

Dominique Duncan

Laboratory of Neuro Imaging
USC Stevens Neuroimaging and Informatics Institute
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Research Interests

- Biomedical signal processing and image analysis
- Traumatic brain injury, epilepsy, Alzheimer's disease
- Mobile health
- Virtual reality, augmented reality
- Large-scale, multimodal data repositories
- Applied harmonic analysis
- Geometry-based data analysis and modeling
- Machine learning

Education

- **Yale University** New Haven, CT
Ph.D. Electrical Engineering 2013
 - Advisor: Ronald R. Coifman
 - Thesis: Nonlinear Factor Analysis of the EEG for Detection of Seizure Onset and Geometric Sensor Modeling
- **Yale University** New Haven, CT
M.Phil. Electrical Engineering 2010
- **Yale University** New Haven, CT
M.S. Electrical Engineering 2009
- **University of Chicago** Chicago, IL
B.S. Mathematics and B.A. Polish Literature (with Honors) 2007
 - Minor in Computational Neuroscience

Positions

- **University of Southern California** Los Angeles, CA
USC Stevens Neuroimaging and Informatics Institute 2016-present
 - Assistant Professor of Neurology, Neuroscience, and Biomedical Engineering

- **University of Southern California** Los Angeles, CA
USC Stevens Neuroimaging and Informatics Institute *2015-2016*
 - Postdoctoral Scholar
 - PI: Arthur Toga
- **University of California, Davis** Davis, CA
Department of Mathematics *2014-2015*
 - Postdoctoral Research Fellow
 - PI: Thomas Strohmer
- **Stanford University School of Medicine** Stanford, CA
Department of Neurology and Neurological Sciences *2013-2014*
 - Postdoctoral Research Fellow
 - PI: Josef Parvizi

Awards and Honors

- Induction into IEEE-HKN as a Professional Member into the Eta Chapter of the Board of Governors (2020)
- IEEE Senior Member (2019)
- One of 20 finalists for the Augmented World Expo (AWE EU 2018) Auggie Breakthrough Award in Munich, Germany (2018)
- The Southern California Clinical and Translational Science Institute Team Building Grant (2018)
- University of Southern California Provost's Postdoctoral Scholar Research Grant (2016 – 2017)
- National Science Foundation (NSF) Travel Award for Dynamical Systems and Applications IV in Lodz, Poland (June 2016)
- American Mathematical Society-Simons Travel Grant (2016–2018)
- University of Southern California Postdoctoral Scholar Training and Travel Award to Nonlocal Aspects in Mathematical Biology in Bedlewo, Poland (January 2016)
- Invitation to the National Institutes of Health (NIH) BD2K California Workshop (October 2015)
- Invitation to DARPA Workshop on Dynamics, Geometry, and Big Data Sets (May 2015)
- Association for Women in Mathematics (AWM) Travel Award to attend AWM Research Symposium (April 2015)
- AWM/NSF Travel Grant (November 2013)
- National Research Council Postdoctoral Fellowship for the Army Research Laboratory (declined) (June 2013)
- Yale University Graduate Student Assembly Conference Travel Fund Award for annual Society for Neuroscience Meeting in New Orleans, LA (December 2012)
- NSF Travel Award for Mathematical Methods in Systems Biology and Population Dynamics in Muizenberg, South Africa (January 2012)

- Yale University Graduate Student Assembly Conference Travel Fund Award for annual American Epilepsy Society Meeting in Baltimore, MD (December 2011)
- NSF Travel Award for Mathematical Methods in Systems Biology in Tel Aviv, Israel (January 2010)
- NSF Graduate Research Fellowship, Honorable Mention (2008)
- Yale University Faculty of Engineering Fellowship (September 2007 – 2008)
- Invited and fully supported by the National Institutes of Health at the International Workshop on Seizure Prediction in Freiburg, Germany (September 2007)
- University of Chicago University Scholar (September 2003 – June 2007)
- Neighborhood Schools Program Excellent Tutor Award (2006)
- NSF Research Experience for Undergraduates (REU) at the University of Kansas (2002)
- Slavic Languages and Literatures Department Scholarship at the University of Kansas (2001 – 2002)

Active Projects

- **National Science Foundation** 2020-2021
\$252,000 *PI*
 – RAPID: COVID-ARC (COVID-19 Data Archive)
- **National Institutes of Health** 2019-2023
\$980,919 *PI*
 – SCH: INT: Collaborative Research: Multimodal signal analysis and data fusion for post-traumatic epilepsy
- **National Institutes of Health** 2018-2023
\$6,160,745 *mPI*
 – Data Archive for the BRAIN Initiative (DABI)
- **National Institutes of Health** 2017-2021
\$21,507,243 *Investigator*
 – The Epilepsy Bioinformatics Study for Antiepileptogenic Therapy (EpiBioS4Rx)

