Archana Venkataraman

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Education

Massachusetts Institute of Technology, Cambridge, MA

> **Ph.D.**, Electrical Engineering — Sept 2007 – Sept 2012
> Thesis Title: Generative Models of Brain Connectivity for Population Studies
> Thesis Supervisor: Polina Golland

> **M. Eng.**, Electrical Engineering — Sept 2006 – Sept 2007
> Thesis Title: Signal Approximation using the Bilinear Transform
> Thesis Supervisor: Alan V. Oppenheim

> **S.B.**, Electrical Engineering — Sept 2003 – June 2006
> Concentration: Communications, Controls and Signal Processing

Academic and Research Positions

> **John C. Malone Assistant Professor, Johns Hopkins, Baltimore MD** — Aug 2016 – Present
> Department of Electrical and Computer Engineering
> Department of Computer Science (Secondary Appointment)
> Malone Center for Engineering in Healthcare (Core Faculty)
> Mathematical Institute for Data Science (Core Faculty)

> **Research Assistant Professor, Johns Hopkins, Baltimore MD** — April 2016 – Aug 2016
> Department of Electrical and Computer Engineering

> **Postdoctoral Associate, Yale School of Medicine, New Haven CT** — Jan 2014 – April 2016
> Department of Diagnostic Radiology
> Yale Image Processing and Analysis Group
> *Faculty Supervisor: James S. Duncan*

> **Postdoctoral Fellow, MIT, Cambridge MA** — Sept 2012 – Dec 2013
> Department of Electrical Engineering and Computer Science
> MIT Medical Vision Group
> *Faculty Supervisor: Polina Golland*

> **Graduate Research Assistant (PhD), MIT, Cambridge MA** — Jan 2008 – Aug 2012
> Department of Electrical Engineering and Computer Science
> MIT Medical Vision Group
> *Faculty Supervisor: Polina Golland*

> **Graduate Research Assistant (MS), MIT, Cambridge MA** — Jan 2006 – Dec 2007
> Department of Electrical Engineering and Computer Science
> Digital Signal Processing Group
> *Faculty Supervisor: Alan V. Oppenheim*

> **Undergraduate Research Assistant, MIT, Cambridge MA** — Sept 2004 – Jan 2006
> Department of Electrical Engineering and Computer Science
> Microsystems Technology Laboratory
> *Faculty Supervisor: Anantha P. Chandrakasan*

Undergraduate Research Assistant, MIT, Cambridge MA Sept 2003 – June 2004
Department of Electrical Engineering and Computer Science
MIT Nanostructures Laboratory
Faculty Supervisor: Henry I. Smith

Industry Experience

Technical Consultant, Vixiar Medical, Annapolis MD May 2018 – Nov 2019

Intern, MIT Lincoln Laboratory, Lexington MA June 2006 – Aug 2006
Advanced Sensor Techniques Group (103)
Supervisor: Dr. Andrew McKellips

Intern, Xerox Corporation, Rochester NY June 2004 – Aug 2004
XCEL Summer Internship Program

Awards and Honors

Best Paper Award, Machine Learning for Clinical Neuroimaging Workshop	2020
Elected to Full Membership in the Sigma Xi Honor Society	2020
Invited Participant, National Academy of Engineering FOE Symposium	2020
Invited Participant, World Leader's Forum	2020
Best Paper Award, Connectomics for NeuroImaging Workshop	2019
MIT Technology Review: 35 Innovators Under 35	2019
NSF CAREER Award	2019
John C. Malone Assistant Professorship	2017
Council of Early Career Investigators in Imaging (CECI^2) Travel Award	2016
CHDI Grant, Network Models of Brain Connectivity for Huntington's Disease	2013 – 2014
MIT Lincoln Lab Campus Collaboration Award	2012 – 2014
NIH Advanced Multimodal Neuroimaging Training Program	2011 – 2012
MICCAI Student Travel Award ($500)	2010
National Defense Science and Engineering Graduate Fellowship (NDSEG)	2007 – 2010
Siebel Scholarship ($20,000)	2007 – 2008
MIT Provost Presidential Fellowship	2006 – 2007
Morris Joseph Levin Award, Best Thesis Presentation (M.Eng.)	2007
Asssociation of MIT Alumnae, Senior Academic Achievement Award ($500)	2006
Xerox Technical Minority Scholarship ($10,000)	2006
Maletta Foundation Scholarship, Rochester Engineering Society ($2500)	2005
Semiconductor Research Corporation Undergraduate Research Award ($18,000)	2004 – 2005
Xerox Technical Minority Scholarship ($2,500)	2004
National Merit Scholarship ($2,500)	2003

Trainee Awards and Honors

Niharika Shimona D'Souza (PhD Student), Mathematical Institute for Data Science Fellowship	2021
Ravi Shankar (PhD Student), Mathematical Institute for Data Science Fellowship	2021
Naresh Nandakumar (PhD Student), Best Paper Award, ML for Clin. Neuroimaging Workshop	2020
Niharika Shimona D'Souza (PhD Student), Best Paper Award, ML for Clin. Neuroimaging Workshop	2020
Niharika Shimona D'Souza (PhD Student), Selected for the Rising Stars Program @ UChicago	2020
Niharika Shimona D'Souza (PhD Student), Selected for the Rising Stars Program @ UC Berkeley	2020
Sayan Ghosal (PhD Student), MICCAI Travel Award	2020
Niharika Shimona D'Souza (PhD Student), MICCAI Travel Award	2020
Ravi Shankar (PhD Student), Interspeech Travel Award	2020

Ravi Shankar (PhD Student), Mathematical Institute for Data Science Fellowship 2020
Naresh Nandakumar (PhD Student), Best Paper Award, Connectomics in Neuroimaging Workshop 2019
Jeff Craley (PhD Student), Finalist WSE/DOM Young Scientist Award 2019
Niharika Shimona D'Souza (PhD Student), IPMI Travel Award 2019
Niharika Shimona D'Souza (PhD Student), MICCAI Travel Award 2018
Jacob Sager (Undergraduate), William B. Huggins Undergraduate Research Fellowship 2018

PROFESSIONAL SERVICE ACTIVITIES

Editorial Responsibilities

Editorial Board, Journal of Imaging 2021 – Present
Handling Editor, OHBM Aperture 2020 – Present
Editorial Board Member, Medical Image Analysis 2019 – Present
Associate Editor, International Symposium on Biomedical Imaging (ISBI) 2021
Review Editor, *Brain Imaging Methods*, Frontiers of Neuroscience 2020
Editor, Connectomics in Neuroimaging, 2019
    Springer MICCAI Workshops Series, ShenZhen, China
Editor, Computational Diffusion MRI and Brain Connectivity 2014
    Springer Mathematics & Visualization Series

Grant Reviewing Activities

2020   NSF Panelist: CAREER Panel (CISE Directorate)
         NSF Panelist: Collaborative Research in Computational Neuroscience (CISE Directorate)

2019   NSF Panelist: CAREER Panel (CISE Directorate)
         NSF Ad-Hoc Reviewer: III Small Informatics Panel (CISE Directorate)
         NSF Panelist: Collaborative Research in Computational Neuroscience (CISE Directorate)
         NSF Panelist: III Medium Informatics Panel (CISE Directorate)

2018   NIH Reviewer: Neuroscience and Ophthalmic Imaging Technologies (NOIT) Study Section

Conference and Workshop Organization

2021   Co-Director, 55th Annual Conference on Information Sciences and Systems (CISS)
         Sponsored by the IEEE Information Theory Society
         Paper Selection Committee, IEEE International Symposium on Biomedical Imaging

2020   Organizer, Asilomar Invited Session: *From Neural Networks to Neural Systems: Using AI*
         to Decode the Brain in Health and Disease
         Area Chair for Medical Image Computing and Computer Assisted Intervention (MICCAI)
         Session Chair for Medical Image Computing and Computer Assisted Intervention (MICCAI)

