Adam Li

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RESEARCH INTERESTS:

Epilepsy, computational neuroscience, linear dynamical systems, control theory, data science, machine learning and medical imaging.

EDUCATION:

JOHNS HOPKINS UNIVERSITY | *Ph.D. in Biomedical Engineering* **Graduation: ~2020**
Thesis: Computational Localization of the Epileptogenic Zone in Drug-Resistant Epilepsy *GPA: 3.8/4.0*

JOHNS HOPKINS UNIVERSITY | *M.S. in Applied Mathematics and Statistics* **Graduation: ~2020**
Coursework in optimal control, optimization (convex/nonlinear), matrix analysis and machine learning

UNIVERSITY OF CALIFORNIA, SAN DIEGO | *B.S Bioengineering, Mathematics-Applied Science* **March 2015**
Gordon Scholar and Fellow, Tau Beta Pi *Major GPA: 3.75/4.0*

POSITIONS:

2015-Present	Johns Hopkins University	Research Scientist
2020	Johns Hopkins University (Intramural Course)	Teaching Instructor
2019	Johns Hopkins University (SBE II Course)	Head Teaching Assistant
2017-2018	Aix-Marseille University	Visiting Research Scientist
2011-2015	University of California, San Diego	Research Assistant

HONORS AND AWARDS:

2019	1 of 5 teams awarded $100K to further the Whitaker mission (The Whitaker Conclusion Grant)
2017	Chateaubriand STEM Research Fellowship
2017	Whitaker Research Fellowship
2017	NSF-GRFP Fellow (~2000 awardees out of ~15,000)
2016	NSF-GRFP Honorable Mention
2016	Intel Cornell Cup 1st Place
2015	NIH NETI Fellow
2015	Frontiers of Innovation Scholars at UCSD
2014	IDEA Center Scholar at UCSD
2014	Inducted into Tau Beta Pi
2014	Top 27 in USA for student design competition of ASAIO
2014	Inducted as a Gordon Fellow for excellent engineering leadership
2012-2013	Chapter of the Year Award for ISPE

2013	Amgen Scholar at UCSD
2013	National EWH Design Competition – 2nd Place
2013	Inducted as a Gordon Leadership Scholar
2012	CalITScholar at UCSD

ENTREPREUNEURIAL AWARDS:

2018	**NSF SBIR Phase I Grant**
2014	**NCIIA E-Team Program** – National selective program (~15% acceptance rate) for funding
2013	**Health and Life Sciences Grant**– Grant for pilot studies in translational medicine
2013	**Von Liebig NSF I-Corps Fellow –** Competitive startup program for NSF seed funding

PROFESSIONAL SERVICE & LEADERSHIP ACTIVITIES:

YALE SCHOOL OF MANAGEMENT (2014) | *Global Pre-MBA Leadership Program*

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

AAMPLIFY 501© (Jan 2017 – Present) | Non-profit organization

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

JOHNS HOPKINS ENGINEERING & MEDICINE EXCHANGE (2016 – 2017)

Co-Founder/President – Plan events for collaborations between engineering, medicine and public health

JOHNS HOPKINS BME COUNCIL (2016 – 2017)

Social Chair – Coordinate and plan events for increasing collaboration within department

UNIVERSITY OF CALIFORNIA, SAN DIEGO, ALPHA KAPPA PSI (2012 –2014)

Class President and Director of Consulting

INTERNATIONAL SOCIETY FOR PHARMACEUTICAL ENGINEERING (2011 – 2014)

Vice President External for student organization at UCSD

OTHER ACTIVITIES:

2017 - Present	Lab Github/Gitlab manager
2018 - Present	Lab Twitter manager

TEACHING EXPERIENCE:

In 2020	Teaching Instructor at Johns Hopkins University for an intramural short course: The Virtual Brain: Whole-Brain Computational Neuroscience
2019	Head Teaching Assistant at Johns Hopkins University for SBEII: Systems Bioengineering (Neuroscience) for 150 students with 6 TAs
2014-2015	Teaching Assistant at University of California, San Diego for CSE12: Data Structures

JOURNAL PAPERS:

1. **Li A**., et al., Sarma S. "Clinically Validated Algorithmic Approaches To Epileptogenic Zone Localization in Intracranial EEG". *Preprint.* 2019.
2. **A. Li**, et al., S.V. Sarma, J. Gonzalez-Martinez. "Using Network Analysis to Localize the Epileptogenic Zone from Invasive EEG Recordings in Intractable Focal Epilepsy." *Network Neuroscience* (2018).

