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CONTACT INFORMATION

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RESEARCH INTERESTS

Methodological

- Signal and Image Processing
- Functional Magnetic Resonance Imaging (fMRI)
- Multimodal Imaging and Data Fusion (e.g. Electroencephalography (EEG) and fMRI)
- Network Modeling of Brain Function (Autoregressive, Bayesian, Wavelet and State-space models)
- Real-time Brain State Classification using Machine Learning
- Nonlinear Dynamics and Chaos in Biomedical Systems

Applications

- Sensory, Motor and Cognitive Neuroscience
- Social and Affective Neuroscience
- Consciousness
- Complementary Medicine, specifically Meditation
- Clinical Populations such as Autism, Alzheimer's, Developmental Psychopathologies, PTSD
- Neuroeconomics and Neuromarketing
- fMRI in awake dogs

EXPERIENCE

- 2015 - PRESENT: Associate Professor, Dept of Electrical and Computer Engineering, Auburn University
- 2015 - PRESENT: Adjunct Associate Professor, Dept of Psychology, Auburn University
- 2010 - 2015: Assistant Professor, Dept of Electrical and Computer Engineering, Auburn University
- 2010 - 2015: Adjunct Assistant Professor, Dept of Psychology, Auburn University
- 2009 - 2010: Research Faculty, Dept of Biomedical Engineering, Georgia Institute of Technology & Emory University
- 2007 - 2009: Post Doctoral Fellow, Dept of Biomedical Engineering, Georgia Institute of Technology & Emory University
- 2003 - 2007: Research Assistant, Dept of Biomedical Engineering, Georgia Institute of Technology & Emory University
- 2003 - 2003: Software Engineer, SASKEN communication Technologies, India

PEER-REVIEWED JOURNAL PUBLICATIONS

1. D Rangaprakash, G Wu, D Marinazzo, X Hu, G Deshpande, "Impact of Undesirable Hemodynamic Variability on fMRI Functional Connectivity", ***IEEE Transactions on Biomedical Engineering*** (Special Issue on Functional Connectivity), 2016 (in press).
2. MN Dretsch, KH Wood, TA Daniel, JS Katz, G Deshpande, A Goodman, MD Wheelock, KB Wood, TS Denney, S Traynham, DC Knight, "Exploring the neurocircuitry underpinning predictability of threat in soldiers with PTSD compared to deployment exposed controls", ***The Open Neuroimaging Journal***, vol. 10, pp. 111-124, 2016.
3. JL Robinson, M Baxi, JS Katz, P Waggoner, R Beyers, E Morrison, N Salibi, TS Denney, V Vodyanoy, G Deshpande, "Characterization of Structural Connectivity of the Default Mode Network in Dogs using Diffusion Tensor Imaging", ***Scientific Reports***, 2016 (in press).
4. K Goodyear, R Parasuraman, S Chernyak, P Madhavan, G Deshpande, F Krueger, "Advice taking from humans and machines: an fMRI and effective connectivity study", ***Frontiers in Human Neuroscience***, vol. 10, pp. 542, 2016.
5. Y Wang, S Katwal, B Rogers, J Gore, G Deshpande, "Experimental validation of dynamic Granger causality for inferring stimulus-evoked sub-100 ms timing differences from fMRI", ***IEEE Transactions on Neural Systems and Rehabilitation Engineering***, 2016 (in press).
6. TA Daniel, MT Davis, TK Witte, RJ Beyers, JZ Willis, Y Wang, TS Denney Jr., JS Katz, N Salibi, G Deshpande, "Demonstration and validation of a new pressure-based MRI-safe pain tolerance device", ***Journal of Neuroscience Methods***, vol. 271, pp. 160-168, 2016.
7. G Deshpande, M Baxi, T Witte, JL Robinson, "A neural basis for the acquired capability for suicide", ***Frontiers in Psychiatry***, vol. 7, pp. 125, doi:10.3389/fpsyt.2016.00125, 2016.
8. P Liang*, G Deshpande*, S Zhao, J Liu, X Hu, K Li, "Altered directional connectivity between emotion network and motor network in Parkinson's disease with depression", ***Medicine***, vol. 95(30), pp. e4222, 2016. * joint first authors
9. K Goodyear, R Parasuraman, S Chernyak, E de Visser, P Madhavan, G Deshpande, F Krueger, "An fMRI and effective connectivity study investigating miss errors during advice utilization from human and machine agents",

Social Neuroscience, 2016 (in press).