2019   Organizer, CNI: MICCAI Workshop on Connectomics in Neuroimaging
         Organizer, CISS Invited Session: Mathematical Models to Decode the Brain
         Area Chair for Medical Image Computing and Computer Assisted Intervention (MICCAI)
         Area Chair for Medical Imaging with Deep Learning (MIDL)
         Session Chair, Conference on Information Processing in Medical Imaging (IPMI)

2018   Organizing Committee, Rising Stars in Biomedical Workshop
         Technical Program Committee, MICCAI Workshop on Connectomics in Neuroimaging
         Session Chair, IEEE International Symposium on Biomedical Imaging

2017   Technical Program Committee, IEEE Conference on Information Sciences and Systems
         Session Chair, Conference on Information Processing in Medical Imaging

2013   Organizer, MMBC: MICCAI Workshop on Mathematical Models for Brain Connectivity

Conference and Journal Reviewing Activities

Frontiers in Neuroscience	2019 – Present
NeuroImage: Clinical	2017 – Present
NeuroImage	2015 – Present
IEEE Transactions on Medical Imaging	2013 – Present
Medical Image Analysis	2013 – Present
Journal of Selected Topics in Signal Processing	2017 – 2018
Public Library of Science (PLoS) One	2016 – 2017
Information Processing in Medical Imaging	2021
NeurIPS: Neural Information Processing Systems	2019 – 2020
Rated by the program committee among the Top 5% of Reviewers in 2019	
MICCAI: Medical Image Computing and Computer Assisted Intervention	2012 – 2018
CISS: IEEE Conference on Information Sciences and Systems	2017
CVPR: IEEE Conference on Computer Vision and Pattern Recognition	2010

BOOK CHAPTERS AND VOLUMES

[B1] M.D. Schirmer, **A. Venkataraman**, I. Rekik, M. Kim, A. Wern Chung (Eds.). *Connectomics in NeuroImaging: MICCAI Workshops, ShenZhen, China*, October 2019.

[B2] **A. Venkataraman**. *Autism Spectrum Disorders: Unbiased Functional Connectomics Provide New Insights into a Multifaceted Neurodevelopmental Disorder*. Connectomics: Methods, Mathematical Models and Applications, Eds. B. Munsel, G. Wu, P. Laurienti, Elsevier Academic Press, 2018.

[B3] T. Schultz, G. Nedjati-Gilani, **A. Venkataraman**, L. O'Donnell, E. Panagiotaki (Eds.). *Computational Diffusion MRI and Brain Connectivity: MICCAI Workshops, Nagoya, Japan*, January 2014.

SUBMITTED PAPERS UNDER REVIEW

[S1] Y. Peng, N.S. D'Souza, B. Bush, C. Brown, **A. Venkataraman**. *Predicting Acute Kidney Injury via Interpretable Ensemble Learning and Attention Weighted Convolutional–Recurrent Neural Networks*. Under Review for Conference on Information Sciences and Systems (CISS), 2021.

[S2] D. Currey, D. Hsu, R. Ahmed, **A. Venkataraman**, J. Craley. *Cross-Site Epileptic Seizure Detection Using Convolutional Neural Networks*. Under Review for Conf. on Information Sciences and Systems (CISS), 2021.

[S3] J. Craley, C. Jouny, E. Johnson, **A. Venkataraman**. *Semi-Supervised Seizure Activity Tracking with Graph Convolutional Networks*. Under Review for Information Processing in Medical Imaging (IPMI), 2021.

[S4] N. Nandakumar, K. Manzoor, S. Agarwal, J. Pillai, S. Gujar, H. Sair, **A. Venkataraman**. *A Multi-Scale Spatial and Temporal Attention Network on Dynamic Connectivity to Localize The Eloquent Cortex in Brain Tumor Patients*. Under Review for Information Processing in Medical Imaging (IPMI), 2021.

[S5] B. Tang, Y. Zhao, **A. Venkataraman**, K. Tsapkini, M. Lindquist, J. Pekar, B. Caffo. *Changes in Functional Connectivity after Transcranial Direct-Current Stimulation: A Connectivity Density Point of View*. Under Review for NeuroImage, 2021.

[S6] S. Ghosal, Q. Chen, G. Pergola, A.L. Goldman, W. Ulrich, K.F. Berman, A. Rampino, G. Blasi, L. Fazio, A. Bertolino, D.R. Weinberger, V.S. Mattay, **A. Venkataraman**. *A Generative Discriminative Framework that Integrates Imaging, Genetic, and Diagnosis into Coupled Low Dimensional Space*. Under Revision for NeuroImage, 2021.

[S7] N.S. D'Souza, M.B. Nebel, D. Crocetti, N. Wymbs, J. Robinson, S. Mostofsky, **A. Venkataraman**. *Deep sr-DDL: Deep Structurally Regularized Dynamic Dictionary Learning to Integrate Multimodal and Dynamic Functional Conn. for Multidimensional Clinical Characterizations*. Under Revision for NeuroImage, 2021.

[S8] N. Nandakumar, K. Manzoor, S. Agarwal, J. Pillai, S. Gujar, H. Sair, **A. Venkataraman**. *Automated Eloquent Cortex Localization in Brain Tumor Patients Using Multi-task Graph Neural Networks.* Under Second Review for Medical Image Analysis (MedIA), 2021.

JOURNAL ARTICLES

[J1] M.D. Schirmer, **A. Venkataraman**, I. Rekik, M. Kim, S. Mostofsky, M.B. Nebel, K. Rosch, K. Seymour, D. Crocetti, H. Irzan, M. Hutel, S. Ourselin, N. Marlow, A. Melbourne, E. Levchenko, S. Zhou, M. Kunda, H. Lu, N.C. Dvornek, J. Zhuang, G. Pinto, S. Samal, J.L. Bernal-Rusiel, R. Pienaar, A. Wern Chung. *Neuropsychiatric Disease Classification Using Functional Connectomics – Results of the Connectomics in NeuroImaging Transfer Learning Challenge*, Medical Image Analysis (MedIA), In Press, 2021.

[J2] J. Craley, C. Jouny, E. Johnson, **A. Venkataraman**. *Automated Inter-Patient Seizure Detection Using Multichannel Convolutional and Recurrent Neural Networks.* Journal of Biomedical Signal Processing and Control, 64:102360, 2021 (ePub 2020).

[J3] X. Liu, K. Akiyoshi, M. Nakano, K. Brady, B. Bush, R. Nadkarni, **A. Venkataraman**, R.C. Koehler, J.K. Lee, C.W. Hogue, M. Czosnyka, P. Smielewski, C.H. Brown. *Determining Thresholds for Three Indices of Autoregulation to Identify the Lower Limit of Autoregulation During Cardiac Surgery.* Journal of Critical Care Medicine, Online First, 2020.

[J4] N.S. D'Souza, N. Wymbs, M.B. Nebel, S. Mostofsky, **A. Venkataraman**. *A Joint Network Optimization Framework to Predict Clinical Severity from Resting State fMRI Data.* NeuroImage, 206:116314, 2020.

[J5] J. Craley, E. Johnson, **A. Venkataraman**. *A Spatio-Temporal Model of Seizure Propagation in Focal Epilepsy.* IEEE Transactions on Medical Imaging, 39(5):1404-1418, 2020 (ePub 2019).

[J6] D. Rangaprakash, M.N. Dretsch, **A. Venkataraman**, J.S. Katz, T.S. Denney Jr., G. Deshpande. *Identifying Disease Foci from Static and Dynamic Effective Connectivity Networks: Illustration in Soldiers with Trauma.* Human Brain Mapping, 39(1):264-287, 2018.

[J7] S. Zhao, D. Rangaprakash, **A. Venkataraman**, P. Liang, G. Deshpande. *Investigating Focal Connectivity Deficits in Alzheimer's Disease using Directional Brain Networks Derived from Resting-State fMRI.* Frontiers on Aging Neuroscience, 9:1-12, 2017.

