# Adam Li

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

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## Positions

**Postdoctoral Fellow** — *New York City, NY*

Columbia University | Computer Science Department (Advisor: Elias Bareinboim) — *Jan. 2022*

- NSF Computing Innovation Fellow

## Education

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

Johns Hopkins University | GPA: 3.8 — *Aug. 2015 — Present*

- Advisor: Dr. Sridevi Sarma | Thesis: *Computational Localization of the Epileptogenic Zone*
- NIH NETI Fellow, NSF-GRFP Fellow, Whitaker Fellow, Chateaubriand Fellow, ARCS Chapter 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. Mathematics - Applied Sciences** — *La Jolla, CA*

University of California San Diego | Major GPA: 3.75 — *Sep. 2010 — Mar. 2015*

- Tau Beta Pi, Gordon Scholar & Fellow, Provost's Honors

## Journal Publications, Preprints and Working Submissions

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

**Adam Li**, et al. — *Nature Neuroscience*

**Manifold Oblique Random Forests: Closing the Gap on Convolutional Neural Networks - pdf** — *2021*

**Adam Li***, et al. — *ArXiv (in review at SIMODS)*

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

P. Greene, **Adam Li**, J. González-Martínez, S. V. Sarma — *Frontiers in Neurology*

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

**Adam Li***, et al. — *Network Neuroscience*

**Source-sink connectivity: A novel interictal EEG marker for seizure localization - pdf** — *2021*

Gunnarsdottir, K., **Li, Adam**, et al. — *In Review at Brain*

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

**Adam Li**, P. Myers, N. Warski, K. Gunnarsdottir, S. Kim, V. Jirsa, A. Oichi, H. Otusbo, G. Ibrahim, S. V. Sarma — *In Review at Brain Communications*

## 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*

## 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 2017*

## 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

2021 **NSF SBIR Phase I Grant**,

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** ,

# Grants

**NSF SBIR Phase-I Grant (2112011) - Co PI** *$256k*

May 15, 2021 — April 30, 2022 | Improving Diagnosis of Epilepsy by Applying Network Analytics to Non-Seizure Scalp EEG Data

**Whitaker Phase I Conclusion Grant - Co PI** *$100k*

Jan. 2019 — Jan. 2023 | Outreach for Biomedical Science story-telling around the world.

# Experience

**Co-Founder and CTO, Neurologic Solutions Corp.** *Sep. 2018 — Mar. 2021*

- Raised over $600K non-dilutive funds to-date (Two 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).
- Led 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**, UX design and **data engineering**).
- Led **510k FDA** approval process with a team of 5 engineers, consultants and advisors involving risk analysis, software requirements, design specifications, and user-testing (unit testing, continuous integration, and software documentation).
- Led research of EEG, imaging and clinical datasets to validate machine learning algorithms to inform clinical decision making in epilepsy patient treatment.

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

- Coordinated data pipeline of electrophysiological and clinical data of epilepsy patients from 5 hospitals in coordination with clinicians in setting up a HIPAA-compliant server for highly parallelized data analysis, resulting in **Nature Neuroscience publication**.
- Identified and developed signal processing and statistical analysis of clinical multi-modality datasets that resulted in over 400 pull requests merged in open-source packages with up to 1,000's of users (**Git, CI, unit-testing, software design & development**)
- Developed statistical and machine learning models on multivariate time series EEG, clinical and neuroimaging MRI and CT data to analyze different seizure localization models (model building & validation with **scikit-learn/keras/pytorch**, data wrangling with **pandas,numpy**).
- Coordinated open-source discussions on EEG and iEEG data formatting in a 79 international team of researchers on Github (**technical communication of the Brain Imaging Data Structure - BIDS**)
- Coordinated a team of engineers to develop a structure-aware Random Forest algorithm in Python and Cython to perform manifold learning (to be implemented as a PR into **scikit-learn**).

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

- Developed a high-throughput parallelized data pipeline for multi-modality 3D brain imaging using **Bash and Snakemake (Python DAG engine)** resulting in robust 3D brain visualizations.
- Designed **nonlinear biophysical models** with **linear dynamical systems analysis** to predict the surgical outcome in epileptic patients resulting in a paper to be submitted to Brain
- Developed a supervised deep learning pipeline using nonlinear computational modeling and a Recurrent-CNN model to perform patient-specific seizure detection (**Python/Keras/Pytorch**)
- Implemented open-source code on *The Virtual Brain* (a Human Brain Project) for generating observational noise, analysis of simulated source signals and scientific demos

## Work Experience

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

- Raised over $600K to-date (Two 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).
- Led 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, UX design and data engineering).
- Led **510k FDA** approval process with a team of 5 engineers, consultants and advisors involving risk analysis, software requirements, design specifications, and user-testing (unit testing, continuous integration, and 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).

## 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 and Posters

**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**, Patrick Greene, Jorge Martinez-Gonzalez, Sridevi Sarma

**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**, Chester Huynh, Jorge Martinez-Gonzalez, Sridevi Sarma

**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

**Identification of the Epileptogenic Zone from Intracranial Electrocorticography with a Novel Network Fragility Algorithm in Patients with Temporal-Lobe Epilepsy** — *Virtual*

AANS — *Jun. 2020*

Iahn Cajigas, Damian Brusko, Angel Claudio, **Adam Li**, Sridevi Sarma, Andres Kanner, Jonathan Jagid

**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**, Iahn Cajigas, Damian Brusko, Angel Claudio, Andres Kanner, Jonathan Jagid, Sridevi Sarma

**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

## Skills

**Programming** Bash, Python, MATLAB, Scikit-learn, Pandas, Numpy, Keras, Pytorch, Cython

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

## Open Source Software

**MNE-Connectivity | https://github.com/mne-tools/mne-connectivity** — *Google Summer of Code 2021*

Developer - (connectivity analysis for neural data) — *2021 — Present*

**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*

**The Virtual Brain (TVB) | https://github.com/the-virtual-brain/tvb-root**

Contributor - Computational Neuroscience Platform *2017 — 2018*

## Leadership and Volunteer Work

**EverydayBME - Co-Founder** *2019 — Present | Worldwide*

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

**AAMPLIFY 501(C) - Director of Leadership** *2017 — Present | San Francisco, CA*

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 - Co-Founder** *2016 — 2017 | JHU*

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 - Global Pre-MBA Leadership Program** *2014 | Yale*

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

**BME PhD Council - Social Chair** *2016 — 2017 | JHU*

Coordinate and plan events for increasing collaboration within department.

**Alpha Kappa Psi - Class President** *2012 — 2014 | UCSD*

Led class of 16 individuals.

## Academic Service

**NeuroImage**

Reviewer *2021*

**IEEE Engineering in Medicine and Biology**

Reviewer *2020*

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

Lab Git Manager *2017 — Present*

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

Lab Twitter Manager *2018 — Present*