# Adam Li

Neural Data Scientist · Applied Machine Learning · Statistics and Mathematics · Engineering Leadership and Project Management

*521 Saint Paul St Apt 306 Baltimore, MD, 21202*

(+1) 805-807-5898 | ali39@jhu.edu | adam2392.github.io | adam2392 | adam2392 | Adam Li

## Education

**PhD in Biomedical Engineering** — *Baltimore, MD*

Johns Hopkins University GPA: 3.8 — *Aug. 2015 — May 2021*

- Advisor: Dr. Sridevi Sarma
- Localization of the Epileptogenic Zone
- NIH NETI Fellow, NSF-GRFP, Whitaker Fellow, Chateaubriand Fellow, ARCS Scholar

**MS in Applied Mathematics and Statistics** — *Baltimore, MD*

Johns Hopkins University GPA: 3.8 — *Aug. 2019 — May 2021*

- Coursework in: Statistical Learning Theory, Optimization, Matrix Analysis, Real Analysis

**B.S. Bioengineering, B.S. Applied Mathematics** — *La Jolla, CA*

University of California San Diego GPA: 3.57 — *Sep. 2010 — Mar. 2015*

- *Tau Beta Pi*, Gordon Scholar & Fellow

## Experience

### Research Experience

**Graduate Research Assistant, Neuromedical Control Systems Lab, Johns Hopkins University**
**Advisor: Dr. Sridevi Sarma** — *Aug. 2015 — Present*

- Aggregate and organize electrophysiological and clinical data of epilepsy patients from 5 hospital centers in coordination with neurosurgeons and epileptologists in setting up a HIPA-compliant sFTP server, resulting in Nature Neuroscience publication in review.
- Engineered a data pipeline for wrangling multivariate time series, clinical and neuroimaging data to analyze different seizure localization models (model selection, pandas for data wrangling).
- Perform precise seizure localization and automatic online seizure detection from intracranial EEG recordings that involves Terabyte's of multivariate time series and images (MRI/CT/DTI)
- Apply machine learning algorithms, statistical modeling, digital signal processing and graph theory in a high-performance computing pipeline to time series data (Python/MATLAB on Linux systems)
- Wrote multiple grant proposals to fund graduate studies, allowing me to devote more time to higher risk projects that were not a central focus of the lab.

**Visiting Research Scientist, Theoretical Neurosciences Group, Aix-Marseille University**
**Advisor: Dr. Viktor Jirsa** — *Sep. 2017 — Sep. 2018*

- Analyzed and processed > 5TB of multi-modality 3D brain imaging in a data pipeline (Freesurfer, Bash, Python, Snakemake) to perform electrode localization, brain MRI analysis and 3D brain visualization
- Designed a successful analytics framework using nonlinear biophysical modeling and linear systems analysis to be able to systematically predict the seizure onset zone in epileptic patients
- Engineered a supervised deep learning pipeline using nonlinear computational modeling and a Recurrent-CNN model to perform patient-specific seizure detection (Python/Keras/Pytorch)
- Contribute open-source code to The Virtual Brain (https://github.com/the-virtual-brain/tvb-library/) for generating observational noise, analysis of simulated source signals and scientific demo notebooks

**Undergraduate Researcher, Neural Interaction Lab, University of California - San Diego**
**Advisor: Dr. Todd Coleman** — *Apr. 2013 — Sep. 2015*

- Researched and developed novel ways to evaluate Parkinson's disease using gait and 3D spatiotemporal data from the Microsoft Kinect in collaboration with Computer Vision Lab and School of Medicine.
- Developed data analytics software using C++ and Matlab for signal processing of coordinate time series data for the purpose of tracking biometrics of Parkinson's disease patients
- Wrote a successful grant and IRB to carry out pilot clinical studies in collaboration with 3 professors; awarded the Gordon Fellowship Award for outstanding engineering leadership.
- Carried out validation and clinical experiments on 21 PD and 21 control subjects, while coordinating scheduling with clinicians and patients.