10. JL Robinson, N Salibi, G Deshpande, "Functional connectivity of the left and right hippocampus: Evidence for functional lateralization using meta-analytic approaches and ultra-high field functional neuroimaging", ***NeuroImage***, vol. 135, pp. 64-78, 2016.
11. AM Thompkins, G Deshpande, P Waggoner, JS Katz, "Functional magnetic resonance imaging of the domestic dog: Research, methodology and conceptual issues", ***Comparative Cognition & Behavior Reviews***, vol. 11, pp. 63-82, 2016.
12. SP Kyathanahally, A Franco-Watkins, X Zhang, VD Calhoun, G Deshpande, "A realistic framework for investigating decision-making in the brain with high spatio-temporal resolution using simultaneous EEG/fMRI and joint ICA", ***IEEE Journal of Biomedical and Health Informatics***, 2016 (in press).
13. V Chattaraman*, G Deshpande*, HJ Kim, KR Sreenivasan, "Form 'defines' function: Neural Connectivity between aesthetic perception and product purchase decisions in an fMRI study", ***Journal of Consumer Behavior***, vol. 15(4), pp. 335-347, 2016. * joint first authors
14. G Bellucci, S Chernyak, M Hoffman, G Deshpande, OD Monte, KM Knutson, J Grafman, F Krueger, "Effective connectivity of brain regions underlying third party punishment: functional MRI and Granger causality evidence", ***Social Neuroscience***, 2016 (in press).
15. C Feng, G Deshpande, C Liu, R Gu, Y-J Luo, F Krueger, "Diffusion of responsibility attenuates altruistic punishment: A functional magnetic resonance imaging effective connectivity study", ***Human Brain Mapping***, vol. 37(2), pp. 663-77, 2016.
16. BM Hampstead, M Khoshnoodi, W Yan, G Deshpande, K Sathian, "Patterns of effective connectivity between memory encoding and retrieval differ between patients with mild cognitive impairment and healthy older adults", ***NeuroImage***, vol. 124(A), pp. 997-1008, 2016.
17. H Jia, OM Pustovyy, Y Wang, P Waggoner, R Beyers, J Schumacher, C Wildey, EE Morrison, N Salibi, TS Denney, VJ Vodyanoy, G Deshpande, "Enhancement of odor-induced activity in the canine brain using zinc nanoparticles: A functional MRI study in fully unrestrained conscious dogs", ***Chemical Senses***, vol. 41(1), pp. 53-67, 2016.
18. Y Wang, V Chattaraman, HJ Kim, G Deshpande, "Predicting purchase decisions based on spatio-temporal functional MRI features using machine learning", ***IEEE Transactions on Cognitive and Developmental Systems, formerly IEEE Transactions on Autonomous Mental Development (special issue on 'Multimodal Modeling and Analysis Informed by Brain Imaging')***, vol. 7(3), pp. 248-255, 2015.
19. LE Libero, TP DeRamus, AC Lahti, G Deshpande, RK Kana, "Multimodal neuroimaging based classification of Autism Spectrum Disorder using anatomical, neurochemical and white matter correlates", ***Cortex***, vol. 66, pp. 46-59, 2015.
20. MM Grant, K Wood, KR Sreenivasan, M Wheelock, D White, J Thomas, DC Knight, G Deshpande, "Influence of early life stress on intra- and extra-amygdaloid causal connectivity", ***Neuropsychopharmacology***, vol. 40(7), pp. 1782-93, 2015.
21. KR Sreenivasan, M Havlicek, G Deshpande, "Non-parametric hemodynamic deconvolution of fMRI using homomorphic filtering", ***IEEE Transactions on Medical Imaging***, vol. 34(5), pp. 1155-63, 2015.
22. G Deshpande, P Wang, D Rangaprakash, B Wilamowski, "Fully connected cascade artificial neural network architecture for attention deficit hyperactivity disorder classification from functional magnetic resonance imaging data", ***IEEE Transactions on Cybernetics*** (formerly IEEE Transactions on Systems, Man and Cybernetics: Part B), vol. 45 (12), pp. 2668-2679, 2015.
23. SP Kyathanahally, H Jia, OM Pustovyy, P Waggoner, R Beyers, J Schumacher, J Barrett, EE Morrison, N Salibi, TS Denney, VJ Vodyanoy, G Deshpande, "Anterior-posterior dissociation of the default mode network in dogs", ***Brain Structure and Function***, vol. 220(2), pp. 1063-1076, 2015.
24. NL Hutcheson, KR Sreenivasan, G Deshpande, MA Reid, J Hadley, DM White, L Ver Hoef, A Lahti, "Effective connectivity during episodic memory retrieval in Schizophrenia participants before and after antipsychotic medication", ***Human Brain Mapping***, vol. 36(4), pp. 1442-57, 2015.
25. H Jia, X Hu, G Deshpande, "Behavioral relevance of the dynamics of the functional brain connectome", ***Brain Connectivity***, vol. 4(9), pp. 741-759, 2014.
26. MD Wheelock, KR Sreenivasan, KH Wood, LW Ver Hoef, G Deshpande, DC Knight, "Threat-related learning relies on distinct dorsal prefrontal cortex network connectivity", ***NeuroImage***, vol. 102, pp. 904-912, 2014.
27. S Lacey, R Stilla, K Sreenivasan, G Deshpande, K Sathian, "Spatial imagery in haptic shape perception", ***Neuropsychologia***, vol.60, pp. 144-158, 2014.