Teaching and Other Research Experience

- **Neuroimaging and Informatics Masters Program (NIIN 520 Experimental Design for Neuroimaging), University of Southern California, 2020 – 2021**
- **Neuroimaging and Informatics Masters Program (NIIN 598 Current Topics in Neuroimaging and Informatics), University of Southern California, 2017 – 2019**
- **Neuroscience Graduate Program member, University of Southern California, 2016 – present**
- **Lion Education Professor, Sichuan University, Chengdu, China, Summer 2013**

- Teaching Calculus II, Calculus III, and Linear Algebra to Undergraduates
- **The Structure of Networks (Applied Math 160), Yale University, Spring 2013**
 - Teaching Fellow
- **Science and Quantitative Reasoning Center, Yale University, 2010 – 2013**
 - Tutored college students in Calculus (I, II, and III), Probability and Statistics, Complex Analysis, Real Analysis, and Linear Algebra.
- **Summer rotation in Behavioral Neuroscience Lab, Yale University, May – September 2008**
 - Worked in Thomas H. Brown’s lab and built electrodes, performed rodent brain surgeries, and collected data from experiments related to learning and memory.
- **Summer Undergraduate Program in Engineering Research at Berkeley (SUPERB), University of California, Berkeley, June – August 2006**
 - Highway traffic control research
 - Created MATLAB GUI to control on-ramp traffic flow on California highways
- **Neighborhood Schools Program, University of Chicago, April 2005 – June 2007**
 - Tutored sixth graders primarily in mathematics, but also in reading, writing, social studies, and politics.
 - Taught students computer skills to research topics for current events projects.
 - Prepared exams for teacher to give to students.
- **Volunteer Teaching English as a Second Language Class to Adults (ESL), University of Chicago, Fall 2004 – Winter 2005**
 - Taught a weekly class for Spanish-speaking adults (with no knowledge of English) at a Chicago school to read, write, and speak English.

Publications

- 1) La Rocca M, Barisano G, Bennett A, Garner R, Engel J, Gilmore EJ, McArthur DL, Rosenthal E, Stanis J, Vespa P, Willyerd F, Zimmerman L, Toga AW, Duncan D, *Distribution and volume analysis of early hemorrhagic contusions by MRI after traumatic brain injury: a preliminary report of the Epilepsy Bioinformatics Study for Antiepileptogenic Therapy (EpiBioS4Rx)*, submitted to Brain Imaging and Behavior, November 2020.
- 2) Duncan D, COVID-19 Data Sharing and Collaboration, Communications in Information and Systems. 2020, in press.
- 3) La Rocca M, Garner R, Lutkenhoff ES, Monti MM, Amoroso N, Vespa P, Toga AW, Duncan D, *Multiplex networks to characterize seizure development in traumatic brain injury patients*, Frontiers in Neuroscience. November 2020.
- 4) Bellantuono L, Marzano L, La Rocca M, Duncan D, Lombardi A, Maggipinto T, Monaco A, Tangaro S, Amoroso N, Bellotti R. brain age with complex networks: From adolescence to adulthood, NeuroImage. 2020 Oct 21, 117458.