CONFERENCE PAPERS:

1. **Li A**., Sarma S., Jirsa V. "Using Whole-Brain Computational Modeling to Augment Training of Deep Neural Networks for Personalized Seizure Annotation". *Preprint.* 2019.
2. **Li A**., et al., "Evaluating Invasive EEG Implantations in Medically Refractory Epilepsy with Functional Scalp EEG Recordings and Structural Imaging Data". *IEEE Engineering in Medicine and Biology Conference, Berlin, Germany* (2019).
3. **Li A**., et al., "Virtual Cortical Stimulation Mapping of Epilepsy Networks to Localize the Epileptogenic Zone". *IEEE Engineering in Medicine and Biology Conference, Berlin, Germany* (2019).
4. **Li A**, Inati S, Zaghloul K, Sarma S. "Fragility in Epileptic Networks: The Epileptogenic Zone". *The American Control Conference* (2017).
5. **Li A**, Gunnarsdottir K, Inati S, Zaghloul K, Gale J, Bulacio J, Martinez-Gonzalez J, Sarma S. "Linear Time-Varying Model Characterizes Invasive EEG Signals Generated from Complex Epileptic Networks." *Engineering in Medicine and Biology Conference, Jeju, South Korea* (2017).
6. Gunnarsdottir K, **Li A**, Bulacio J, Martinez-Gonzalez J, Sarma S. "Estimating Unmeasured Invasive EEG Signals Using a Reduced Order Observer." *Engineering in Medicine and Biology Conference, Jeju, South Korea* (2017).

CONFERENCE ABSTRACTS:

1. ''Using personalized brain models to augment datasets for deep learning.'' Li A. Jirsa V., Sarma S. Janelia Scientist Workshop on Machine Learning and Computer Vision, Janelia HHMI, USA, April 2nd 2019.
2. **Li A.,** Sarma S., Jirsa V. "Integrating Large Brain Networks and Network Analysis to Understand The Epileptogenic Zone." *Organization for Computational Neurosciences CNS* (2018).
3. "Integrating Large Brain Networks and Network Analysis to Understand The Epileptogenic Zone." **Li A.,** Sarma S., Jirsa V. *Organization for Computational Neurosciences CNS* 18, Seattle WA, USA, July 23rd 2018 and ACDL, Tuscany, Italy, July 28th 2018.
4. Haagensen J, Chen S, Hopp J L, **Li A**, Sarma S. "T101. Use of a quantitative algorithm to help predict seizure lateralization in a patient with bitemporal epilepsy and responsive nerve stimulation." *Clinical Neurophysiology* (2018).

PATENTS:

1. GEAR (Game Enhancing Augmented Reality) - A lower limb alternative control interface for computers. Inventors: Gyorgy Levay, Adam Li, Nate Tran. Patent Application No. 16309183. 5/23/16.
2. Identifying the Epileptogenic Zone using Network Fragility Theory. Inventors: Sridevi Sarma, Adam Li, Jorge Gonzalez. Patent Application No. 62421037. 11/11/2017
3. Identifying the Epileptogenic Zone using Virtual Cortical Stimulation. Provisional Patent Applied. Inventors: Adam Li, Sridevi Sarma. 2/20/19.

PRESENTATIONS:

1. ''Using personalized brain models to augment datasets for deep learning.'' Li A. Jirsa V., Sarma S. Janelia Scientist Workshop on Machine Learning and Computer Vision, Janelia HHMI, USA, April 2nd 2019.
2. "Fragility In Epilepsy: A Dynamical Networked Systems Perspective," Li A, et al. Institute of Computational Medicine Retreat, Baltimore MD, United States, October 25th, 2019.
3. *"Linear Time-Varying Model Characterizes Invasive EEG Signals Generated from Complex Epileptic Networks"*, **Li A**, Gunnarsdottir K, Inati S, Zaghloul K, Gale J, Bulacio J, Martinez-Gonzalez J, Sarma S, EMBC 17, Jeju, South Korea, July 14th, 2017.
4. "*Fragility in Epileptic Networks: The Epileptogenic Zone",* **Li A**, Inati S, Zaghloul K, Sarma S, ACC 17, Seattle WA, USA, May 24th, 2017.
5. *"Analysis of Gait Applied to Parkinson's Disease",* **A. Li**, N. Gandhi, I. Litvan and T. Coleman, Thiel Summit Conference for Entrepreneurship, Las Vegas NV, November 11th, 2014.