## Work Experience

**Co-Founder and CTO, Neurologic Solutions Corp.** *Sep. 2018 — Present*

- Raised over $350K to-date (NSF SBIR Phase I $225k, Mayland Innovation Initiative $150k, $10K JHTV Pitch Competition).
- Filed provisional patents and full patents in the USA, European and Japan markets through collaboration with Johns Hopkins Technology Ventures (JHTV).
- Lead product development of software product with team of 3 software engineers for helping clinicians localize the epileptogenic zone in epileptic patients (AWS infrastructure with Kubernetes and Flux, REST API, algorithm development, MVP UX design, data engineering).
- Led **510k FDA** approval process involving risk analysis, and software requirements and design specifications while working with a team of 5 engineers, consultants and advisors (unit/integration testing, continuous integration, software documentation).

**Co-Founder, Biometrics Analytics** *Jun. 2012 — Sep. 2015*

- Researched & developed novel ways to evaluate Parkinson's Disease using biometric sensors and robust data analysis; led team in data acquisition of human data, data analysis and statistical analysis using MATLAB and Python.
- Led data acquisition of clinical data and full-body pose data from the Microsoft Kinect. Performed data analysis using machine learning and image processing algorithms (MATLAB, Python and C++).
- Raised over $20,000 and obtained an IRB for a pilot clinical human study, resulting in the Gordon Fellowship Award for outstanding engineering leadership (awarded to 3 students/year at UCSD).
- Worked in a team of 4 for the Von Liebig NSF I-Corps Program and the NCIIA Entrepreneurship Program ( 15% acceptance rate) for startup incubation.

**Data Processing Intern, West Health Institute 501(C)** *Jun. 2014 — Jun. 2015*

- Wrote pymongo queries running on an event scheduler (Python, MongoDB) that provided computed features of game play and behavior for the clinical team to analyze behavior during experiments.
- Developed clinical web forms using HTML, CSS, JavaScript, which are then linked to an AWS server running MongoDB with Node.js (git and general version control).
- Built an Android application that created a custom launch screen for the clinical team with Java and XML.
- Researched and recommended technological improvements to data collection that could be incorporated into the analytics group at the institute for the treatment of Autism Spectrum Disorder.

**Project Team Leader, West Health Institute 501(C)** *Jun. 2014 — Jun. 2015*

- Wrote pymongo queries running on an event scheduler (Python, MongoDB) that provided computed features of game play and behavior for the clinical team to analyze behavior during experiments.
- Developed clinical web forms using HTML, CSS, JavaScript, which are then linked to an AWS server running MongoDB with Node.js (git and general version control).
- Built an Android application that created a custom launch screen for the clinical team with Java and XML.
- Researched and recommended technological improvements to data collection that could be incorporated into the analytics group at the institute for the treatment of Autism Spectrum Disorder.

**Process Development Engineering Intern and College Ambassador, Genentech** *Aug. 2010 — Aug. 2011*

- Collaborated with Genentech College Programs to improve online engagement by 60%, while coordinating events with directors and human resources that drew in over 200 attendees.
- Implemented a new batch control process using Rockwell Automation and PLCs to automate chromatography purification process (used SQL and Python).

# Journal Publications

**Neural Fragility as an EEG Marker of the Seizure Onset Zone** *2021*

Adam Li, Chester Huynh, Zachary Fitzgerald, Iahn Cajigas, Damian Brusko, Jonathan Jagid, Angel Claudio, Andres Kanner, Jennifer Hopp, Stephanie Chen, Jennifer Haagensen, Emily Johnson, William Anderson, Nathan Crone, Sara Inati, Kareem Zaghloul, Juan Bulacio, Jorge Gonzalez-Martinez, Sridevi V. Sarma *In review at Nature Neuroscience*

bioRxiv 862797; https://doi.org/10.1101/862797.

