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Assistant Professor
Institute of Computational Medicine
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EDUCATION

2006 Ph.D., Department of Electrical Engineering and Computer Science (EECS),
Minor in Brain and Cognitive Sciences, MIT, Cambridge, MA.
1997 S.M., Department of EECS, MIT, Cambridge, MA.
1994 B.S., Department of Electrical Engineering, Cornell University, Ithaca, NY.

POSITIONS HELD

2008- 2009 Research Associate, Statistical Neural Data Analysis, Computational Neuroscience
Laboratory, Brain and Cognitive Science Dept, MIT
2006-2008 Research Associate, Statistical Neural Data Analysis, Neuroscience Statistics
Research Laboratory, Massachusetts General Hospital and Harvard Medical School

Johns Hopkins University

2009 Assistant Professor, Institute for Computational Medicine, Department of Biomedical
Engineering (July 1, 2009)

Massachusetts Institute of Technology

2007 Lecturer, *Scientific Marketing*, Professional Institute
2006 Lecturer, *Introduction to Probability*, Department of EECS
2005 Lecturer, *Scientific Marketing*, Professional Institute
2000-2001 Teaching Assistant, *Dynamic Systems and Control*, Department of EECS
1998 Teaching Assistant, *Introduction to Communication, Control, and Signal
Processing*, Department of EECS
1995-1997 Teaching Assistant, *Introduction to Probability*, Department of EECS
1994 Teaching Assistant, *Signal & Systems*, Department of EECS

Cornell University

1994 Teaching Assistant, *Signal & Systems*, Department of Electrical Engineering
1993-1994 Research Assistant, *Control Design* for hydraulic servo-valve system at Moog Inc
(Buffalo, NY)
1992-1994 Workshop Facilitator, *Academic Excellence Workshop for Women and Minorities*

InfoLenz Corporation

2000-2007 President & Co-Founder, *Data-Analytics Start Up* company, based on innovative
optimization technology to maximize ROI for retail companies. Active participant in
research & development, fund raising (\$2M raised as seed money), business

development, and client engagements. Clients include Borders Book Store, Dell, Express Fashion, Barnes & Noble, Nebraska Furniture Mart, Bealls, PointRight

Los Alamos Laboratory

2011 Capability Review Panel Member. Reviewed the Information Knowledge Sciences Division.

AWARDS AND HONORS

2015 Whiting School of Engineering Robert B. Pond Excellence in Teaching Award
2014 Kumar Young Investigator Award - North American Neuromodulation Society (NANS)
2014 GATech Biomedical Engineering Young Innovators Award
2012 Presidential Early Career Award for Scientists and Engineers (PECASE)
2010 NSF CAREER Award
2008 Burroughs Wellcome Fund Career Awards at the Scientific Interface
2008 L'Oreal USA for Women in Science Fellowship
1995 National Science Foundation Graduate Research Fellow
1992 GE Faculty for the Future Research Fellow
1991-1994 Member of Eta Kappa Nu National Honor Society
1991-1994 Member of Tau Beta Pi National Honor Society

PROFESSIONAL SOCIETIES

2015 Committee Member of the International Workshop Statistical Analysis of Neuronal Data (SAND7)
2015 Associate Editor for IEEE Transactions on Neural Systems and Rehabilitation (TNSRE)
2014 Biomedical Engineering Society (BMES)
2013 American Society of Mechanical Engineers (ASME)
2007- Society for Neuroscience (SNF)
2004- Institute of Electrical and Electronics Engineers (IEEE)
2008- 2009 Association for Women in Science (AWIS)
2008-2009 American Association for the Advancement of Science (AAAS)

UNIVERSITY SERVICE

2015 Control and Robotics Search Committee, Dept. of Mechanical Engineering
2015 Brain Machine Interface Search Committee, Dept. of Electrical and Computer Engineering
2014 BDP in Computational Healthcare Search Committee
2014 ICM Minor Committee
2013 Kennedy Krieger Institute Search Committee
2013 BME Strategic Vision Committee on Education

TEACHING

Undergraduate Courses/Graduate School Courses

2015 Lecturer, 580.431, Introduction to Computational Medicine I, Department of Biomedical Engineering, JHU
2015 Lecturer, 580.222, Systems and Control, Department of Biomedical Engineering, JHU
2014 Lecturer, 580.445, Networks, JHU
2014 Lecturer, 580.222, Systems and Control, Department of Biomedical Engineering, JHU
2013 Lecturer, 580.222, Systems and Control, Department of Biomedical Engineering, JHU

