Java, JavaScript, Objective-C, HTML

Neuroimaging Analysis: resting state fMRI connectivity analysis (in Matlab), task fMRI-based analysis (in Python)

Working with Neural Data Formats: fMRI, graph representations of axonal arbors

Software Development: Open-source Python package development (version control, documentation, unit testing (pytest), object-oriented programming), iOS development, shell scripting (bash), high performance computing clusters, database management (Firestore), cloud services (AWS, Azure), containers, machine learning and deep learning (pytorch)

Bioengineering Experimental Design: Needs screening, concept generation/selection, validation study and pilot study design, project design for low-resource settings

Wetlab and Animal: Cell culture, gel electrophoresis, synthesis of polymers, nanoparticle synthesis, handling of mice, handling of marmosets, marmoset psychophysical experiments, immunohistochemistry

Writing: online article publication, manuscript preparation

Other: Project foundation and management, cross-institutional and global collaboration, collaboration between clinicians and engineers, presentation (conference, to key project stakeholders, in-lab), research subject recruitment

RESEARCH EXPERIENCE

Senseable Intelligence Group | McGovern Institute of Brain Research at MIT

April 2022 – Present

Technical Associate | Principal Investigator: Dr. Satrajit Ghosh

- *Mumble Melody* | Primary Project Collaborator: Dr. Rébecca Kleinberger
 - Project management and organization for Mumble Melody, a project between the MIT McGovern Institute and Media Lab to increase fluency for people who stutter (PWS) using altered auditory feedback (AAF).
 - iOS development using Objective-C of a phone-based application implementing AAF.
 - Setting up lab outreach to recruit subjects for preliminary study to gather user feedback and usage data for app.
 - Launching application on the App Store; achieved 100 downloads.
 - Data analysis from subject app usage data stored in online database. Creation of auto-updating online dashboard to display information from app users.
 - Design and implementation of a month-long consented targeted longitudinal experiment to examine the effect of AAF for PWS in an ecological setting.
 - Interaction with and presentation to project catalysts.
 - Conducting a literature review on uses of auditory feedback, and a research proposal on using AAF to investigate the neural basis of sensory feedback in speech using behavioral, neuroimaging, and neurocomputational methods.
- *Neuroimaging Study of Medical Marijuana Card Use* | Primary Project Collaborator: Dr. Jodi Gilman
 - Performing functional and structural MRI analysis to understand the impact of medical marijuana card ownership on brain structure and function for subjects with pain, anxiety, and insomnia. Performed preliminary search on cannabis-related fMRI studies, and development of analysis stages with lab members.
- *Automated Stuttering Disfluency Detection*
 - Individual research project on automated detection of stuttering disfluencies.
- *Voice as a Biomarker of Health*
 - Involvement in an NIH based research project (bridge2ai) on data acquisition for voice as a biomarker of health.
- Auditing courses
 - HST.583 – Functional Magnetic Resonance Imaging: Data Acquisition and Analysis
 - SHBT.200 – Introduction to Sound, Speech, and Hearing

Computational Neuroscience Lab | Boston Children's Hospital/Harvard Medical School

June 2021 – Feb 2022

Research Assistant II, Adolescent Medicine | Principal Investigator: Dr. Caterina Stamoulis

- *Next-Generation-Neural-Data-Analysis* (NGNDA)
 - Writing MATLAB code to contribute to fMRI analysis portion of NGNDA, a novel computational infrastructure for massive analyses of high-dimensional brain networks and next-generation neuroscience research. Developing and implementing mathematical and statistical methods to preprocess, denoise, and calculate network connectivity for resting state fMRI brain data from the *Human Connectome Project – Aging* study and the *Adolescent Brain Cognitive Development (ABCD)* study. Literature search on fMRI and EEG analysis. Contributed to development of manuscript in progress on NGNDA for publication.

Neuro Data Lab | Johns Hopkins Univ.**June 2020 – June 2021**

Research Intern | Principal Investigator: Dr. Joshua Vogelstein

- *Classification of Axon Collaterals*
 - Developed experimental design and created Python scripts to study axon geometry in individual neuron traces from whole mouse brain images, for semester-long independent research study. Analyzed how well manually traced axon trajectories can be predicted based on branch angles. 95.75% accuracy for predicting branch trajectory between main and collateral axons, and 82.42% accuracy for predicting branch trajectory of collateral branch pathways. Prepared poster on results.
- *Software Development: Open-source Python Package*
 - Developed Python code integral to neuron trace analysis for Github repository of Brainlit, a computational neuroscience project focused on analysis of whole mouse brain images, for year-long research project.
- *Neuron Segmentation Algorithms*
 - Analyzed applying of state-of-the-art neuron segmentation algorithm separating neuron clusters into individual neurons to Mouselight dataset, a light microscopy dataset.