[J8] S. van Noordt, J. Wu, **A. Venkataraman**, M.J. Larson, M. South, M.J. Crowley. *Inter-trial Coherence of Medial Frontal Theta Oscillations Linked to Differential Feedback Processing in High-Functioning Autism.* Research in Autism Spectrum Disorders, 37:1-10, 2017.

[J9] **A. Venkataraman**, D. Yang, N. Dvornek, L.H. Staib, J.S. Duncan, K.A. Pelphrey, P. Ventola. *Pivotal Response Treatment Prompts a Functional Rewiring of the Brain Among Individuals with Autism Spectrum Disorder.* NeuroReport, 27(14):1081-1085, 2016.

[J10] D. Yang, K.A. Pelphrey, D.G. Sukhodolsky, M.J. Crowley, E. Dayan, N. Dvornek, **A. Venkataraman**, J.S Duncan, L.H. Staib, P. Ventola *Brain Responses to Biological Motion Predict Treatment Outcome in Young Children with Autism.* Translational Psychiatry, 6(11):e948 2016.

[J11] **A. Venkataraman**, D. Yang, K.A. Pelphrey, J.S. Duncan. *Bayesian Community Detection in the Space of Group-Level Functional Differences.* IEEE Transactions Medical Imaging, 35(8):1866-1882, 2016.

[J12] **A. Venkataraman**, J.S. Duncan, D. Yang, K.A. Pelphrey. *An Unbiased Bayesian Approach to Functional Connectomics Implicates Social-Communication Networks in Autism.* NeuroImage Clin, 8:356-366, 2015.

[J13] **A. Venkataraman**, M. Kubicki, P. Golland. *From Brain Connectivity Models to Region Labels: Identifying Foci of a Neurological Disorder.* IEEE Transactions on Medical Imaging, 32(11):2078-2098, 2013.

[J14] **A. Venkataraman**, T.J. Whitford, C-F. Westin, P. Golland, M. Kubicki. *Whole Brain Resting State Functional Connectivity Abnormalities in Schizophrenia.* Schizophrenia Research, 139(1-3):7-12, 2012.

[J15] **A. Venkataraman**, Y. Rathi, M. Kubicki, C-F. Westin, P. Golland. *Joint Modeling of Anatomical and Functional Connectivity for Population Studies.* IEEE Trans on Medical Imaging, 31(2):164-182, 2012.

[J16] K.R.A. Van Dijk, T. Hedden, **A. Venkataraman**, K.C. Evans, S.W. Lazar, R.L. Buckner. *Intrinsic Functional Connectivity As a Tool For Human Connectomics: Theory, Properties, and Optimization.* Journal of Neurophysiology, 103(1):297-321, 2010.

Peer-Reviewed Conference Proceedings

[C1] S. Ghosal, Q. Chen, G. Pergola, A.L. Goldman, W. Ulrich, K.F. Berman, A. Rampino, G. Blasi, L. Fazio, A. Bertolino, D.R. Weinberger, V.S. Mattay, **A. Venkataraman**. *G-MIND: An End-to-End Multimodal Imaging-Genetics Framework for Biomarker Identification and Disease Classification.* To Appear in SPIE, 2021. **Selected for an Oral Presentation**

[C2] N. Nandakumar, N.S. D'Souza, K. Manzoor, J. Pillai, S. Gujar, S. Agarwal, H. Sair, **A. Venkataraman**. *A Multi-Task Deep Learning Framework to Localize the Eloquent Cortex in Brain Tumor Patients using Both Static and Dynamic Functional Connectivity.* In Proc. MLCN: MICCAI Workshop on Machine Learning for Clinical Neuroimaging, LNCS 12449:34-44, 2020. **Selected for an Oral Presentation** - **Best Paper Award**

[C3] N.S. D'Souza, M.B. Nebel, D. Crocetti, N. Wymbs, J. Robinson, S. Mostofsky, **A. Venkataraman**. *A Deep-Generative Hybrid Model to Integrate Multimodal and Dynamic Connectivity for Predicting Spectrum-Level Deficits in Autism.* In Proc. MICCAI: Medical Image Computing and Computer Assisted Intervention, LNCS 12267:437-447, 2020. **[Acceptance Rate ≈ 30%]**

[C4] R. Shankar, H.-W. Hsieh, N. Charon, **A. Venkataraman**. *Multispeaker Emotion Conversion via a Chained Encoder-Decoder-Predictor Network and Latent Variable Regularization.* In Proc. Interspeech: Conference of the International Speech Communication Association, 3391-3395, 2020.

[C5] R. Shankar, J. Sager, **A. Venkataraman**. *Non-parallel Emotion Conversion using a Pair Discrimination Deep-Generative Hybrid Model.* In Proc. Interspeech: Conference of the International Speech Communication Association, 3396-3400, 2020.

[C6] N. Nandakumar, K. Manzoor, J. Pillai, S. Gujar, H. Sair, **A. Venkataraman**. *A Novel Graph Neural Network to Localize Eloquent Cortex in Brain Tumor Patients from Resting-State fMRI Connectivity.* In Proc. CNI: MICCAI Workshop on Connectomics in Neuroimaging, LNCS 11848:10-20, 2019. **Selected for an Oral Presentation** - **Best Paper Award**

[C7] R. Shankar, J. Sager, **A. Venkataraman**. *A Multi-Speaker Emotion Morphing Model Using Highway Networks and Maximum Likelihood Objective.* In Proc. Interspeech: Conference of the International Speech Communication Association, 2848-2852, 2019. **Selected for an Oral Presentation**

[C8] J. Sager, J. Reinhold, R. Shankar, **A. Venkataraman**. *VESUS: A Crowd-Annotated Database to Study Emotion Production and Perception in Spoken English.* In Proc. Interspeech: Conference of the International Speech Communication Association, 316-320, 2019. **Selected for an Oral Presentation**

[C9] R. Shankar, H.-W. Hsieh, N. Charon, **A. Venkataraman**. *Automated Emotion Morphing in Speech Based on Diffeomorphic Curve Registration and Highway Networks.* In Proc. Interspeech: Conference of the International Speech Communication Association, 4499-4503, 2019.

[C10] R. Shankar and **A. Venkataraman**. *Weakly Supervised Syllable Segmentation by Vowel-Consonant Peak Classification.* In Proc. Interspeech: Conf of the Intl Speech Communication Association, 644-648, 2019.

[C11] J. Craley, C. Jouny, E. Johnson, **A. Venkataraman**. *Automated Noninvasive Seizure Detection and Localization Using Switching Markov Models and Convolutional Neural Networks.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 11767:253-262, 2019. **[Acceptance Rate ≈ 30%] – Selected for Early Acceptance (Top 18% of Submissions)**

[C12] S. Ghosal, Q. Chen, A.L. Goldman, W. Ulrich, K.F. Berman, D.R. Weinberger, V.S. Mattay, **A. Venkataraman**. *Bridging Imaging, Genetics, and Diagnosis in a Coupled Low-Dimensional Framework.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 11767:647-655, 2019. **[Acceptance Rate ≈ 30%] – Early Acceptance (Top 18% of Submissions)**

[C13] N.S. D'Souza, N. Wymbs, M.B. Nebel, S. Mostofsky, **A. Venkataraman**. *Integrating Neural Networks and Dictionary Learning for Multidimensional Clinical Characterizations from Functional Connectomics Data.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 11766:709-717, 2019. [**Acceptance Rate ≈ 30%**]

[C14] J. Craley, E. Johnson, **A. Venkataraman**. *Integrating Convolutional Neural Networks and Probabilistic Graphical Modeling for Epileptic Seizure Detection in Multichannel EEG.* In Proc. IPMI: Information Processing in Medical Imaging, LNCS 11492:291-303, 2019. [**Acceptance Rate ≈ 30%**] − **Oral Presentation**

[C15] N.S. D'Souza, N. Wymbs, M.B. Nebel, S. Mostofsky, **A. Venkataraman**. *A Coupled Manifold Optimization Framework to Jointly Model the Functional Connectomics and Behavioral Data Spaces.* In Proc. IPMI: Information Processing in Medical Imaging, LNCS 11492:605-616,2019. [**Acceptance Rate ≈ 30%**]

[C16] S. Ghosal, Q. Chen, A.L. Goldman, W. Ulrich, D.R. Weinberger, V.S. Mattay, **A. Venkataraman**. *A Generative-Predictive Framework to Capture Altered Brain Activity in fMRI and its Association with Genetic Risk: Application to Schizophrenia.* SPIE Medical Imaging, vol. 10949, 2019.