**Neural Fragility of the Intracranial EEG Network Decreases after Surgical Resection of the Epileptogenic Zone** *2021*

Adam Li, Nebras Warski, Kristin Gunnarsdottir, Sarah Kim, Viktor Jirsa, George Ibrahim, Sridevi V. Sarma *In preparation*

**Stereotactic EEG Kit (SEEK) – Semi-automating anatomical and eletrophysiological workflows** *2021*

Adam Li, Christopher Coogan, Chester Huynh, Joon Kang, Nathan Crone, Sridevi V. Sarma *In preparation*

**Classification of Stereo-EEG Contacts in White Matter vs. Gray Matter Using Recorded Activity** — *2021*

Greene Patrick, Li Adam, González-Martínez Jorge, Sarma Sridevi — *Frontiers in Neurology*

**Using network analysis to localize the epileptogenic zone from invasive EEG recordings in intractable focal epilepsy** — *2018*

Li Adam, Chennuri Bhaskar, Subramanian Sandya, Yaffe Robert, Gliske Steve, Stacey William, Norton Robert, Jordan Austin, Zaghloul Kareem, Inati Sara, Agrawal Shubhi, Haagensen Jennifer, Hopp Jennifer, Atallah Chalita, Johnson Emily, Crone Nathan, Anderson William, Fitzgerald Zach, Bulacio Juan, Gale John, Sarma Sridevi, Gonzalez-Martinez Jorge — *Network Neuroscience*

## Peer-Reviewed Conference Proceedings

**Network Fragility in Seizure Genesis in an Acute in vivo Model of Epilepsy** — *IEEE EMBS - EMBC*

Adam Li, Daniel Ehrens, Fadi Aeed, Yitzhak Schiller, Sridevi V Sarma — *Montreal, Canada 2020*

**Evaluating Invasive EEG Implantations in Medically Refractory Epilepsy with Functional Scalp EEG Recordings and Structural Imaging Data** — *IEEE EMBS - EMBC*

Anil Palepu, Adam Li, Zachary Fitzgerald, Katherine Hu, Julia Costacurta, Juan Bulacio, Jorge Martinez-Gonzalez, Sridevi V Sarma — *Berlin, Germany 2019*

**Virtual Cortical Stimulation Mapping of Epilepsy Networks to Localize the Epileptogenic Zone** — *IEEE EMBS - EMBC*

Adam Li, Sridevi V Sarma, Zachary Fitzgerald, Jennifer Hopp, Emily Johnson, Nathan Crone, Juan Bulacio, Jorge Martinez-Gonzalez, Sara Inati, Kareem Zaghloul — *Berlin, Germany 2019*

**Linear Time-Varying Model Characterizes Invasive EEG Signals Generated from Complex Epileptic Networks** — *IEEE EMBS - EMBC*

Adam Li, Kristin M. Gunnarsdottir, Sara Inati, Kareem Zaghloul, John Gale, Juan Bulacio, Jorge Martinez-Gonzalez, Sridevi Sarma — *Jeju, South Korea 2017*

**Fragility in epileptic networks: The epileptogenic zone** — *American Control Conference*

Adam Li, Sara Inati, Kareem Zaghloul and Sridevi Sarma — *Seattle, WA 2017*

**Estimating Unmeasured Invasive EEG Signals Using a Reduced Order Observer** — *IEEE EMBS - EMBC*

Kristin M. Gunnarsdottir, Adam Li, Juan Bulacio, Jorge Gonzalez-Martinez, Sridevi V. Sarma — *Jeju, South Korea 2019*

## Patents

**GEAR (Game Enhancing Augmented Reality) - A lower limb alternative control interface for computers.** — *Patent Application No. 16309183*

Gyorgy Levay, Adam Li, Nate Tran — *May 23rd, 2016*

**Identifying the Epileptogenic Zone using Network Fragility Theory** — *Patent Application No. 62421037*

Sridevi Sarma, Adam Li, Jorge Gonzalez — *Nov. 11th, 2017*

**Identifying the Epileptogenic Zone using Virtual Cortical Stimulation** — *Provisional Patent*

Sridevi Sarma, Adam Li, Jorge Gonzalez — *Feb. 11th, 2019*

## Teaching

**Teaching Assistant** — *Baltimore, MD*

NeuroData Design Course (BME 580.638) - develop open source contributions to Python scientific computing libraries — *Sep. 2019 — Jan 2020*