- 5) Lutkenhoff ES, Shrestha V, Tejada JR, Real C, McArthur DL, Duncan D, La Rocca M, Garner R, Toga AW, Vespa PM, Monti MM, *Early brain biomarkers of post-traumatic epilepsy: initial report of the multicenter Epilepsy Bioinformatics Study for Anti-epileptogenic Therapy (EpiBioS4Rx) prospective study*, Journal of Neurology, Neurosurgery, and Psychiatry. Aug 26 2020.
- 6) Akbar MN, La Rocca M, Garner R, Duncan D, Erdogmus D. *Prediction of Epilepsy Development in Traumatic Brain Injury Patients from Diffusion Weighted MRI*, arXiv preprint arXiv:2004.14580. 2020 Apr 30.
- 7) La Rocca M, Garner R, Duncan D, *Machine learning model to characterize seizure development in traumatic brain injury patients*, in 21st International Federation of Automatic Control (IFAC) World Congress 2020.
- 8) Liu J, Garner R, La Rocca M, Bae EK, Duncan D, *The effects of filtering on high frequency oscillation classification*, in Proceedings of the IEEE Modeling and Simulation in Medicine Symposium 2020. Society for Computer Simulation International, 2020.
- 9) Cabeen RP, Immonen R, Harris NG, Grohn O, Smith G, Manninen E, Garner R, Duncan D, Pitkanen A, Toga AW, *A computational diffusion MRI framework for biomarker discovery in a rodent model of post-traumatic epileptogenesis*, in Proceedings of the International Symposium on Biomedical Imaging 2020 April.
- 10) Garner R, La Rocca M, Vespa P, Jones N, Monti MM, Toga AW, Duncan D, *Imaging biomarkers of posttraumatic epileptogenesis*, Epilepsia. October 2019.
- 11) Garner R, La Rocca M, Barisano G, Vespa P, Toga AW, Duncan D, *A machine learning model to predict seizure susceptibility from resting-state fMRI connectivity*, in Proceedings of the IEEE Modeling and Simulation in Medicine Symposium 2019 Apr 29 (p.14). Society for Computer Simulation International, 2019.
- 12) Immonen R, Pitkanen A, Santana Gomez C, Branch C, Wright D, Duncan D, Manninen E, Smith G, Ali I, Johnston L, Harris N, Puhakka N, Grohn O, Casillas-Espinosa PM, Andrade P, Salo R, Brady RD, Staba R, Cabeen R, Shultz S, O'Brien TJ, Ndode-Ekane XE, Toga A, *Harmonization of pipeline for preclinical multicenter MRI biomarker discovery in a rat model of post-traumatic epileptogenesis*, Epilepsy Research, 2019 January; 150:46-57.
- 13) Duncan D, Barisano G, Cabeen R, Seppehrband F, Garner R, Braimah A, Vespa P, Pitkanen A, Law M, Toga A, *Analytic tools for post-traumatic epileptogenesis biomarker search in multimodal dataset of an animal model and human patients*, Frontiers in Neuroinformatics, 2018 December.
- 14) Vespa PM, Shrestha V, Abend N, Agoston D, Au A, Bell MJ, Bleck TP, Blanco MB, Claassen J, Diaz-Arrastia R, Duncan D, *The epilepsy bioinformatics study for anti-epileptogenic therapy (EpiBioS4Rx) clinical biomarker: Study design and protocol*, Neurobiology of disease. 2018 July 23.
- 15) Duncan D, Garner R, Zrantchev I, Ard T, Newman B, Saslow A, Wanserski E, Toga A, *Using virtual reality to improve performance and user experience in manual correction of MRI segmentation errors by non-experts*, Journal of Digital Imaging, 2018 July, 1-8.
- 16) Tubi M,..., Duncan D, et al., *Early seizures and temporal lobe trauma predict post-traumatic epilepsy: A longitudinal study*, Special Issue on 'Antiepileptogenesis following traumatic brain injury', Neurobiology of Disease, 2018 June.
- 17) Duncan D, Vespa P, Pitkanen A, Braimah A, Lapinlampi N, Toga A, *Big data sharing and analysis to advance research in traumatic brain injury*, Special Issue on 'Antiepileptogenesis following traumatic brain injury', Neurobiology of Disease, 2018 June.

- 18) Duncan D, Vespa P, Toga A, *Detecting features of epileptogenesis in EEG after TBI using Unsupervised Diffusion Component Analysis*, Discrete & Continuous Dynamical Systems-Series B, 2018 January; 23(1).
- 19) Duncan D, Newman B, Saslow A, Wanserski E, Ard T, Essex R, Toga A, *VRain: Virtual reality assisted intervention for neuroimaging*, In Virtual Reality (VR), IEEE 2017, 2017 March; 467-8.
- 20) Ard T, Krum DM, Phan T, Duncan D, Essex R, Bolas M, Toga A, *NIVR: Neuro imaging in virtual reality*, In Virtual Reality (VR), IEEE 2017, 2017 March; 465-6.
- 21) Kashdan E, Duncan D, Parnell A, Schattler H, *Mathematical methods in systems biology*, Mathematical Biosciences and Engineering, 2016 December; 13(6):i-ii.
- 22) Duncan D and Strohmer T, *Classification of Alzheimer's Disease using Unsupervised Diffusion Component Analysis*, Mathematical Biosciences and Engineering, 2016 December; 13(6):1119-1130.
- 23) Joshi RB, Gaspard N, Goncharova I, Duckrow RB, Duncan D, Gerrard JL, Spencer DD, Hirsch LJ, Zaveri HP, *Regional and Network Relationship in the Intracranial EEG Second Spectrum*, Clinical Neurophysiology, 2016 November; 127(11):3485-91.
- 24) Duncan D, Duckrow RB, Pincus SM, Goncharova I, Hirsch LJ, Spencer DD, Coifman RR, Zaveri HP, *Reply to "About the electrophysiological basis of resting state networks,"* Clinical Neurophysiology, 2013 December; 125(8):1713-4.
- 25) Duncan D, Duckrow RB, Pincus SM, Goncharova I, Hirsch LJ, Spencer DD, Coifman RR, Zaveri HP, *Intracranial EEG Evaluation of Relationship Within a Resting State Network*, Clinical Neurophysiology, 2013 October; 124(10):1943-51.
- 26) Duncan D, Talmon R, Zaveri HP, Coifman RR, *Identifying preseizure state in intracranial EEG data using diffusion kernels*, Mathematical Biosciences and Engineering, 2013 June; 10(3):579-90.
- 27) Duncan D, Duckrow RB, Coifman RR, Zaveri HP, *Intracranial EEG Evaluation of a Resting State Network*, Challenges of Modern Technology, 2010 October-December; 1(1):27-29.
- 28) Fang J, Duncan D, Morse AS, *Sequential Localization with Inaccurate Measurements*, American Control Conference Proceedings, IEEE, 2009 June; 1970-5.
- 29) Fang J, Duncan D, Morse AS, *Sequential Localization with Inaccurate Measurements*, chapter in book: Localization Algorithms and Strategies for Wireless Sensor Networks, IGI Global, 2009.
- 30) Pasik-Duncan B, Whiffen P, Duncan D, *The power, beauty and excitement of a field that spans science, technology, engineering and mathematics*, American Control Conference Proceedings, IEEE, 2009.
- 31) Duncan D and Pasik-Duncan B, *From the Brain to the Stock Market*, Proceedings of Special Control Education Workshop, 17th IFAC World Congress, 2008.
- 32) Duncan D and Pasik-Duncan B, *Undergraduates' Partnership with K-12*, American Control Conference Proceedings, IEEE, 2002.