[C17] N. Nandakumar, N.S. D'Souza, J. Craley, K. Manzoor, J. Pillai, S. Gujar, H. Sair, **A. Venkataraman**. *Defining Patient Specific Functional Parcellations in Lesional Cohorts via Markov Random Fields.* In Proc. CNI: MICCAI Workshop on Connectomics in Neuroimaging, LNCS 11083:88-98, 2018.
Selected for an Oral Presentation (< 25% of Accepted Papers)

[C18] N.S. D'Souza, N. Wymbs, M.B. Nebel, S. Mostofsky, **A. Venkataraman**. *A Generative-Discriminative Basis Learning Framework to Predict Clinical Severity from Resting State Functional MRI Data.* In Proc. MICCAI: Intl Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 11072:163-171, 2018. [**Acceptance Rate ≈ 30%**] − **Selected for Early Acceptance (Top 15% of Submissions)**

[C19] J. Craley, E. Johnson, **A. Venkataraman**. *A Novel Method for Epileptic Seizure Detection Using Coupled Hidden Markov Models.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 11072:482-489, 2018. [**Acceptance Rate ≈ 30%**]
Selected for Early Acceptance (Top 15% of Submissions)

[C20] **A. Venkataraman**, N. Wymbs, M.B. Nebel, S. Mostofsky. *A Unified Bayesian Approach to Extract Network-Based Functional Differences from a Heterogeneous Patient Cohort.* In Proc CNI: MICCAI Workshop on Connectomics in NeuroImaging, LNCS 10511, pp. 60-69 2017.
Selected for an Oral Presentation (< 20% of Accepted Papers)

[C21] N.C. Dvornek, D. Yang, **A. Venkataraman**, P. Ventola, L.H. Staib, K.A. Pelphrey, J.S. Duncan. *Prediction of Autism Treatment Response from Baseline fMRI using Random Forests and Tree Bagging.* In Proc. MICCAI Workshop on Multimodal Learning for Clinical Decision Supp, pp. 1-8, 2016. − **Oral Presentation**

[C22] **A. Venkataraman**, D. Yang, K.A. Pelphrey, J.S. Duncan. *Community Detection in the Space of Functional Abnormalities Reveals both Heightened and Reduced Brain Synchrony in Autism.* In Proc. BAMBI: MICCAI Workshop on Bayesian and Graphical Models for Biomedical Imaging, pp. 1-12, 2015. − **Oral Presentation**

[C23] A. Sweet[†], **A. Venkataraman**[†], S.M. Stufflebeam, H. Liu, N. Tanaka, P. Golland. *Detecting Epileptic Regions Based on Global Brain Connectivity Patterns.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 8149:98-105, 2013. [**Acceptance Rate ≈ 30%**]
Selected for an Oral Presentation (< 10% of Accepted Papers)
† *Joint first authorship (equal contributions)*

[C24] **A. Venkataraman**, M. Kubicki, P. Golland. *From Brain Connectivity Models to Identifying Foci of a Neurological Disorder.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 7510:697-704, 2012. [**Acceptance Rate ≈ 30%**]
Selected for an Oral Presentation (< 10% of Accepted Papers)

[C25] **A. Venkataraman**, Y. Rathi, M. Kubicki, C-F. Westin, P. Golland. *Joint Generative Model for fMRI/DWI and its Application to Population Studies.* In Proc. MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention, LNCS 6361:191-199, 2010. [**Acceptance Rate ≈ 30%**]
Selected for Oral Presentation (< 10% of Accepted Papers)

[C26] **A. Venkataraman**, M. Kubicki, C-F. Westin, P. Golland. *Robust Feature Selection in Resting-State fMRI Connectivity Based on Population Studies.* In Proc. MMBIA: IEEE Computer Society Workshop on Mathematical Methods in Biomedical Image Analysis: 63-70, 2010.

[C27] **A. Venkataraman**, K.R.A Van Dijk, R.L. Buckner, P. Golland. *Exploring Functional Connectivity in fMRI via Clustering.* In Proc. ICASSP: IEEE Conference on Acoustics, Speech and Signal Proc, 441-444, 2009.

[C28] P. Golland, D. Lashkari, **A. Venkataraman**. *Spatial Patterns and Functional Profiles for Discovering Structure in fMRI Data.* In Proc. Asilomar Conf on Signals, Systems and Computers, 1402-1409, 2008.

[C29] **A. Venkataraman**, A.V. Oppenheim, *Signal Approximation using the Bilinear Transform*, In Proc. ICASSP: IEEE Conference on Acoustics, Speech and Signal Processing, 3729-3732, 2008.

Working Papers and Preprints

[W1] Y. Kobayashi*, A. Bukowski*, S. Das*, N. Wagle, S. Bakshi, M. Saha, J. Kaltschmidt†, **A. Venkataraman**†, S. Kulkarni†. *A Statistical Map of the Adult Murine Ilieal Enteric Nervous System using an AI-Driven COUNTEN Algorithm .* In Prep. for Journal of Neuroscience, 2020.
* *Joint first authorship* † *Joint senior authorship*

Conference Abstracts

[A1] S. Ghosal, Qiang Chen, Giulio Pergola, Daniel Weinberger, **A. Venkataraman**. *An End-to-End Multimodal Imaging-Genetics Framework for Biomarker Identification and Disease Classification.* Asilomar Invited Session: From Neural Networks to Neural Systems: Using AI to Decode the Brain in Health and Disease, 2020.

[A2] N.S. D'Souza, M.B. Nebel, N. Wymbs, S. Mostofsky, **A. Venkataraman**. *A Joint Network Optimization Framework to Predict Clinical Severity from Resting-State Functional MRI Data.* Second International Conference on Medical Imaging and Case Reports, 2019. **Invited Abstract and Presentation**

[A3] N.S. D'Souza, M.B. Nebel, N. Wymbs, S. Mostofsky, **A. Venkataraman**. *A Joint Network Optimization Framework to Predict Clinical Severity from Resting-State Functional Connectomics.* Flux Congress, 2019.

[A4] **A. Venkataraman**, N.S. D'Souza, M.B. Nebel, N. Wymbs, S. Mostofsky. *Predicting Behavior from Resting-State fMRI Connectivity.* In Proc. SAND9: Statistical Analysis of Neuronal Data, 2019.
Selected for a Young Investigator Spotlight Presentation

[A5] N.S. D'Souza, M.B. Nebel, N. Wymbs, S. Mostofsky, **A. Venkataraman**. *A Generative-Discriminative Basis Learning Framework to Predict Autism Spectrum Disorder Severity.* In Proc. ISBI: International Symposium on Biomedical Imaging, 2018.

[A6] N. Nandakumar, N.S. D'Souza, H. Sair, **A. Venkataraman**. *A Modified K-Means Algorithm for Resting State FMRI Analysis of Brain Tumor Patients, As Validated by Language Localization.* In Proc. ISBI: International Symposium on Biomedical Imaging, 2018.

[A7] J. Craley, E. Johnson, **A. Venkataraman**. *Robust Seizure Detection Using Coupled Hidden Markov Models.* In Proc. ISBI: International Symposium on Biomedical Imaging, 2018.