**Head Teaching Assistant** — *Baltimore, MD*

Systems Bioengineering II Course (BME 580.424) - 150 students and 6 TAs — *Jan. 2019 — May 2019*

**Teaching Assistant** — *La Jolla, CA*

Data Structures Course (CSE 12) - C, C++ — *Sep. 2014 — May 2015*

## Conference Presentations

**Automated classification of stereo-EEG contacts in white matter versus gray matter using recorded activity** — *Montreal, Canada (virtual)*

IEEE Engineering in Medicine and Biology — *Jul. 2020*

**Adam Li**, et al.

**Towards Automatic Localization and Anatomical Labeling of Intracranial Depth Electrodes in Brain Images** — *Montreal, Canada (virtual)*

IEEE Engineering in Medicine and Biology — *Jul. 2020*

**Adam Li**, et al.

**Semi-Automatic SEEG Localization and Interactive Neuroimage Visualization in Epilepsy Patients** — *Montreal, Canada*

Organization for Human Brain Mapping — *June 23 - July 3, 2020*

**Adam Li**, Chester Huynh, Christopher Coogan, Sridevi Sarma

**MNE-BIDS: MNE-Python + BIDS = easy dataset interaction (Version 1.0.1)** — *Montreal, Canada*

Organization for Human Brain Mapping — *June 23 - July 3, 2020*

Stefan Appelhoff, **Adam Li**, et al. - 10.5281/zenodo.3891836

**Application of A Network Fragility Algorithm for the Identification of the Epileptogenic Zone from Intracranial Electrocorticography in Patients with Temporal-Lobe Epilepsy** — *Baltimore, MD*

American Epilepsy Society — *Nov. 2019*

**Adam Li**, et al.

**Using personalized brain models to augment datasets for deep learning** — *Janelia, HHMI, USA*

Workshop on Machine Learning and Computer Vision — *Apr. 2019*

**Adam Li**, Sridevi Sarma, Viktor Jirsa

**Integrating Large Brain Networks and Network Analysis to Understand The Epileptogenic Zone** — *Seattle, WA*

Organization for Computational Neuroscience — *Jul. 2018*

**Adam Li**, Marmaduke Woodman, Sridevi Sarma, Viktor Jirsa

**Integrating Large Brain Networks and Network Analysis to Understand The Epileptogenic Zone** — *Tuscany, Italy*

Advanced Course on Data Science — Machine Learning

*Jul. 2018*

**Adam Li**, Sridevi Sarma, Viktor Jirsa

**T101. Use of a quantitative algorithm to help predict seizure lateralization in a patient with bitemporal epilepsy and responsive nerve stimulation** — *Seattle, WA*

Clinical Neurophysiology — *2018*

Jennifer J. Haagensen, Stephanie Chen, Jennifer L. Hopp, **Adam Li**, Sridevi Sarma

## Honors & Awards

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|---|---|---|
| 2020 | **ARCS Chapter Fellowship**, 1 of 3 awardees - Pre-doctoral Fellowship | *Washington, DC* |
| 2019 | **Whitaker Conclusion Grant**, 1 of 5 teams awarded $100k - Outreach Fellowship | *USA* |
| 2017 | **Chateaubriand STEM Research Fellowship**, Pre-doctoral international fellowship | *France* |
| 2017 | **Whitaker Research Fellowship**, Pre-doctoral international fellowship | *France* |
| 2017 | **NSF**, Graduate Research Fellowship | *USA* |
| 2016 | **NSF**, Graduate Research Fellowship - Honorable Mention | *USA* |
| 2016 | **Intel Cornell Cup**, 1st place | *USA* |
| 2015 | **NIH NETI**, Graduate training fellowship | *Baltimore* |
| 2015 | **Frontiers of Innovation Scholars**, undergraduate research fellowship | *UCSD* |
| 2014 | **IDEA Center Scholar**, undergraduate research fellowship | *UCSD* |
| 2014 | **Gordon Fellow**, undergraduate leadership award | *UCSD* |
| 2014 | **ASAIO Student Design Competition**, top 27 in USA | *USA* |
| 2013 | **Amgen Scholar**, undergraduate research fellowship | *UCSD* |
| 2013 | **Gordon Leadership Scholar**, undergraduate leadership | *UCSD* |
| 2012 | **CalIT Scholar**, undergraduate research fellowship | *UCSD* |