Patent

- Dominique Duncan and Arthur Toga, *Methods and analytical tools for the study and treatment of epileptogenesis*, USPTO Appl. No. 62/690.292 and Publication No. WO 2020/005525

Presentations

- *COVID-19 Information Commons Research Collaboration*
 - Invited talk at the International FAIR Convergence Symposium 2020 in November 2020.
- *Studying the brain and COVID-19 using multimodal data and large-scale data archives*
 - Invited talk at the University of Kansas Student Chapter of the Association for Women in Mathematics Seminar in October 2020.
- *COVID-19 Data Archive (COVID-ARC)*
 - Invited talk at IEEE International COVID-19 Congress (ICC) 2020 in August 2020.
- *To explore the challenges of organizing a full virtual technical conference*
 - Invited panelist at IEEE Virtual Conference Organizer's Panel 2020 in July 2020.
- *The impact of innovative multimodal quantitative methods to control post-traumatic epilepsy*
 - Invited talk at IEEE Technology for Impactful Sustainable Development (TENSYMP) 2020 in June 2020.
- *Data Archive for the BRAIN Initiative (DABI)*
 - Invited talk at the virtual Open Mind Consortium Workshop in June 2020.
- *The impact of innovative multimodal quantitative methods to control post-traumatic epilepsy*
 - Invited talk at the virtual IEEE TENSYMP 2020 conference in June 2020.
- *Multimodal data analysis for post-traumatic epilepsy*
 - Invited talk at the Pacific Rim Neuroimaging Meeting in Kahuku, Hawaii, February 2020.
- *Short Course: Analysis, Visualization and Data Sharing for Human Intracranial Recording and Stimulation*
 - Invited talk at the Winter Conference on Brain Research in Big Sky, Montana, January 2020.
- *Multimodal signal analysis and data fusion for post-traumatic epilepsy*
 - Invited talk and poster at the Smart and Connected Health PI Meeting at NSF, January 2020.
- *Scientific gaps in remote and ambulatory monitoring*
 - Selected and invited to speak on expert panel at the Smart and Connected Health PI Meeting at NSF, January 2020.
- *Analytic tools to study post-traumatic epilepsy using multi-modal data*
 - Invited talk at the University of Iceland Biomedical Center in Reykjavik, Iceland, August 2019.
- *Stepping inside the brain using virtual reality*
 - Invited talk at the International Federation of Automatic Control Advances in Control Education (IFAC-ACE) High School Workshop in Philadelphia, Pennsylvania, July 2019.

- *Multimodal signal analysis for post-traumatic epilepsy*
 - Poster presentation at the International Federation of Automatic Control Advances in Control Education (IFAC-ACE) Meeting in Philadelphia, Pennsylvania, July 2019.
- *Analytic tools for multimodal data to search for biomarkers of post-traumatic epileptogenesis*
 - Invited talk at the Society for Industrial and Applied Mathematics (SIAM) Conference on Control and Its Applications (CT19) in Chengdu, China, June 2019.
- *Efficient MRI segmentation of traumatic brain injury data using active learning*
 - Poster presentation at the Organization for Human Brain Mapping (OHBM) Annual Meeting in Rome, Italy, June 2019.
- *Analytic tools for identifying biomarkers of epileptogenesis after traumatic brain injury using multi-modal data*
 - Invited talk at the Institute for System Analysis and Computer Science seminar series at the CNR, the Italian National Research Council and University of L'Aquila, Rome, Italy, June 2019.
- *Analytic tools for identifying biomarkers of epileptogenesis after traumatic brain injury using multi-modal data*
 - Invited talk at the Automation and Control Engineering Program seminar series at the Politechnic University of Milan, Milan, Italy, June 2019.
- *Analytic tools for identifying biomarkers of epileptogenesis after traumatic brain injury using multi-modal data*
 - Invited talk at the Electrical and Electronics Engineering and Computer Science seminar series at the University of Pavia, Pavia, Italy, June 2019.
- *Traumatic brain injury and epilepsy research, neuroimaging visualization using virtual reality*
 - Invited talk at Family Science Night at the Crossroads School for Arts & Sciences in Santa Monica, CA, March 2019.
- *Identifying biomarkers of epileptogenesis after traumatic brain injury and using virtual reality to visualize brain MRI data and correct segmentation errors*
 - Invited talk for the Nu Rho Psi Neuroscience Honor Society Guest Lecture Series at the University of Southern California, Los Angeles, CA, February 2019.
- *Collaborative quality control and correction of neuroimaging data using web-services and virtual reality environment*
 - Invited talk for the Pilot Programs at the Keck School event at the University of Southern California, Los Angeles, CA, February 2019.
- *Analytic tools for identifying biomarkers of epileptogenesis after traumatic brain injury using multi-modal data and using virtual reality to correct segmentation errors in MRI*
 - Invited talk for the Center for Systems and Control at the Viterbi School of Engineering at the University of Southern California, Los Angeles, CA, January 2019.
- *Multidisciplinary research and neurological applications*