[A8] **A. Venkataraman**, J.S. Duncan, D. Yang, K.A. Pelphrey. *Abnormal Functional Communities in Autism.* IMFAR: Intl Meeting For Autism Research, 2016. **Oral Presentation ($< 5\%$ of Abstracts)**

[A9] D. Rangaprakash, G. Deshpande, **A. Venkataraman**, J.S. Katz, T.S. Denney, M.N. Dretsch. *Identifying Foci of Brain Disorders from Effective Connectivity Networks*, ISMRM, 2016. **Honorable Mention**

[A10] **A. Venkataraman**, J.S. Duncan, D. Yang, K.A. Pelphrey. *An Unbiased Bayesian Approach to Functional Connectomics Implicates Social-Communication Networks in Autism.* In Proc. ISBI: International Symposium on Biomedical Imaging, 2015. **Invited Abstract and Presentation**

[A11] S. Zhao, **A. Venkataraman**, P. Liang, G. Deshpande. *Investigating the Role of Brain Stem in Alzheimer's Disease using Directional Brain Networks derived from Resting State fMRI*, Annual Mtg of ISMRM, 2015.

[A12] **A. Venkataraman**, M. Kubicki, P. Golland. *From Brain Connectivity Models to Identifying Foci of a Neurological Disorder.* 3rd Biennial Conference on Resting State Brain Connectivity, Sept 2012.

[A13] **A. Venkataraman**, K.R.A Van Dijk, R.L. Buckner, P. Golland. *Exploring Functional Connectivity in fMRI via Clustering,* Annual Meeting of the Organization of Human Brain Mapping, June 2009.

DISSERTATIONS

[D1] **A. Venkataraman**. *Generative Models of Brain Connectivity for Population Studies.* Doctor of Philosophy Thesis. Massachusetts Institute of Technology, Cambridge MA, 2012.

[D2] **A. Venkataraman**. *Signal Approximation Using the Bilinear Transform.* Masters of Engineering Thesis. Massachusetts Institute of Technology, Cambridge MA, 2007.

ONGOING & COMPLETED RESEARCH SUPPORT

JHU Discovery Award Joint PI: Faigle/<u>Venkataraman</u> 05/01/21 − 04/30/22
Harnessing Machine Learning to Optimize Stroke Critical Care Resource Use
This project will develop an automated platform to continuously predict the risk of critical care needs for post-MT stroke patients. This is a highly competitive internal award with only a **15**% ***funding rate***.
Total Funding Amount: $100,000 for 1 year

JHU Discovery Award Joint PI: Marvel/<u>Venkataraman</u>/Rosenthal 05/01/21 − 04/30/22
Using Motor Imagery and Machine Learning-Based Real-Time fMRI Neurofeedback to Improve Motor Function in Cerebellar Ataxia
This project will use a real-time fMRI neurofeedback to train cerebellar ataxia patients to "exercise" their motor network. This is a highly competitive internal award with only a **15**% ***funding rate***.
Total Funding Amount: $100,000 over 2 years

GI Core Pilot Grant Program PI: <u>Venkataraman</u> 04/01/21 − 05/31/22
AI for Neuro-GI: Developing an AI-Driven Software to Construct and Analyze the First Large-Scale Network Map of the Enteric Nervous System
This project will develop AI methods to estimate the ENS connectome from immunostained microscopy and extract predictive topological measures of the network to compare across healthy and diseased cohorts.
Total Funding Amount: $15,000 for 1 year

MCEH Seed Grant PI: <u>Venkataraman</u> 01/01/20 − 12/31/20
A Deep Learning Approach to Continuously Forecast Postop Kidney Failure During Cardiac Surgery
This project develops an automated platform to predict the risk for AKI based on patient history and real-time intraoperative and physiological data. This is a competitive internal award with only a **20**% ***funding rate***.
Total Funding Amount: $50,000 for 1 year

JHU Discovery Award Joint PI: <u>Venkataraman</u>/Johnson/Sair/Jouny 07/01/19 − 06/31/20
Noninvasive Seizure Localization in Epilepsy Patients via Multimodal Magnetic Resonance Imaging
This project collects multimodal MRI from epilepsy patients and uses this data to develop new machine learning algorithms to localize the seizure onset. This is a highly competitive internal award with only a **15**% ***funding rate***.
Total Funding Amount: $100,000 over 2 years

NSF CAREER 1845430 PI: <u>Venkataraman</u> 02/15/19 − 01/31/24
Small Data in a Big World: Balancing Interpretability and Generalizability for Data Integration in Clinical Neuroscience
This project develops a coupled network optimization framework that simultaneously extracts interpretable features from functional neuroimaging data and makes patient-specific predictions.
Agency: National Science Foundation, CISE Directorate
Total Funding Amount: $500,006 over 5 years

NSF CRCNS 1822575 PI: <u>Venkataraman</u> 10/01/18 – 09/30/21
Discovering Network Structure in the Space of Group-Level Functional Differences
This project develops a robust mathematical framework to detect altered neural subsystems that track with a particular neurological disorder. We focus on three clinical testbeds: autism, ADHD and schizophrenia.
Agency: National Science Foundation, CISE Directorate
Total Funding Amount: $874,048 over 3 years

JHMI Synergy Award Joint PI: Johnson/<u>Venkataraman</u> 07/01/17 – 06/31/19
Epileptic Seizure Localization via Bayesian Structure Learning
This project develops a Bayesian structure learning framework to track the origin and progression of a focal epileptic seizure in the brain. This is a highly competitive internal award with only a **15%** *funding rate.*
Total Funding Amount: $100,000 over 2 years

Neuroradiology MRI Scanning Award Joint PI: Sair/<u>Venkataraman</u>/Johnson 07/01/17 – 06/31/18
Building a Database of Neurotypical Controls for Multiple Clinical Studies
This project will collect rsfMRI data from a normative population using the research Siemens 3T scanner at JHMI. This dataset will serve as a resource for the Johns Hopkins community.
Total Funding Amount: $7,000 for 1 year

Pending Research Support

NSF CRCNS PI: <u>Venkataraman</u> 09/01/21 – 08/31/24
Deep-Generative Fusion Models to Parse Functional Changes in the Brain
This proposal will combine model-based domain knowledge with the representational power of deep learning to localize the source of functional disruptions in the brain. We will focus on multichannel EEG and resting-state fMRI.
Agency: National Science Foundation
Total Funding Amount: $902,639 over 3 years

NIH R01 PI: Caffo 09/01/21 – 08/31/26
Statistical Methods for Structural and Functional Integration in Multi-Modal Neuroimaging Data
This project will develop a suite of analytical tools to integrate structural and functional information about the brain to better understand and predict neurological dysfunction.
Agency: National Institute of Biomedical Imaging and Bioengineering
Total Funding Amount: $2,043,750 over 5 years
Project Role: Co-Investigator

NSF FRG Joint PI: Younes/Bauer 09/01/21 – 08/31/26
A Riemannian Framework for Geometric Data: Statistical Learning, Computation and Applications
This project will build novel analytical frameworks for complex geometric spaces. Methods will blend differential geometry and deep learning. Key applications include brain connectivity and emotional speech synthesis.
Agency: National Science Foundation, CISE Directorate
Total Funding Amount: $1,250,000 over 5 years
Project Role: Co-Principal Investigator

NIH R21 PI: <u>Venkataraman</u> 09/01/21 – 8/31/23
Automated Presurgical Language Mapping via Deep Learning for Multimodal Brain Connectivity
This project will develop a graph neural network to map the language areas of the brain using resting-state fMRI and diffusion MRI. We will link our predictions to change in postoperative cognitive functioning.
Agency: National Cancer Institute
Total Funding Amount: $434,171 over 2 years

Public Mentions

This Week in Machine Learning (TWiML) Podcast (October 2019): *Using AI to Diagnose and Treat Neurological Disorders with Archana Venkataraman*
Interview Summary: This conversation explores Archana Venkataraman's work in applying machine learning

to these problems, including biomarker discovery, disorder severity prediction, along with some of the various techniques and frameworks used. (*Host: Sam Charrington*)