6. *"The Gait Analysis of Parkinson's Disease"*, **A.Li**, N. Gandhi, L. Li, J. Chu, C. Yang, I. Litvan and T. Coleman, UCSD Bioengineering Day Poster Conference, San Diego CA, April 10th, 2014.
7. *"Feasibility of 3D Deformation and Strain Analyses by Micro-Computed Tomography"*, **A. Li**, E. Cory, J. Caffrey, V. Wong, Q. Nguyen and R. Sah, ISPE Poster Competition, La Jolla CA, May 29th, 2013.
8. *"Feasibility of 3D Deformation and Strain Analyses by Micro-Computed Tomography"*, **A. Li**, E. Cory, J. Caffrey, V. Wong, Q. Nguyen and R. Sah, Calit2 Summer Scholars Presentation, La Jolla CA, September 21st, 2012.

RESEARCH EXPERIENCE:

THEORETICAL NEUROSCIENCES GROUP
Sept 2017 – Aug 2018

Visiting Scientist under Dr. Viktor Jirsa (*viktor.jirsa@univ-amu.fr)* Marseille, France

Research Goal: The TNG lab aims at modelling the activity of the brain both in the normal and in the pathological case. For this purpose, we adopt a "multi-scale" approach. This means trying to understand the brain by binding in a single framework different resolution levels, and/or different time scales.

- 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**)
- Developed international relationships between Johns Hopkins and the University of Marseille to establish a 3-year data sharing agreement
- 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

NEUROMEDICAL CONTROL SYSTEMS LABORATORY
Aug 2015 – Present

Graduate Student Researcher under Dr. Sri Sarma (sree@jhu.edu) Baltimore, MD

Research Goal: To develop and apply new estimation, systems and control tools to (i) understand electrophysiological dynamics of neural circuits in health, and in disease, and (ii) to design more effective, adaptive, and safer treatment strategies for neurological disorders.

- 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
- 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**)

FUNCTIONAL AND RESTORATIVE NEUROSURGERY UNIT
Jan 2016 – Aug 2016

Graduate Student Researcher under Dr. Kareem Zaghloul Baltimore, MD

Research Goal: The lab exploits the unique opportunities provided by intracranial electrical recordings during neurosurgical procedures. Using recordings captured from epilepsy patients implanted with subdural and depth electrodes, we investigate the activation of cortical networks during memory encoding and recall.

- Researched memory reinstatement of a word pair remap associate task using Morlet wavelet, multitaper FFT and time series analysis
- Modified task extraction code to collect useful metadata about experimental events

NEURAL INTERACTION LABORATORY Sept 2013 – Sept 2015

Undergraduate Researcher under Dr. Coleman La Jolla, CA

- 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
- Mentored a senior Bioengineering design group within the design course sequence to engineer a cost-effective mobile eye tracking system in collaboration with a movement disorders specialist

QUALCOMM INSTITUTE Jun 2012 – Sept 2012

Summer Research Scholar under Calit2 La Jolla, CA

- Awarded $3000 to be a part of a 30-person cohort in order to conduct ~40+ hrs/week of independent research for the purpose of improving quality of life using emerging technologies and analytics
- Conducted initial feasibility experiments using a LabView programmed mechanical actuator to compress agarose hydrogels with embedded radiopaque particles, while imaging with 3D microCT
- Developed a computational method with 90% accuracy to measure strain and strain variance using quantitative statistical analysis

CARTILAGE TISSUE ENGINEERING LABORATORY Sept 2011 – Jun 2013

Undergraduate Researcher under Dr. Robert L Sah La Jolla, CA

- Created standard operating procedures for inventory processing, laboratory operations, tissue preparation, hydrogel polymerization, data collection methods and data analysis of CT images
- Scanned and analyzed bone and tissue images using microCT, Excel, Matlab and CT image analysis software and then documented experimental results through scientific reports
- Contributed to a large human cartilage research project by scanning ~20 samples over the course of an entire weekend for ~72 hrs straight; in collaboration with orthopedic surgeons and post-docs of lab

INDUSTRY EXPERIENCE:

NEUROLOGIC SOLUTIONS CORPORATION Sept 2018 – Present

Chief Technology Officer & Co-Founder Baltimore, MD

- Lead product development of software product for helping clinicians localize the epileptogenic zone in epileptic patients (**unit/integration testing, continuous integration, software documentation**)
- Led 510k FDA approval process involving risk analysis, and software requirements and design specifications while working with a team of 5

BIOMETRICS ANALYTICS Sept 2013 – Sept 2015

Co-Founder San Diego, CA

- 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

ENGINEERING WORLD HEALTH Sept 2012 – Sept 2014

Project Team Leader for PCR under Dr. David M Smith La Jolla, CA

- Collaborated with UCSD School of Medicine and a clinic in Mozambique to develop a rapid, cost-effective medical device for diagnosing HIV, which culminated in 2nd place for the EWH National Design Competition
- Led team of 10 in product development, while managing a budget of over $10,000. Developed firmware on microcontroller using C++ and C (utilized PID algorithm, SolidWorks and circuit design)
- Mentored and helped carry out "build days" with K-12 students to get them excited about science

UCSD COMPUTER SCIENCE Sept 2014 – Mar 2015

Computer Science Tutor under Gary Gillespie San Diego, CA

- Was sole bioengineer in cohort, and assisted 100+ students in learning basic data structures in C and C++
- Graded exams and assisted professor in communicating fundamental concepts in computer science

WEST HEALTH INSTITUTE 501© Jun 2014 – Jun 2015

Data Processing Intern under Asim Mittal San Diego, CA

- 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
- 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

GENENTECH INC. schimizzi.domenic@gene.com Jul 2013 – Jun 2014

Process Engineering Intern and College Ambassador under Domenic Schmizz San Francisco, CA

- 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 Structured Text, Sequential Flow Charting, SQL and Python)

HACKATHONS AND COMPETITIONS:

BOSCH CONNECTED WORLD (Cloudera Data Challenge) Feb 2018

- Improved a data pipeline to predict truck ETAs by ~25% accuracy using Impala database with Python

INTEL CORNELL CUP (1st place Nationwide) Apr 2016

- Created an augmented reality device using Intel hardware and software to help disabled individuals.

HOPHACKS (1st place in Biomedical Data Challenge) Feb 2016

- Created web app for web scraping, data visualization and search functionality of clinical trials in the USA

MEDHACKS @ JHU 2015 (1st place) Oct 2015

- Developed apparatus using ultrasound transducers, raspberry PI and web server to detect blood clots

MICROMOUSE @ UCSD 2015 May2015

- Developed micromouse with Teensy microcontroller, custom PCB, flood-fill alg, PID alg using C++/C

References:

THEORETICAL NEUROSCIENCES GROUP @ AIX-MARSEILLE UNIVERSITY Sept 2017 – Aug 2018

Visiting Scientist under Dr. Viktor Jirsa (*viktor.jirsa@univ-amu.fr)* Marseille, France

NEUROMEDICAL CONTROL SYSTEMS LABORATORY Aug 2015 – Present

Graduate Student Researcher under Dr. Sri Sarma (sree@jhu.edu) Baltimore, MD

NEURAL INTERACTION LABORATORY Sept 2013 – Sept 2015

Undergraduate Researcher under Dr. Coleman (tpcoleman@ucsd.edu) La Jolla, CA

CARTILAGE TISSUE ENGINEERING LABORATORY / QUALCOMM INSTITUTE Sept 2011 – Jun 2013

Undergraduate Researcher under Dr. Robert L Sah (*rsah@ucsd.edu)* La Jolla, CA

BIOMETRICS ANALYTICS Sept 2013 – Sept 2015

Chief Executive Officer & Co-Founder (neilrg11@gmail.com) San Diego, CA

UCSD COMPUTER SCIENCE Sept 2014 – Mar 2015

Computer Science Tutor under Gary Gillespie(gillespie@eng.ucsd.edu) San Diego, CA

WEST HEALTH INSTITUTE 501© Jun 2014 – Jun 2015

Data Processing Intern under Asim Mittal (asim.mittal@gmail.com) San Diego, CA

FUNCTIONAL AND RESTORATIVE NEUROSURGERY UNIT Jan 2016 – Aug 2016

Graduate Student Researcher under Dr. Kareem Zaghloul (kareem.zaghloul@nih.gov) Baltimore, MD