- Invited talk for the Biology Club at La Quinta High School, Westminster, CA, December 2018.
- *Quality control of MRI segmentation using virtual reality and crowdsourcing*
 - Dynamic poster presentation at the Society for Neuroscience Annual Meeting in San Diego, CA, November 2018.
- *Correcting Segmentation Errors in Neuroimaging Data using Virtual Reality*
 - Invited talk and demo at the first annual USC Virtual Technologies for Health Symposium in Los Angeles, CA, September 2018.
- *Nonlinear factor analysis for identifying features of epileptogenesis after traumatic brain injury*
 - Invited talk at the USC Neuroscience Graduate Program Retreat at the American Jewish University Brandeis-Bardin Campus, Simi Valley, CA, September 2018.
- *Nonlinear factor analysis for identifying features of epileptogenesis after traumatic brain injury*
 - Invited talk at the 2018 International Federation for Information Processing Technical Committee (IFIP TC) 7 Conference on System Modelling and Optimization in Essen, Germany, July 2018.
- *Paravascular spaces in post-traumatic epilepsy patients*
 - Poster presentation at the Organization for Human Brain Mapping (OHBM) Annual Meeting in Singapore, June 2018.
- *Visualization and manual correction of brain segmentation failures using virtual reality*
 - Poster presentation at the Organization for Human Brain Mapping (OHBM) Annual Meeting in Singapore, June 2018.
- *Using Unsupervised Diffusion Component Analysis on EEG of Posttraumatic Epilepsy Patients*
 - Invited talk at the 2018 European Conference on Mathematics for Industry (ECMI) in Budapest, Hungary, June 2018.
- *The Brain and Big Data*
 - Invited talk at Family Science Night at the Crossroads School for Arts & Sciences in Santa Monica, CA, May 2018.
- *Virtual Brain Segmenter (VBS)*
 - Exhibit booth at the annual American Academy of Neurology (AAN) meeting in Los Angeles, CA, April 2018.
- *The Postdoc Roadmap—Marching Toward Independence*
 - Invited Panelist at the Preparing for the Faculty Job Market seminar series in Los Angeles, CA, March 2018.
- *Academia—Careers in STEM*
 - Invited Panelist at Beyond the PhD, the 7th Annual PhD and Postdoctoral Career Conference in Los Angeles, CA, March 2018.
- *Virtual Reality and Neuroscience*

- Invited talk at the 2018 Los Angeles Brain Bee, Los Angeles, CA, February 2018.
- *Predicting Epileptogenesis after Traumatic Brain Injury and Using Virtual Reality to Correct Segmentation Errors in MRI*
 - Invited talk at the Mechanical and Civil Engineering Seminar, California Institute of Technology in Pasadena, CA, January 2018.
- *Identifying epileptogenic biomarkers after traumatic brain injury using Diffusion Component Analysis*
 - Poster presentation at the Society for Neuroscience Annual Meeting in Washington, DC, November 2017.
- *The ‘Glass’ Brain – Secrets of the Mind and Brain Revealed*
 - Invited talk at the Carlyle Summit in Santa Barbara, CA, September 2017.
- *Identifying Biomarkers of Epileptogenesis after Traumatic Brain Injury and Correcting Segmentation Errors in Neuroimaging Data using Virtual Reality*
 - Invited talk for the USC Stevens Neuroimaging and Informatics Institute Masters Program in Los Angeles, CA, August 2017.
- *Identifying Biomarkers of Epileptogenesis after Traumatic Brain Injury and Correcting Segmentation Errors in Neuroimaging Data using Virtual Reality*
 - Invited talk for the USC Neuroscience Graduate Program in Los Angeles, CA, August 2017.
- *The Human Brain and Neurological Disorders*
 - Invited talk to K-12 students and teachers at the Lincoln Heights Tutorial Program in Los Angeles, CA, July 2017.
- *Crowdsourcing Manual Validation of Algorithmically Segmented Brain Volumes through Virtual Reality*
 - Poster presentation at the Organization of Human Brain Mapping (OHBM) annual meeting in Vancouver, Canada, June 2017.
- *Predicting Epileptogenesis after Traumatic Brain Injury and Using Virtual Reality to Correct Segmentation Errors in MRI*
 - Invited talk at the Association for Women in Mathematics Seminar at the University of Kansas, Lawrence, KS, May 2017.
- *Academia–Careers in STEM*
 - Invited Panelist at Beyond the PhD, the 6th Annual PhD and Postdoctoral Career Conference in Los Angeles, CA, March 2017.
- *Virtual Reality Assisted Intervention for Neuroimaging (VRAIN)*
 - Research Demo session at IEEE VR 2017 in Los Angeles, CA, March 2017.
- *Predicting Epileptogenesis after Traumatic Brain Injury, Resting State Networks and icEEG, and Using Virtual Reality to Correct Segmentation Errors in MRI*