Center for Data Innovation (September 2019): *5 Q's for Archana Venkataraman*
Article Summary: The Center for Data Innovation spoke with Archana Venkataraman, assistant professor of electrical and computer engineering at Johns Hopkins University. Venkataraman discussed how machine learning can help increase our understanding of complex neurological disorders. (*Correspondent: Joshua New*)

Fair Observer (August 2019): *South Asians Are Shaping the Future of Science and Technology*
Article Summary: Archana Venkataraman is using artificial intelligence (AI) to better map the human brain and to develop entirely new ways to diagnose and treat neurological disorders. (*Correspondent: Vikram Zutshi*)

MIT Technology Review (June/July 2019): *35 Innovators Under 35*
Article Summary: Archana Venkataraman develops mathematical models designed to unlock the "black box" of the brain's function and provide the building blocks for treatments. (*Correspondent: Jonathan Rosen*)

JHU Engineering Magazine (Summer 2019): *Safety First: Building a Resilient Future*
Article Summary: Researchers at Johns Hopkins develop algorithms to use brain imaging and electrical monitoring technology to localize epileptic foci in the brain. (*Correspondent: Andrew Meyers*)

JHU Engineering Magazine (Summer 2018): *Your Brain on Engineering*
Article Summary: Researchers at Johns Hopkins use machine learning techniques to localize the source of epileptic seizures based on noninvasive EEG recordings. (*Correspondent: Christen Brownlee*)

MIT News (2012): *Mapping Neurological Disease*
Article Summary: A new algorithm developed at MIT can analyze information from medical images to identify diseased areas of the brain and connections with other regions. (*Correspondent: Helen Knight*)

Technical Presentations

Invited Talks and Seminars

2020 **Title: You Can Teach an Old Dog New Tricks – Deep Learning in Data-Starved Regimes**
- Stanford Vision and Learning Lab, Stanford University, USA *(Host: Prof. Ehsan Adeli)*
- Applied Math Colloquium, University of Pennsylvania, USA
  (Hosts: Prof. Paris Perdikaris and Prof. James Gee)

2020 **Title: Deep Learning for Multimodal and Dynamic Functional Neuroimaging**
- Feindel Virtual Brain and Mind Lecture, Montreal Neurological Institute, McGill University, Canada
  (Hosts: Prof. Louis Collins and Prof. Tal Arbel)

2020 **Title: Integrating Convolutional Neural Networks and Probabilistic Graphical Models for Epileptic Seizure Detection and Localization**
- AI for Mental Disorders Workshop of WCCI 2020 *(Host: Prof. Mah Parsa)*

2019 **Title: Generative-Deep Hybrid Models to Decipher Brain Functionality**
- Guest Lecture, Athinoula A. Martinos Center for Biomedical Imaging, Mass General Hospital and Harvard Medical School, USA *(Hosts: Prof. Bruce Fischl, Prof. Lilla Zollei)*
- Guest Lecture, Medical Vision Group, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, USA *(Host: Prof. Polina Golland)*
- Special Departmental Seminar, Department of Electrical and Computer Engineering, University of Maryland College Park, USA *(Host: Prof. Behtash Babadi)*
- Departmental Seminar Series, Department of Biostatistics, University of Wisconsin Madison, USA
  (Host: Prof. Vikas Singh)

2019 **Title: Generative Models to Decode the Brain**

- Machine Leaning in Medicine Seminar Series, Department of Electrical and Computer Engineering, Cornell University, USA *(Hosts: Prof. Mert Sabuncu, Prof. Amy Kuceyeski)*
- Medical Imaging Seminar Series, Department of Computer Science, University of North Carolina Chapel Hill, USA *(Host: Prof. Martin Styner)*
- Neuroscience and Behavior Distinguished Seminar Series, Department of Neuroscience, University of Massachusetts Amherst, USA *(Host: Prof. Xian Du)*

2018 **Title: Mathematical Models for Functional Neuroimaging**
- Bodian Distinguished Lecture Series, Mind Brain Institute, Johns Hopkins University, USA
  (Invitation by Prof. Ernst Niebur)

2018 **Title: Generative Models to Decode Brain Pathology**
- Departmental Seminar Series, Department of Applied Mathematics and Statistics, Johns Hopkins University, USA *(Invitation by Prof. Tamas Budavari)*

2018 **Title: Automated Detection and Localization of Epileptic Seizures**
- Guest Lecture, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins Medical Institute, USA *(Invitation by Prof. Robert Stevens)*

2017 **Title: An Adaptable Framework to Extract Abnormal Brain Networks**
- Distinguished Lecture Series, Institute for Computational Medicine, Johns Hopkins University, USA
  (Invitation by Prof. Michael Miller)
- Keynote Lecture, IEEE Joint Chapters Meeting, Rochester NY, USA
  (Invitation by Prof. Cristian Linte)
- Guest Lecture, Department of Biomedical Engineering, University of Rochester, USA *(Invitation by Prof. Cristian Linte)*
- Departmental Seminar Series, Department of Electrical Engineering, Rochester Institute of Technology, USA *(Host: Prof. Jayanti Venkataraman)*
- Departmental Seminar Series, Department of Electrical and Computer Engineering, University of Virginia Charlottesville, USA *(Host: Prof. Daniel Weller)*

2016 **Title: An Adaptable Framework to Extract Abnormal Brain Networks**
- Departmental Seminar Series, Magnetic Resonance Research Center, Department of Radiology and Biomedical Imaging, Yale University, USA *(Invitation by Prof. Todd Constable)*
- Special Departmental Seminar, Department of Electrical and Computer Engineering, University of Texas San Antonio, USA *(Host: Prof. Yufei Huang)*
- Special Departmental Seminar, Department of Biomedical Engineering, Vanderbilt University, USA
  (Host: Prof. Todd Giogio)
- Special Departmental Seminar, Department of Electrical Engineering, University of Rochester, USA
  (Host: Prof. Wendi Heinzelman)
- Special Departmental Seminar, Department of Electrical Engineering and Systems Science, Washington University, USA *(Host: Prof. Arye Nehorai)*

2015 **Title: An Unbiased Bayesian Approach to Functional Connectomics Implicates Social-Communication Networks in Autism**
- Invited Session on Brain Connectivity, International Symposium on Biomedical Imaging, Brooklyn NY, USA *(Session Organizer: Prof. Vince Calhoun)*

Title: An Adaptable Framework to Extract Abnormal Brain Networks
- Special Departmental Seminar, Department of Electrical and Computer Engineering, Johns Hopkins University, USA *(Host: Prof. Jerry Prince)*

2014 **Title: Characterizing Abnormal Brain Networks**

- Invited Session on Neuroimaging, Image Processing Conference at SPIE Medical Imaging, San Diego CA, USA *(Session Organizer: Prof. Martin Styner)*

2013 **Title: Characterizing Abnormal Brain Networks**
- Special Departmental Seminar, Institute of Medical Engineering and Science, Massachusetts Institute of Technology, USA *(Host: Prof. Arup Chakraborty)*
- Special Departmental Seminar, Department of Electrical and Computer Engineering, Johns Hopkins University, USA *(Host: Prof. Jerry Prince)*
- Special Departmental Seminar, Department of Electrical and Computer Engineering, University of Texas Austin, USA *(Host: Prof. Constantine Caramanis)*
- Guest Lecture, Image Processing and Analysis Group, Department of Diagnostic Radiology, Yale University, USA *(Host: Prof. James Duncan)*

2012 **Title: From Brain Connectivity Models to Identifying Foci of a Neurological Disorder**
- Guest Lecture, Laboratory for Mathematical Imaging, Brigham and Womens Hospital, USA *(Invited by Prof. Carl-Fredrick Westin)*
- Rising Stars Workshop, Massachusetts Institute of Technology, USA *(Invited by Prof. Polina Golland)*