- 2012 Lecturer, 580.222, Systems and Control, Department of Biomedical Engineering, JHU
- 2011 Lecturer, 580.616, Linear Dynamical Systems, Department of Biomedical Engineering, JHU
- 2010 Lecturer, 580.616, Linear Dynamical Systems, Department of Biomedical Engineering, JHU
- 2010 Lecturer, Neuroinformatics, Woods Hole MBL Summer Course
- 2009 Lecturer, Neuroinformatics, Society for Neuroscience Annual Meeting
- 2009 Lecturer, Neuroinformatics, Woods Hole MBL Summer Course
- 2007 Lecturer, 6.66s, Scientific Marketing and Offer Design: Pricing, Bundling, and Customer Targeting, MIT Professional Institute. Co-created and co-taught (with a Full Professor at MIT and a senior level Executive from SAP)
- 2006 Lecturer, 6.041, Introduction to Probability, Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and recitations and exams, and grading exams for a class of approximately 200 undergraduates.
- 2005 Lecturer, 6.66s, Scientific Marketing and Offer Design: (see above)
- 1999 Teaching Assistant, 6.241, Dynamic Systems & Control, Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and teaching recitations, grading exams for a class of approximately 50 graduate students.
- 1998 Teaching Assistant, 6.011, Introduction to Communication, Control, and Signal Processing, Mathematics Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and teaching tutorials, grading homework and exams for a class of approximately 200 undergraduate students.
- 1997 Teaching Assistant, 6.041, Introduction to Probability, Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and teaching recitations, tutorials, grading homework and exams for a class of approximately 200 undergraduate students.
- 1996 Teaching Assistant, 6.041, Introduction to Probability, Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and teaching recitations, tutorials, grading homework and exams for a class of approximately 200 undergraduate students.
- 1995 Teaching Assistant, 6.041, Introduction to Probability, Department of Electrical Engineering and Computer Science, MIT. Responsibilities included preparing and teaching recitations, tutorials, grading homework and exams for a class of approximately 200 undergraduate students.

INVITED SEMINARS, PRESENTATIONS & WORKSHOPS

- 2015 Invited speaker to BrainModes 2015 Conference
- 2015 Invited speaker to Boston University's Bioengineering Seminar Series
- 2015 Invited speaker to MIT's Institute for Medical Engineering and Science (IMES) Seminar Series
- 2015 Invited speaker to special panel on "Research Avenues in Network Neuroscience and Controls" at the 2015 American Control Conference
- 2015 Invited speaker to University of Virginia's Statistics Seminar Series
- 2015 Invited speaker to University of Minnesota's ECE/BME Seminar Series
- 2014 Invited Speaker and Recipient of the New Investigator Award from the North American Neuromodulation Society, Las Vegas. Dec 12, 2014.
- 2014 Invited Speaker and Recipient of the BME Young Innovators Seminar Series Award at Georgia Tech, Atlanta GA. Oct 28, 2014.
- 2014 Organized Workshop on "Modeling, Estimation and Control of Neurons and Neuronal Networks" at the 2014 22nd Mediterranean Conference on Control & Automation
- 2014 Invited Speaker to Columbia University BME Seminar Series
- 2013 Organized Workshop on "Dynamical Neural Systems, Synchronization and Control" at the 52nd IEEE Conference on Decision and Control (Dec. 2013)

- 2013 Invited Lecturer for Satellite Workshop on “The Science of Large Data Sets: Spikes, Fields, and Voxels“ at the Society for Neuroscience Annual Meeting, (Nov. 2013)
- 2013 Invited Speaker to workshop titled "Feedback and synchronization in neuroscience" in Paris, at Institut Henri Poincaré, on June 3-4, 2013.
- 2013 Invited Speaker to Minisymposium titled “Dynamics and Control of Neurons” at the SIAM Conference on Applications of Dynamical Systems (DS13), May 19-23, 2013, at the Snowbird Ski and Summer Resort, Snowbird, Utah, USA.
- 2013 **Plenary Speaker** to 27th Annual Meeting of “Society for Neurochemistry, India (SNCI)” and International Conference on “Recent Advances in Molecular Mechanisms of Neurological Disorders” 21 -23 February, 2013 All India Institute of Medical Sciences, Ansari Nagar, New Delhi-110029, Delhi (INDIA)
- 2013 Invited Speaker to workshop titled “Disease”. Mathematical Biosciences Institute. The Ohio State University. Feb 4-8, 2013.
- 2012 Invited Speaker to workshop titled “Emerging Topics in Interconnected Systems: From manmade to biological”. MIT. June 24-25, 2012.
- 2012 Invited Speaker to UCSD, Department of Biomedical Engineering. Hosted by Dr. Todd Coleman. Oct 1, 2012.
- 2012 Invited Speaker to workshop titled "Towards Mathematical Modeling of Neurological Disease from Cellular Perspectives" Hosted by the Fields Institute, Toronto. Larry Abbott (Columbia Univ.), Sue Ann Campbell (Univ. Waterloo), Nancy Kopell (Boston Univ.), Frances Skinner (TWRI/UHN and Univ Toronto), David Terman (Ohio State Univ.)
- 2012 Invited Speaker for Grand Rounds in Epilepsy Center, Cleveland Clinic
- 2011 Invited speaker to Applied Mathematics and Statistics Seminar Series, JHU
- 2011 Invited Speaker to the Zanvyl Krieger Mind Brain Institute Bodian Seminar Series, JHU
- 2011 Invited Speaker to CNS, Workshop on “Method of Information Theory in Computational Neuroscience”, Stockholm, Sweden. Hosted by Simon Schultz (UCL), Michael Gastpar (UC Berkeley), Aurel A. Lazar (Columbia), Todd Coleman (UCSD)
- 2011 Invited Speaker to COSYNE, Workshop on “Closing the loop: New techniques for online neural characterization and optimal control”, Salt Lake City, Utah. Hosted by Dr. George Horwitz.
- 2011 Invited Panel Speaker on “Can your basic research contribute to cures? Translational Research for PhDs” at the AAAS Annual Meeting, Washington, DC. Hosted by Dr. Jim Austin.
- 2010 Invited Speaker to the Riken Brain Science Institute, Mathematical Sciences Workshop, Kamisawa, Japan. Hosted by Dr. Shunichi Amari.
- 2010 Lecturer at Workshop at 2010 IEEE International Symposium on Information Theory on modeling of neural activity based on computational/biophysical and statistical approaches.
- 2010 Invited Speaker to the Symposium on Emerging Topics in Control and Modeling: Biomedical Systems. Hosted by: The Beckman Institute, University of Illinois at Urbana-Champaign.
- 2010 Invited Speaker to Seminar Series, Department of Electrical Engineering, American University of Beirut, Lebanon.
- 2008 Invited for Interview. Improving Deep Brain Stimulation in Parkinson’s Disease Using Feedback Control, (Boston University, Stanford University, UC Berkeley, USC, UCLA, Princeton, GA Tech, Univ. of Utah, Cornell University, George Mason University, Johns Hopkins University)
- 2006 Finite-Rate Control: Stability and Performance, Department of Mechanical and Aerospace Engineering, UCLA, Los Angeles, Ca.
- 2005 Stability Under Finite-Rate Feedback, Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI.
- 2001 From data to dollars, Invited Speaker, Cyberposium 2001, Harvard Business School’s high technology conference, Cambridge, MA.