28. MM Grant, D White, J Hadley, N Hutcheson, R Shelton, K Sreenivasan, G Deshpande, "Early life trauma and directional brain connectivity within major depression", ***Human Brain Mapping***, vol. 35(9), pp. 4815-4826, 2014.
29. D Kapogiannis, G Deshpande, F Krueger, MP Thornburg, JH Grafman, "Brain Networks Shaping Religious Belief", ***Brain Connectivity***, vol. 4(1), pp. 70-79, 2014.
30. P Liang, Z Li, G Deshpande, Z Wang, X Hu, K Li, "Altered causal connectivity of resting state brain networks in amnesic MCI", ***PLoS ONE***, vol. 9(3), pp. e88476, 2014.
31. H Jia, OM Pustovyy, P Waggoner, R Beyers, J Schumacher, C Wildey, J Barrett, EE Morrison, N Salibi, TS Denney, VJ Vodyanoy, G Deshpande, "Functional MRI of the Olfactory System in Conscious Dogs", ***PLoS ONE***, vol. 9(1), pp. e86362, 2014.
32. WS Randall, DR Nowicki, G Deshpande, RF Lusch, "Converting knowledge into value: Gaining insights from service dominant logic and neuroeconomics", ***International Journal of Physical Distribution and Logistics Management***, vol. 44(8/9),pp. 655-670, 2014.
33. G Deshpande, L Libero, KR Sreenivasan, H Deshpande, RK Kana, "Identification of neural connectivity signatures of autism using machine learning", ***Frontiers in Human Neuroscience***, vol.7, pp. 670, 2013.
34. K Sathian, G Deshpande, R Stilla, "Neural changes with tactile learning reflect decision level reweighting of perceptual readout", ***Journal of Neuroscience***, vol. 33(12), pp. 5387-98, 2013.
35. D Rangaprakash, X Hu, G Deshpande, "Phase synchronization in brain networks derived from correlation between probabilities of recurrences in functional MRI data", ***International Journal of Neural Systems***, vol. 23(2), pp. 1350003-14, 2013.
36. G Deshpande, K Sathian, X Hu, JA Buckhalt, "A rigorous approach for testing the constructionist hypotheses of brain function", ***Behavioral and Brain Sciences***, vol. 35(3), pp. 148, 2012.
37. G Deshpande and X Hu, "Investigating Effective Brain Connectivity from fMRI Data: Past Findings and Current Issues with Reference to Granger Causality Analysis", ***Brain Connectivity***, vol. 2(5), pp.235, 2012.
38. M Strenziok, F Krueger, G Deshpande, R Lenroot, E van der Meer, J Grafman, "Fronto-Parietal Regulation of Media Violence Exposure in Adolescents: A Multi-Method Study", ***Social Cognitive and Affective Neuroscience***, vol. 6(5), pp. 537-547, 2011.
39. K Sathian, S Lacey, R Stilla, GO Gibson, G Deshpande, X Hu, S Laconte, C Glielmi, "Dual pathways for haptic and visual perception of spatial and texture information", ***NeuroImage***, vol. 57(2), pp. 462-475, 2011.
40. F Preusse, E Van der Meer, G Deshpande, F Krueger, I Wartenburger, "Fluid intelligence allows flexible recruitment of the parieto-frontal network in analogical reasoning", ***Frontiers in Human Neuroscience***, vol. 5, pp. 22, 2011.
41. F Krueger, S Landgraf, E van der Meer, G Deshpande and X Hu, "Effective connectivity of the multiplication network: A functional MRI and multivariate Granger causality mapping study", ***Human Brain Mapping***, vol. 32(9), pp. 1419-1431, 2011.
42. S Lacey, H Hagtvedt, VM Patrick, A Anderson, R Stilla, G Deshpande, X Hu, JR Sato, S Reddy, K Sathian, "Art for reward's sake: Visual art recruits the ventral striatum", ***NeuroImage***, vol. 55(1), pp. 420-433, 2011.
43. BM Hampstead, AY Stringer, RF Stilla, G Deshpande, X Hu, AB Moore, K Sathian, "Activation and effective connectivity changes following explicit memory training for face-name pairs in patients with mild cognitive impairment: A pilot study", ***Neurorehabilitation and Neural Repair***, vol. 25(3), pp. 210-222, 2011.
44. G Deshpande, P Santhanam, X Hu, "Instantaneous and causal connectivity in resting state brain networks derived from functional MRI data", ***NeuroImage***, vol. 54(2), pp. 1043-52, 2011.
45. G Deshpande, X Hu, S Lacey, R Stilla and K Sathian, "Object familiarity modulates effective connectivity during haptic shape perception", ***NeuroImage***, vol. 49(3), pp. 1991-2000, 2010.
46. G Deshpande, Z Li, P Santhanam, CD Coles, ME Lynch, S Hamann, X Hu, "Recursive cluster elimination based support vector machine for disease state prediction using resting state functional and effective brain connectivity", ***PLoS One***, vol. 5(12), pp. e14277, 2010.
47. G Deshpande, K Sathian and X Hu, "Effect of hemodynamic variability on Granger causality analysis of fMRI", ***NeuroImage***, vol. 52(3), pp. 884-96, 2010.
48. G Deshpande, K Sathian and X Hu, "Assessing and compensating for zero-lag correlation in time-lagged Granger causality analysis of fMRI", ***IEEE Transactions on Biomedical Engineering***, vol. 57, pp. 1446-1556, 2010.
49. G Deshpande, C Kerssens, P Sebel and X Hu, "Altered Local Coherence in the Default Mode Network due to Sevoflurane Anesthesia", ***Brain Research***, vol. 1318, pp. 110-121, 2010.