Center for Nanomedicine (CNM) | Johns Hopkins Univ.**May 2019 – March 2020**

Research Intern | Principal Investigator: Dr. Jung Soo Suk

- Designed, synthesized, and tested bioreducible cationic polymers to increase the effectiveness of non-viral gene delivery to the brain via DNA nanoparticles for the treatment of high-grade gliomas. Coauthored for manuscript in progress for submission.

Laboratory of Auditory Neurophysiology | Johns Hopkins Univ.**September 2018 – January 2019**

Research Intern | Principal Investigator: Dr. Xiaoqin Wang

- Worked on design of an experimental platform to study marmoset auditory behavior and perception. Gained training on handling of marmosets. Collaborated with Columbia Univ. to understand implementation of method in other labs.

Center for Imaging Science (CIS) | Johns Hopkins Univ.**May 2018 – July 2018**

Research Intern | Principal Investigator: Dr. Tilak Ratnanather

- Built a computational atlas of the cat brain using 3D image reconstruction for research on deafness.

MAIN BIOENGINEERING RESEARCH PROJECTS**Neonatal & Maternal Health Radar | Biomedical Design Project****May 2020 – Present**

Founder & Leader | Faculty Mentors: Dr. Eileen Haase, Dr. Samson Jarso, and Shababa Matin

- Lead an international biomedical collaboration between Johns Hopkins and the Mbarara University of Science and Technology to develop a phone-based system to send health education messages to pregnant mothers in rural Ugandan communities. Contributed to preparation of poster on methods and literature review of mHealth based solutions for neonatal and maternal health in Africa.
- Playing an advising role to research members conducting a pilot study to deploy technological solution for postnatal care in Mbarara, Uganda.

Coma Predictor | Precision Care Medicine Project**August 2020 – June 2021**

Team Member | Medical PI: Dr. Robert Stevens, Engineering PIs: Dr. Raimond Winslow, Dr. Joseph Greenstein

- Applied machine learning techniques on ICU patient physiological data to predict coma onset and emergence. Contributed to preparation of manuscript, abstract, and poster on results.

TinnitX | Biomedical Design Project**March 2019 – May 2020**

Design Team Engineer | Faculty Mentor: Shababa Matin, Medical PIs: Dr. Ferdinand Hui, Dr. John Carey, Dr. Daniel Sun

- Collaborated with numerous clinicians in the Johns Hopkins Hospital and Center for Bioengineering Innovation and Design to develop a non-invasive device that can be used to aid in diagnosis of pulsatile tinnitus (PT).
- Finalist to participate in TCU Values and Venture Competition 2020 (Cancelled).

TEACHING EXPERIENCE**Biomedical Engineering Department Teaching Assistant and Grader****October 2019 – December 2020**

- Data Science Lab | Professor: Dr. Kwame Kutten | Teaching Assistant (August - October 2020) | 10h/week
- Computational Cardiology Lab | Professor: Dr. Eileen Haase | Teaching Assistant (October – December 2020) | 10h/week
- Linear Signals and Systems | Professor: Dr. Michael Miller | Grader (October – December 2019) | 5h/week

RELEVANT COURSEWORK

- *Neuroscience: Basic, Computational, and Engineering*
 - PSYC.200.141 - Foundations of Brain, Behavior, and Cognition | Institution: Johns Hopkins University | Grade: A
 - NEUR.080.305 - Neuroscience: Cellular and Systems I | Institution: Johns Hopkins University | Grade: B
 - BMED.580.424 - Neuroengineering Lab | Institution: Johns Hopkins University | Grade: A
 - BMED.580.439 - Models of the Neuron | Institution: Johns Hopkins University | Grade: Pass (COVID Pass/Fail scale)
 - BMED.580.697 - Neuro Data Design I | Institution: Johns Hopkins University | Grade: A
 - BMED.580.638 - Neuro Data Design II | Institution: Johns Hopkins University | Grade: A