- Invited talk at Neuroradiology Conference at USC, Los Angeles, CA, January 2017.
- *Predicting Epileptogenesis after Traumatic Brain Injury, Resting State Networks and icEEG, and Using Virtual Reality to Correct Segmentation Errors in MRI*
 - Invited talk at Biomedical Engineering Seminar at USC, Los Angeles, CA, January 2017.
- *Advances in Understanding and Analyzing the Human Brain*
 - Invited talk at the Workshop for High School Teachers and Students: The Power, Beauty and Excitement of the Cross-Boundaries Nature of Control, a Field that Spans Science, Technology, Engineering & Mathematics (STEM) in conjunction with the IEEE CDC in Las Vegas, NV, December 2016.
- *Unsupervised Diffusion Component Analysis in Post-Traumatic Epilepsy*
 - Poster presentation at the Society for Neuroscience Annual Meeting in San Diego, CA, November 2016.
- *Detecting Features of Epileptogenesis in EEG using Diffusion Component Analysis*
 - Invited talk at the Dynamical Systems and Applications IV in Lodz, Poland, June 2016.
- *Predicting Epilepsy after Traumatic Brain Injury*
 - Invited talk at the first annual University of Southern California Postdoctoral Symposium, Los Angeles, CA, May 2016.
- *Diffusion Component Analysis in Post-Traumatic Epilepsy*
 - Invited talk at the Nonlocal Aspects in Mathematical Biology in Bedlewo, Poland, January 2016.
- *Nonlinear Factor Analysis in Neurological Applications, such as Alzheimer's Disease and Epilepsy*
 - Invited talk at the Applied Mathematics and Mathematical Medicine and Biology Seminar at the University of Delaware, Newark, DE, October 2015.
- *Classification of Alzheimer's Disease using Unsupervised Diffusion Component Analysis*
 - Invited talk at the SIAM Conference on Control and its Applications (CT15) in Paris, France, July 2015.
- *Stochastic Modeling and MRI Data Analysis of Patients with Alzheimer's Disease*
 - Invited talk at the IFIP TC7 Conference on System Modelling and Optimization in Sophia Antipolis, France, June 2015.
- *Classification of Alzheimer's Disease using Unsupervised Diffusion Component Analysis*
 - Invited talk at the Mathematical Methods in Systems Biology Workshop in Dublin, Ireland, June 2015.
- *Identifying Changes in Brain MRI in Early Stages of Alzheimer's Disease*
 - Invited talk at the Micro and Macro Systems in Life Sciences Conference in Bedlewo, Poland, June 2015.
- *Nonlinear Factor Analysis in Neurological Applications*

- Invited talk at the Young Researchers Colloquium at the Institute of Mathematics Polish Academy of Sciences in Warsaw, Poland, May 2015.
- *Nonlinear Factor Analysis in Neurological Applications*
 - Invited talk at the DARPA Workshop on Dynamics, Geometry, and Big Data Sets in Washington, DC, May 2015.
- *Nonlinear Factor Analysis in Neurological Applications*
 - Invited talk at the Sensory Motor Performance Program Seminar at the Rehabilitation Institute of Chicago in Chicago, IL, May 2015.
- *How to Find and Negotiate a Postdoc Position, and Get the Most Out of It*
 - Invited talk at panel discussion at 16th Annual Career Connections Symposium at UC Davis, Davis, CA, March 2015.
- *The Legacy of Jerzy Neyman*
 - Invited talk at the Joint Mathematics Meetings in San Antonio, Texas, January 2015.
- *Understanding and Analyzing the Human Brain: Opportunities for Controls*
 - Invited talk at the Workshop for High School Students and Teachers: "The Power, Beauty and Excitement of the Cross-Boundaries Nature of Control, a Field that Spans Science, Technology, Engineering, and Mathematics (STEM)" at the Conference on Decision and Control in Los Angeles, California, December 2014.
- *Nonlinear Factor Analysis in Neurological Applications*
 - Invited talk at the National Chiao Tung University, Hsinchu, Taiwan, December 2014.
- *Classification of Alzheimer's Disease Using Nonlinear Independent Component Analysis*
 - Poster presented at the Society for Neuroscience Annual Meeting in Washington, DC, November 2014.
- *Nonlinear Independent Component Analysis in Neurological Applications*
 - Invited talk at the Mathematical Biology Seminar at UC Davis, Davis, CA, October 2014.
- *Understanding and Analyzing the Human Brain: Opportunities for Controls*
 - Invited talk at the Workshop for High School Students and Teachers: "The Beauty of Feedback Control," at the International Federation of Automatic Control World Congress in Cape Town, South Africa, August 2014.
- *Classification of Alzheimer's Disease Using Nonlinear Independent Component Analysis*
 - Invited talk at the 21st International Symposium on Mathematical Theory of Networks and Systems in Groningen, Netherlands, July 2014.
- *The Brain, its Disorders, and Controls*
 - Invited talk at the Workshop for Middle and High School Students and Teachers: "The Beauty of Controls," at the American Control Conference in Portland, OR, June 2014.
- *Nonlinear Factor Analysis of the EEG for Detection of Seizure Onset*