50. G Deshpande, S LaConte, GA James, S Peltier and X Hu, “Multivariate Granger causality analysis of brain networks”, ***Human Brain Mapping***, vol. 30(4), pp. 1361-1373, 2009.
51. R Stilla, R Hanna, E Mariola, G Deshpande, X Hu and K Sathian, “Neural processing underlying tactile microspatial discrimination in the blind: A functional magnetic resonance imaging study”, ***Journal of Vision***, vol. 8(10), pp. 13.1-19, 2008.
52. G Deshpande, X Hu, R Stilla and K Sathian, “Effective Connectivity during Haptic Perception: A study using Granger causality analysis of functional magnetic resonance imaging data”, ***NeuroImage***, vol. 40(4), pp. 1807-14, 2008.
53. R Stilla, G Deshpande, S LaConte, X Hu, K Sathian, “Posteromedial parietal cortical activity and inputs predict tactile spatial acuity”, ***Journal of Neuroscience***, vol. 27(41), pp. 11091-11102, 2007.
54. G Deshpande, S LaConte, S Peltier and X Hu, “Connectivity analysis of human functional MRI data: from linear to nonlinear and static to dynamic”, ***Lecture Notes in Computer Science***, vol. 4091, pp. 17-24, 2006.
55. G Deshpande, S LaConte, S Peltier and X Hu, “Tissue specificity of nonlinear dynamics in baseline fMRI”, ***Magnetic Resonance in Medicine***, vol. 55(3), pp. 626-632, 2006.
56. G Deshpande and A Makur, “A high performance scheme for EEG compression using a multichannel model”, ***Lecture Notes in Computer Science***, vol. 2552, pp. 443-451, 2002.