- **Neuroimaging**
 - Open Online Course: Center for Brain, Minds, and Machines - FMRI Bootcamp, A two day workshop presented by Rebecca Saxe | Institution: Massachusetts Institute of Technology | Online Audit (Asynchronous)
 - HST.583 - Functional Magnetic Resonance Imaging: Data Acquisition and Analysis | Institution: Massachusetts Institute of Technology | Audit
- **Speech and Hearing**
 - ELEC.520.315 - Introduction to Bio-Inspired Processing of Audio and Visual Signals | Institution: Johns Hopkins University | Grade: A
 - BMED.580.625 - Structure and Function of the Auditory and Vestibular Systems | Institution: Johns Hopkins University | Grade: A
 - SHBT.200 - Introduction to Sound, Speech, and Hearing | Institution: Massachusetts Institute of Technology | Audit
- **Computational and Engineering**
 - BMED.580.243 - Linear Signals and Systems | Institution: Johns Hopkins University | Grade: A-
 - BMED.580.475 - Biomedical Data Science | Institution: Johns Hopkins University | Grade: A
 - BMED.580.477 - Biomedical Data Science Lab | Institution: Johns Hopkins University | Grade: A
 - CS.605.202 - Data Structures | Institution: Johns Hopkins University | Grade: A
 - BMED.580.680 - Precision Care Medicine I | Institution: Johns Hopkins University | Grade: A
 - BMED.580.681 - Precision Care Medicine II | Institution: Johns Hopkins University | Grade: A
 - BMED.580.737 - Seminar Series in Computational Medicine | Institution: Johns Hopkins University | Grade: Pass (Pass/Fail scale)

LEADERSHIP ACTIVITIES

JHU Hippocrates Medical Review

February 2018 – May 2021

Biotechnology Writer

- Wrote biotechnology articles for medical journal to describe current technological advancements in medicine. Select articles published in written journal and online website.
- #1: “Prosthetics with a Sense of Touch and Pain”: written journal, Hippocrates Medical Review ISSUE NO. 3 - SPRING/FALL 2019
- #2: “How Dueling Neural Networks are Fighting for the Next Steps in Medicine”, online: hippocratesmedreview.org 1/09/2020
- #3: “Xenobots: The First Living Robots”, online: hippocratesmedreview.org, 4/09/2020
- #4: “Self-healing soft robots”, online: hippocratesmedreview.org, 11/13/2020

JHU Kranti

September 2017 – May 2021

Performance Director and Soloist

- Directed a team of students and choreographed for competitive events in the South Asian a capella national circuit. Soloed for competitive events. Soloed and recorded for album featured on Spotify. Placed 2nd and 3rd in national competitions at UPitt, UC Berkeley, and NC State.

CONFERENCE POSTERS AND ABSTRACTS

1. **Kodibagkar, A.**, Athey, T., Le, M., & Vogelstein, J. (2021, June 15-17). *Predicting Axon Collaterals Using Branch Angles* [Conference Poster] The 2021 BRAIN Initiative Investigators Meeting, Virtual Meeting.
2. **Kodibagkar, A.**, Athey, T., Le, M., & Vogelstein, J. (2021, October 6-9). *Predicting Axon Collaterals Using Branch Angles* [Conference Poster] 2021 BMES Annual Meeting, Orlando, FL, United States.
3. Haoyin, X., **Kodibagkar, A.**, Desman, J., Igboko, M., Huang, Q., Wang, Z., Winslow, R., Greenstein, J., & Stevens, R. (2021, May). *Coma Predictor: Prediction of Neurological Trajectories in Non-Neurological ICU Patients* [Design Poster] Johns Hopkins Engineering Design Day 2021.
4. Vasu, S., **Kodibagkar, A.**, Iyer, S., Park, M., Kirungi, U., Baingana, F., & Jarso, S. (2021, October 6-9) *Strategies to Increase Antenatal and Postnatal Care in Eastern Uganda* [Conference Poster] 2021 BMES Annual Meeting, Orlando, FL, United States.
5. Haoyin, X., Desman, J., Huang, Q., Igboko, M., **Kodibagkar, A.**, Wang, Z., Gong, K., Winslow, R., Greenstein, J., & Stevens, R. (2022, April 18-21). *Machine Learning Prediction of Responsiveness Phenotypes in Non-Neurological ICU Patients* [Conference Poster and Abstract] Society of Critical Care Medicine 2022 Critical Care Congress, Virtual Meeting. (delayed)
6. Haoyin, X., Desman, J., Igboko, M., Huang, Q., Wang, Z., **Kodibagkar, A.**, Gong, K., Winslow, R., Greenstein, J., & Stevens, R. (2021, October 26-29). *A Computational Model to Predict Discharge Responsiveness in Non-Neurological ICU Patients* [Conference Poster and Abstract] Neurocritical Care Society Virtual 19th Annual Meeting, Virtual Meeting.
7. Haoyin, X., Desman, J., Igboko, M., Huang, Q., Wang, Z., **Kodibagkar, A.**, Winslow, R., Greenstein, J., & Stevens, R. (2021, October 3-6). *A Machine Learning Model to Predict Responsiveness in Non-Neurological ICU Patients* [Conference Poster and Abstract] European Society of Intensive LIVES 2021, Virtual Meeting.