- Invited talk at the Combined Applied PDE Seminar at UC Davis, Davis, CA, May 2014.
- *Mathematics and Mystery of the Brain*
 - Invited talk at the University of Kansas Department of Mathematics for the Association for Women in Mathematics and Mathematics Awareness Month, Lawrence, KS, April 2014.
- *Nonlinear Factor Analysis of the EEG for Detection of Seizure Onset and Geometric Sensor Modeling*
 - Invited talk at the Dynamical Neuroscience Seminar at the University of California, Santa Barbara, CA, April 2014.
- *Detecting Preseizure States in Intracranial EEG Data Using an Adaptation of Diffusion Maps*
 - Poster presented at the Society for Neuroscience Annual Meeting in San Diego, CA, November 2013.
- *Detecting Preseizure States in Intracranial EEG Data Using Diffusion Kernels*
 - Poster presented at the 6th International Workshop on Seizure Prediction in San Diego, CA, November 2013.
- *Predicting Seizures in Intracranial EEG Data Using Diffusion Maps*
 - Poster presented at Yale Epilepsy Retreat, Madison, CT, October 2012.
- *Relationship Analysis Using Intracranial EEG in Resting State Networks*
 - Poster presented at the annual Society for Neuroscience meeting, New Orleans, LA, October 2012.
- *Predicting Seizures in Intracranial EEG Data Using Diffusion Maps*
 - Poster presented at the Challenges in Geometry, Analysis, and Computation: High-Dimensional Synthesis conference, Yale University, New Haven, CT, June 2012.
- *Predicting Seizures in Intracranial EEG Data Using Diffusion Maps*
 - Invited talk at Mathematical Methods in Systems Biology and Population Dynamics in Muizenberg, South Africa, January 2012.
- *A Lack of Intracranial EEG Support for a Resting State Network Observed with fMRI*
 - Poster presented at American Epilepsy Society Annual Meeting in Baltimore, MD, December 2011.
- *A Possible Lack of Intracranial EEG Support for a Resting State Network Observed with fMRI*
 - Poster presented at Yale Epilepsy Retreat, Madison, CT, October 2011.
- *Coherence, Mutual Information, and Approximate Entropy in Intracranial EEG Evaluation of a Resting State Network*
 - Invited talk in Mini-Symposium on Stochastic Methods, Identification and Control, SIAM Conference on Control and its Applications, Baltimore, MD, July 2011.
- *Detection of Anomalies in the Brain*

- Invited talk at Ideas and Technology of Control Systems at American Control Conference, Baltimore, MD, June 2010.
- *Intracranial EEG Evaluation of a Resting State Network*
 - Invited talk at the PhD Students and Young Scientists Conference: Young Scientists Towards the Challenges of Modern Technology in Warsaw, Poland, September 2010.
- *The Detection of Anomalies in EEG Data Using Diffusion Geometry*
 - Poster presented at Mathematical Methods in Systems Biology in Tel Aviv, Israel, January 2010.
- *The Detection of Anomalies in EEG Data Using Diffusion Geometry*
 - Invited talk at IFIP TC 7 Conference on System Modelling and Optimization in Buenos Aires, Argentina, July 2009.
- *Analysis of Brain Data*
 - Invited talk in Mini-Symposium on Computational Methods and Control, SIAM Conference on Control and its Applications, Denver, CO, July 2009.
- *Sequential Localization with Inaccurate Measurements*
 - Invited talk at American Control Conference in St. Louis, MO, June 2009.
- *The Measurement of Relationships in Brain Networks*
 - Invited talk at the Conference on Applications of Mathematics in Zakopane, Poland, September 2008.
- *From the Brain to the Stock Market*
 - Invited talk at the Workshop at the International Federation of Automatic Control World Congress in Seoul, South Korea, July 2008.
- *Random Walk Around Some Problems in Stochastic Systems and Control*
 - Invited talk at Plain Talk on Control for a Wide Range of the Public Special Session at the Conference on Decision and Control (CDC), New Orleans, LA, 2007.
- *Random Walk Around Some Stochastic Control Problems in Telecommunication, Finance and Medicine*
 - Invited talk at the IFAC Workshop for High School Teachers and Students in Prague, Czech Republic, July 2005 and in Madrid, Spain, July 2006.