HONORS AND AWARDS

- 2016: President's outstanding collaborative units award
- 2007: International society for magnetic resonance in medicine stipend
- 2006: International society for magnetic resonance in medicine stipend
- 2005: International society for magnetic resonance in medicine stipend
- 2003: Indian Institute of Science research scholarship
- 2000: Undergraduate scholarship for academic excellence

MEDIA EXPOSURE

· Autism research: http://www.sciencedaily.com/releases/2013/10/131017114233.htm

· Religion Research: http://www.scienceworldreport.com/articles/12256/20140119/evidence-of-biological-basis-for-religion-in-human-evolution.htm

http://www.wtvm.com/story/24524624/au-researcher-finds-brain-interactions-differ-between-religious-and-non-religious-subjects?autostart=true

PUBLIC SERVICE, PROFESSIONAL SERVICE AND PROFESSIONAL MEMEBERSHIPS

1. Member
   a. IEEE (Institute of Electrical and Electronics Engineers)
   b. ISMRM (International Society for Magnetic Resonance in Medicine)
   c. OHBM (Organization for Human Brain Mapping)
   d. SNE (Society for Neuroeconomics)
   e. BMES (Biomedical Engineering Society)
   f. CCS (Comparative Cognition Society)

2. Reviewer for Peer-reviewed Journals

   IEEE Transactions on Medical Imaging
   IEEE Transactions on Biomedical Engineering
   IEEE Journal of Selected Topics in Signal Processing
   IEEE Transactions on Neural Systems and Rehabilitation Engineering
   IEEE/ACM Transactions on Computational Biology and Bioinformatics
   Human Brain Mapping

NeuroImage
Neuroscience Letters
PLoS ONE
PLoS Computational Biology
International Journal of Yoga
Biomedical Signal Processing and Control
International Journal of Neuropsychopharmacology
Brain Connectivity
Behavioral and Brain Sciences
Journal of Neuroscience Methods
Journal of Visualized Experiments
CNS Spectrums
International Journal of Neural systems
Brain Imaging and Behavior
Journal of Neuroimaging
Neuroinformatics
Open Neuroimage Journal
Journal of Magnetic Resonance Imaging
Computers in Biology and Medicine
Journal of Neurological Sciences

3. Treasurer, Governing Committee of the Detection & Correction of Motion in MRI & MRS Study Group, International Society for Magnetic Resonance in Medicine in 2012-2013

4. Editorships:

- Editor, Medical Diagnostic Methods Journal
- Editor, Frontiers in Neuroscience
- Managing Editor, Frontiers in Bioscience
- Guest Editor, IEEE/ACM Transactions on Computational Biology and Bioinformatics
- Guest Editor, Computational Intelligence and Neuroscience
- Guest Editor, BioMed Research International

5. Member, International Advisory Board, Bharat University, Chennai, India

CURRENT STUDENTS

Pradyumna Lanka: https://sites.google.com/site/pradyumnalanka/

Tuo Shi: https://sites.google.com/site/tuosresumes/

Mohammed Syed: http://www.auburn.edu/~mas0047/

Yun Wang: https://sites.google.com/site/yun66smile/home

Wenjing Yan: https://sites.google.com/site/wenjingyan0422/

Xinyu Zhao: http://xinyu.zhao.gao.io/

Sinan Zhao: http://zsn900503.wix.com/zsnpersonalpage

FORMER STUDENTS

Hao Jia (Asst. Prof at Taiyuan University of Technology, China)

Peng Wang

Karthik Ramakrishnan Sreenivasan (Staff Scientist at Cleveland Clinic Lou Ruvo Center for Brain Health, Las Vegas)

Sreenath Pruthviraj Kyathanahally (Doctoral student at University of Bern, Switzerland)

Yunzhi Wang (Doctoral student at University of Oklahoma)

Madhura Baxi(Doctoral student at Boston University)

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Comments

Gopikrishna Deshpande

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