2012 **Title: Generative Models of Brain Connectivity for Population Studies**
- Guest Lecture, MIT Lincoln Laboratory, Lexington MA, USA *(Invited by Group 104)*
- Guest Lecture, MGH Martinos Center for Biomedical Imaging, USA *(Invited by Prof. Bruce Rosen)*

2011 **Title: Joint Modeling of Anatomical and Functional Connectivity for Population Studies**
- Guest Lecture, Parietal Team, Neurospin, Gif-sur-Yvette, France *(Hosts: Bertrand Thirion, Gael Varaquoaux)*

Conference, Workshop & Symposium Oral Presentations

2020 **A Multi-Task Deep Learning Framework to Localize the Eloquent Cortex in Brain Tumor Patients using Both Static and Dynamic Functional Connectivity**
CNI: MICCAI Workshop on ML for Clinical Neuroimaging, Lima, Peru (Virtual)
Speaker: Naresh Nandakumar, PhD Student

2019 **Engineering Solutions to Brain Dysfunction**
EmTech, Massachusetts Institute of Technology

2019 **A Generative-Deep Hybrid Model for Epileptic Seizure Localization**
Mathematical Institute for Data Science Symposium, JHU

2019 **A Joint Network Optimization Framework to Predict Clinical Severity from Resting-State Functional MRI Data**
Second International Conference on Medical Imaging and Case Reports
Speaker: Niharika Shimona D'Souza, PhD Student

2019 **A Novel Graph Neural Network to Localize Eloquent Cortex in Brain Tumor Patients from Resting-State fMRI Connectivity**
CNI: MICCAI Workshop on Connectomics in Neuroimaging, ShenZhen, China
Speaker: Naresh Nandakumar, PhD Student

2019 **AI in Medicine: Opportunities and Hurdles**
JHU/APL Future of Humans and Machines Symposium

2019 **Integrating Convolutional Neural Networks and Probabilistic Graphical Modeling for Epileptic Seizure Detection in Multichannel EEG**
IPMI: International Conference on Information Processing in Medical Imaging, Hong Kong
Speaker: Jeff Craley, PhD Student

2019 **Predicting Behavior from Resting-State fMRI Connectivity**
SAND9: Statistical Analysis of Neuronal Data, Pittsburgh, PA

2018 **Defining Patient Specific Functional Parcellations in Lesional Cohorts via MRFs**
CNI: MICCAI Workshop on Connectomics in Neuroimaging, Granada, Spain
Speaker: Naresh Nandakumar, PhD Student

2017 **Extracting Network-Based Functional Differences from a Heterogeneous Patient Cohort**
CNI: MICCAI Workshop on Connectomics in Neuroimaging

2016 **Abnormal Functional Communities in Autism**
IMFAR: International Meeting for Autism Research

2015 **Community Detection in the Space of Functional Abnormalities Reveals Abnormal Brain Synchrony in Autism**
BAMBI: MICCAI Workshop on Bayesian and grAphical Models for Biomedical Imaging

2013 **Detecting Epileptic Regions Based on Global Brain Connectivity Patterns**
MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention

2012 **From Brain Connectivity Models to Identifying Foci of a Neurological Disorder**
MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention

2010 **Joint Generative Model for fMRI/DWI and it Application to Population Studies**
MICCAI: International Conference on Medical Image Computing and Computer Assisted Intervention

Other Poster Presentations

2020 **Bridging Imaging, Genetics, and Diagnosis in a Coupled Low-Dimensional Framework**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Sayan Ghosal, PhD Student

2020 **A Novel Graph Neural Network to Localize Eloquent Cortex in Brain Tumor Patients from Resting-State fMRI Connectivity**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Naresh Nandakumar, PhD Student

2020 **Automated Emotion Morphing in Speech Based on Diffeomorphic Curve Registration and Highway Networks**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Ravi Shankar, PhD Student

2020 **Integrating Neural Networks and Dictionary Learning for Multidimensional Clinical Characterizations from Functional Connectomics Data**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Niharika Shimona D'Souza, PhD Student

2020 **Automated Noninvasive Seizure Detection and Localization Using Switching Markov Models and Convolutional Neural Networks**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Jeff Craley, PhD Student

2019 **A Generative-Predictive Framework to Capture Altered Brain Activity in fMRI and its Association with Genetic Risk: Application to Schizophrenia**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Sayan Ghosal, PhD Student

2019 **Defining Patient Specific Functional Parcellations in Lesional Cohorts via MRFs**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Naresh Nandakumar, PhD Student

2019   **A Generative-Discriminative Basis Learning Framework to Predict Clinical Severity from Resting State Functional MRI Data**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Niharika Shimona D'Souza, PhD Student

2019   **A Novel Method for Epileptic Seizure Detection Using Coupled Hidden Markov Models**
WSE/DOM Research Retreat, Johns Hopkins University
Presenter: Jeff Craley, PhD Student

2015   **Bayesian Community Detection in the Space of Group-Level Functional Differences**
Yale Bioimaging Sciences Retreat Symposium

2012   **From Brain Connectivity Models to Identifying Foci of a Neurological Disorder**
Third Biennial Conference on Resting State Brain Connectivity

2009   **Exploring Functional Connectivity in fMRI via Clustering**
Annual Meeting of the Organization of Human Brain Mapping

2005   **An Integrated Low-Power Switched-Capacitor DC-DC Power Converter**
Interconnect Focus Center Design Review, Atlanta, GA

Teaching Initiatives

Courses Taught at Johns Hopkins University

EN.520.651   *Random Signals Analysis*
A core graduate course that covers the fundamentals of probabilistic machine learning.
Selected Topics: probability spaces, random variables, derived distributions, decision theory, parameter estimation, graphical models, EM algorithm, approximate inference techniques, Markov models, random sequences, Dirichlet processes, autoencoders
Semesters Taught: Fall 2016, Fall 2017, Fall 2018, Fall 2019, Fall 2020

EN.520.385   *Signals, Systems and Learning*
An elective undergraduate course that covers detection and estimation in signal processing.
Selected Topics: Discrete time Fourier transforms, Z-transforms, probability spaces, random variables, derived distributions, random processes, power spectral density, signal estimation, hypothesis testing, signal detection, state-space models, clustering algorithms
Semesters Taught: Spring 2018, Spring 2019, Spring 2020

Teaching Prior to Professorship (MIT)

6.437   *Information and Inference*
Teaching assistant for a core graduate course in machine learning.
Responsibilities: teaching weekly recitation, writing and grading exams, compiling homework assignments and solutions, holding weekly office hours
Semester Taught: Spring 2011

HKN SP   *Introduction to Signals and Systems*
Developed an introductory signals and systems course to prep underclassmen; compiled and taught four (chalkboard) lectures, each one lasting three hours
Taught: Intersession 2006

Mentoring Activities

PhD Students

1. Sayan Ghosal   Sept 2017 – Aug 2022 (Exp)

Department: Electrical and Computer Engineering
Project: Imaging-Genetics for Schizophrenia

2. Ravi Shankar   Sept 2017 – Aug 2022 (Exp)
   Department: Electrical and Computer Engineering
   Project: Manipulating Emotional Content in Speech

3. Naresh Nandakumar   June 2017 – Aug 2022 (Exp)
   Department: Electrical and Computer Engineering
   Project: Localizing Eloquent Cortex for Presurgical Planning

4. Jeff Craley   June 2017 – Aug 2021 (Exp)
   Department: Electrical and Computer Engineering
   Project: Detecting and Localizing Epileptic Seizures

5. Niharika Shimona D'Souza   Sept 2016 – Aug 2021 (Exp)
   Department: Electrical and Computer Engineering
   Project: Predicting Clinical Severity from fMRI

Rotation PhD Students

1. Pouria Tohidi   April 2016 – Mar 2018
   Department: Electrical and Computer Engineering
   Project: Epileptic Seizure Detection

2. Jacob Reinhold   Aug 2017 – Jan 2018
   Department: Electrical and Computer Engineering
   Project: Manipulating Emotional Content in Speech