Academic Service and Contributions

- IEE Bio Imaging and Signal Processing Technical Committee Affiliate Member (2021 – present)
- NIH reviewer, Biomedical Computing and Health Informatics (BCHI) Study Section (June and November 2020)

- Review Editor, Understanding Neuroscience, specialty section of Frontiers for Young Minds (2020 – present)
- Associate Editor for contributed papers for the Biomedical and Health Informatics Theme for the IEEE Engineering in Medicine and Biology Conference (EMBC) (2020 – present)
- Associate Editor for the Student Paper Competition (SPC) for the 2020 IEEE Engineering in Medicine and Biology Conference (EMBC 2020) (2020)
- Member of the USC Research Visionaries: Dean’s Seminar Series Selection Committee (2019 – present)
- Reviewer for the Clinical and Translational Science Awards (CTSA) External Reviewers Exchange Consortium (2019)
- Associate Editor for contributed papers for the IFAC Symposium: Advances in Control Education (ACE 2019) (2019)
- Member of the USC Neuroscience Graduate Program Admissions Committee (2017 – present)
- Member of the USC Neuroimaging and Informatics (NIIN) Masters Program Admissions Committee (2017 – present)
- Big Data Discovery and Diversity Through Research Education Advancement and Partnerships (BD3-REAP) Advisory Board member (2016 – present)
- Associate Editor for contributed papers for the IFAC Symposium: Advances in Control Education (ACE 2016) (2016 – present)
- Member of the International Programme Committee of the IFAC Symposium: Advances in Control Education (ACE 2016) (2016)
- Co-organizer of the Workshop on Stochastic Control and Related Fields, IEEE CDC 2016, Las Vegas, NE (2016)
- Member of the IEEE Women in Engineering Outreach Sub-committee (2015 – present)
- Co-Editor of the Mathematical Biosciences and Engineering (MBE) journal (2015 – present)
- Served on NSF review panel (2014, 2015, 2017, 2018, 2020, 2021)
- Elected Communications Chair of the University of Southern California Postdoctoral Association (2015 – 2016)
- Elected member of the IFAC TC 9.4 Technical Committee on Control Education (2014 – present)
- Member of the IEEE Control Systems Society Technical Committee on Education (2014 – present)
- Reviewer for International Federation of Automatic Control, Conference on Decision and Control, Neurobiology of Disease, American Control Conference, Epilepsy Research, Spring Simulation Conference, IEEE MED, International Conference on Control, Decision and Information Technologies, Communications Biology, and Journal of Pediatric Epilepsy (2007 – present)
- Organizing Committee for first UC Davis Postdoctoral Research Symposium (2015)
- Elected Chair of the University of California, Davis Postdoctoral Scholars Association (2014 – 2015)
- Elected Council Member in the Stanford University Postdoctoral Association (2013 – 2014)

- Stanford University Women in Science and Engineering member (2013 – 2014)
- Stanford University Postdoc Symposium Organizing Committee member (2013 – 2014)
- Elected Senator representing Engineering for the Yale University Graduate and Professional Student Senate (2007 – 2013)
- President of the University of Chicago Polish American Student Association (PASA) (2006 – 2007)
- Chair of the University of Chicago Committee on Recognized Student Organizations (CORSO) (2006 – 2007)
- University of Chicago Student government Executive Committee member (2006 – 2007)
- Treasurer of the University of Chicago Polish American Student Association (2005)
- Control Committee and American Automatic Control Council Technical Committee on Education, representing students, (2004 – present)
- Vice President of the University of Chicago Mathematics Club (2004 – 2006)
- Appointed member of the IEEE Control Systems Society Technical Committee on Control Education, representing undergraduates (2004)

Professional Affiliations

- American Epilepsy Society, 2019 – present
- American Academy of Neurology, 2018 – present
- Organization for Human Brain Mapping, 2017 – present
- Society for Neuroscience, 2012 – present
- Society for Industrial and Applied Mathematics, 2009 – present
- The Institute of Electrical and Electronics Engineers (IEEE), 2008 – present
- IEEE Women in Engineering, 2008 – present
- IEEE Control Systems Society, 2008 – present
- Association for Women in Mathematics, 2002 – present
- IEEE Control Systems Society Women in Control, 1996 – present

Technical Skills

- MATLAB, L^AT_EX, Mathematica, FreeSurfer, FSL, BrainSuite, SPSS, STATA, SAS, R
- Electrode fabrication for in vivo experimentation
- Experience with performing surgical procedures to implant electrodes in brains of rodents
- MRI trained (3T and 7T)
- CPR/AED certified