## Entrepreneurial Awards

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|---|---|
| 2019 | **Maryland Innovative Initiative (MII) Grant**, |
| 2018 | **NSF SBIR Phase I Grant**, |
| 2014 | **NCIIA E-Team Grant**, |
| 2013 | **Health and Life Sciences Grant**, |
| 2013 | **Von Liebig NSF I-Corps Fellow** , |

## Skills

**Programming** Bash, Python, MATLAB, Scikit-learn, Pandas, Numpy, LaTeX

**Misc.** Git, Software Design and Engineering, Software Quality Control, Software Testing

## Open Source Software

**Stereotactic EEG Kit (SEEK) | https://github.com/ncsl/seek**

Developer - (data pipeline for neuroimaging data) *2019 — Present*

**MNE-HFO | https://github.com/adam2392/mne-hfo**

Developer - (High-frequency oscillations in Python) *2020 — Present*

**BIDS | https://github.com/bids-standard/bids-specification**

Electrophysiology Team Member - (Open-Access Scientific Data) *2019 — Present*

**MNE-Python | https://github.com/mne-tools/mne-python**

Contributor - Electrophysiological data analysis *2019 — Present*

**MNE-BIDS | https://github.com/mne-tools/mne-bids**

Contributor - BIDS IO for MEG/EEG/iEEG *2019 — Present*

**pybids | https://github.com/https://github.com/bids-standard/pybids**

Contributor - Querying of BIDS datasets *2019 — Present*

**bids-validator | https://github.com/https://github.com/bids-standard/bids-validator**

Contributor - Validation of BIDS datasets *2019 — Present*

**pyDMD | https://github.com/mathLab/PyDMD**

Contributor - Dynamic Mode Decomposition *2019 — Present*

**TVB | https://github.com/the-virtual-brain/tvb-root**

Contributor - Computational Neuroscience Platform *2017 — 2018*

# Leadership and Volunteer Work

**EverydayBME** *World*

Co-Founder *2019 — Present*

- Design and aggregate digital storybooks of Biomedical science (researchers, students, etc.) over the world. Worked with BMESDiversity and Whitaker Foundation.

**AAMPLIFY 501(C)** *San Francisco, CA*

Director of Leadership *2017 — Present*

- Planned and implement a summer leadership and advocacy program for AAPI youth. Also involved in raising over $5000 as a non profit organization.

**Engineering & Medicine Exchange** *Johns Hopkins University*

Co-Founder *2016 — 2017*

- Plan events for collaborations between engineering, medicine and public health. Arduino workshop, Machine Learning in Healthcare workshop, and Electronic Health Records for Engineering workshop.

**Yale School of Management Pre-MBA Program** *Yale University*

Global Pre-MBA Leadership Program *2014*

- Placed 3rd in Audubon Business Concept Pitch Plan, and 2nd in Audience Choice Award.

**BME PhD Council**

Social Chair *2016 — 2017*

- Coordinate and plan events for increasing collaboration within department.

**Alpha Kappa Psi** *UCSD*

Class President *2012 — 2014*

- Led class of 16 individuals.

# Academic Service

**IEEE Engineering in Medicine and Biology**

Reviewer *2020 — Present*

**https://github.com/ncsl**

Lab Git Manager *2017 — Present*

**https://twitter.com/labsarma**

Lab Twitter Manager *2018 — Present*