Masters Students

1. Yi-Te Hsu   March 2020 – Present
   Department: Computer Science
   Graduate Project: Sequence-to-Sequence Models for Emotion Conversion in Speech

2. Evan Yu   Nov 2019 – Present
   Department: Biomedical Engineering
   Thesis Topic: Predicting Acute Kidney Injury from Intraoperative Measurements
   Co-advised with Charles Brown in the Department of Anesthesiology

3. Rohan Nandkarni   Jan 2018 – June 2019
   Department: Biomedical Engineering
   Thesis: Examination of the Association Between Arterial Blood Pressure Below the Lower Limit of Autoregulation and Acute Kidney Injury After Cardiac Surgery
   Co-advised with Charles Brown in the Department of Anesthesiology
   First Postgraduate Position: Researcher in the Imaging for Surgery, Therapy and Radiology Lab

Undergraduate Students

1. Danielle Currey   Nov 2019 – Present
   Department: Computer Science
   Project: Epileptic Seizure Detection

2. Arjun Somayazulu   Oct 2019 – Present
   Department: Computer Science and Biomedical Engineering
   Project: Emotion Recognition from Human Speech

3. Yu-Chung Peng   Sept 2019 – Present
   Department: Computer Science and Neuroscience
   Project: Machine Learning Algorithms to Predict Postoperative AKI

4. Narayani Wagle   Jan 2019 – Present
   Department: Computer Science and Biomedical Engineering
   Project: Analyzing the Structure and Function of the Enteric Nervous System

5. Yuta Kobayashi   Jan 2019 – Present
   Department: Biomedical Engineering
   Project: Analyzing the Structure and Function of the Enteric Nervous System

6. Kavi Wick   June 2020 – Aug 2020
   Department: NSF Research Experiences for Undergraduates Program
   Project: Predicting Spinal Cord Injury
   First Post-Departure Position: Undergraduate Student at Rutgers University

7. Yesika Alexandra Agudelo Londono   Jan 2020 – July 2020
   Home Institution: Universidad De Antioquia, Colombia
   Project: Predicting Neurological Disorders from rs-fMRI Data
   Visiting Student sponsored by the Colciencias
   First Post-Departure Position: Research Assistant in Colombia

8. Jacob Sager   June 2017 – June 2019
   Department: Electrical and Computer Engineering
   Project: Emotion Recognition from Human Speech
   First Postgraduate Position: Software Engineer at FiscalNote

9. Duha Awad   June 2018 – Aug 2018
   Department: NSF Research Experiences for Undergraduates Program
   Project: Epileptic Seizure Detection
   First Post-Departure Position: Undergraduate Student at University of Maryland, College Park

UNIVERSITY SERVICE

Department of Electrical and Computer Engineering

Co-Director, Conference on Information Sciences and Systems (CISS)	2021 – Present
ECE Department Head Search Committee	2020 – Present
ECE Curriculum Committee	2018 – Present
Distinguished Lecturer Committee	2016 – Present
Graduate Student Admissions	2017 – Present
ECE Chair Election Committee	2019
Faculty Search Committee	2017 – 2018
ECE Chair Election Committee	2017
Graduate Student Visit Day Organizer	2017
Keynote Speaker, GRACE Mentoring Dinner	2016

Whiting School of Engineering

AI-X Initiative Steering Committee	2019 – Present
Malone Center Strategic Planning Committee	2016 – Present
MINDS Symposium Planning Committee	2019
WSE/DOM Research Retreat Committee	2018 – 2020
MINDS Faculty Search Committee	2018 – 2019
WSE Curriculum Committee	2016 – 2018
Malone Center Student Symposium Organizer	2017
ChemBE Dept Head Search Committee	2017 – 2018
Malone Center Faculty Search Committee	2016 – 2017

Doctoral Thesis Committee Membership

1. Yufan He   Expected Aug 2021
   Department: Electrical and Computer Engineering
   Thesis Advisor: Jerry Prince, ECE

2. Ben Strober   Expected Aug 2021
   Department: Computer Science
   Thesis Advisor: Alexis Battle, BME

3. Jordi Abante   Expected Aug 2021
   Department: Electrical and Computer Engineering
   Thesis Advisor: John Goutsias, ECE

4. Golnoosh Kamali   Oct 2020
   Department: Biomedical Engineering
   Thesis Title: Transfer Function Models of Cortico-Cortical Evoked Potentials for the Localization of Seizures in Medically Refractory Epilepsy Patients
   Thesis Advisor: Sridevi Sarma, BME

5. Yi (Gary) Li   August 2020
   Department: Electrical and Computer Engineering
   Thesis Title: Optimization of Administered Activity for Pediatric Renal SPECT Imaging
   Thesis Advisor: Eric Frey, Medicine

6. Evan Schwab   Nov 2017
   Department: Electrical and Computer Engineering
   Thesis Title: Joint Spatial-Angular Sparse Coding, Compressed Sensing, and Dictionary Learning for dMRI
   Thesis Advisors: Rene Vidal, BME and Nicholas Charon, AMS

Masters Thesis Committee Membership

1. Rohan Nandkarni   June 2019
   Department: Biomedical Engineering
   Thesis Title: Examination of the Association Between Arterial Blood Pressure Below the Lower Limit of Autoregulation and Acute Kidney Injury After Cardiac Surgery
   Thesis Advisor: Charles Brown, Anesthesiology and Archana Venkataraman, ECE

2. Carolina Pacheco   Aug 2018
   Department: Biomedical Engineering
   Thesis Title: Recurrent Neural Nets for Classification of Human Embryonic Stem Cell-Derived Cardiomyocytes
   Thesis Advisor: Rene Vidal, BME

Graduate Board Exams Administered

1. Jacob Reinhold   May 2021 (Exp)
   Department: Electrical and Computer Engineering

2. Haomin Chen   May 2021 (Exp)
   Department: Computer Science

3. Naresh Nandakumar   Oct 2020
   Department: Electrical and Computer Engineering

4. Sayan Ghosal   Oct 2020
   Department: Electrical and Computer Engineering

5. Blake Dewey   Sept 2019
   Department: Electrical and Computer Engineering

6. Miguel Vivar Lazo   June 2019
   Department: Biomedical Engineering

7. Yufan He — June 2019
   Department: Electrical and Computer Engineering

8. Niharika Shimona D'Souza — April 2019
   Department: Electrical and Computer Engineering

9. Jeff Craley — April 2019
   Department: Electrical and Computer Engineering

10. Jordi Abante Llenas — April 2019
    Department: Electrical and Computer Engineering

11. Muhan Shao — Feb 2019
    Department: Electrical and Computer Engineering

12. Scott Sterrett — Feb 2019
    Department: Biomedical Engineering

13. Wenying Wang — April 2018
    Department: Biomedical Engineering

ECE Qualifying Exams Administered

- Mardava Gubbi (Aug 2019)
- Hancheng Min (Jan 2019)
- Naresh Nandakumar (Aug 2018)
- Ravi Shankar (Aug 2018)
- Sayan Ghosal (Aug 2018)
- Ranjani Srinivasan (Aug 2018)
- Jacob Reinhold (Aug 2018)
- Yan Jiang (Jan 2018)
- Niharika Shimona D'Souza (Aug 2017)
- Yufan He (Aug 2017)
- Muhan Shao (Aug 2017)
- Mengnan Zhao (Aug 2017)
- Nanxin Chen (Jan 2017)
- Jaejin Cho (Jan 2017)

Professional Society Memberships

Sigma Xi Honor Society	2020 – Present
International Speech and Communication Association (ISCA)	2019 – Present
American Epilepsy Society (AES)	2019 – Present
MICCAI Society Member	2008 – Present
Siebel Scholar	2007 – Present
IEEE Member	2006 – Present
Tau Beta Pi, Engineering Honor Society	2006 – Present
Eta Kappa Nu, EE Honor Society	2006 – Present
National Society of Collegiate Scholars	2006 – Present

References

Available upon request.