PUBLICATIONS

Journal Articles (published)

- [J1] Vyas S, Huang H, Gale JT, and **Sarma SV***, Montgomery Jr EB. (2015) Neuronal Complexity in Subthalamic Nucleus is Reduced in Parkinson's Disease. [IEEE Trans Neural Syst Rehabil Eng. Volume:PP Issue:99](#). (*co-senior author)
- [J2] Czanner G, **Sarma SV**, Ba D, Eden UT, Wu W, Eskandar E, Lim HH, Temereanca S, Suzuki WA, and Brown EN. (2015) Measuring the signal-to-noise ratio of a neuron. *Proc Natl Acad Sci U S A*. vol. 112(23): 7141–7146.
- [J3] Kahn K, Saxena S, Eden UT, Gale JT, Eskandar E, Thakor N, Schieber M, Brown EN, **Sarma SV**. Selecting Task-Related Neurons through Model Deterioration Eliminating Stimulus (MDES). *J Neurosci Methods*. 2015 Apr 30;245:156-68.
- [J4] Agarwal R, Thakor N, **Sarma SV**, Massaquoi S. (2015) PMv Neuronal Firing May Be Driven by a Movement Command Trajectory within Multidimensional Gaussian Fields. *The Journal of Neuroscience*, 24 June 2015, 35(25):9508-9525. (*co-senior author)
- [J5] Ehrens D, Sritharan D, **Sarma SV**. (2015) Closed-Loop Control of a Fragile Network: Application to Seizure-like Dynamics of an Epilepsy Model. *Front. Neurosci.*, 03 March 2015.
- [J6] Santaniello S, McCarthy MM, Montgomery Jr. EB, Kopell N, Gale JT, and **Sarma SV**. (2014) The Therapeutic mechanism of high frequency DBS in Parkinson's disease: neural restoration through loop-based reinforcement. *Proc Natl Acad Sci U S A*. 2015 Feb 10;112(6):E586-95.
- [J7] Kang X, **Sarma SV**, Santaniello S., Schieber M, Thakor M. A Cognitive State Transition Detection Framework Based on Task-Independent Models. [IEEE Trans Neural Syst Rehabil Eng. 2015 Jul;23\(4\):676-82](#)
- [J8] Burns SP, Santaniello S, Yaffe RB, Jouny C, Crone N, Bergey G, Anderson WS, **Sarma SV**. (2014) Network Dynamics of the Brain and Influence of the Epileptic Seizure Onset Zone. *Proc Natl Acad Sci U S A*. Dec 9;111(49):E5321-30
- [J9] Yaffe R, Kerr MSD, Damera S, **Sarma SV**, Inati SK, Zaghoul K. Reinstatement of distributed cortical oscillations occurs with precise spatiotemporal dynamics during successful memory retrieval. *Proc Natl Acad Sci U S A*. 2014 Dec 15. pii: 201417017.
- [J10] Yaffe RB, Borger P, Megevand P, Groppe DM, Kramer MA, Chu CJ, Santaniello S, Meisel C, Mehta AD, **Sarma SV** (2014) Physiology of Functional and Effective Networks in Epilepsy. *Clin Neurophysiol*. Sep 22. pii: S1388-2457(14)00494-5.
- [J11] Sritharan D., **Sarma SV** (2014) Fragility in Dynamic Networks: Application to Neural Networks in the Epileptic Cortex. [Neural Computation](#). Vol. 26, No. 10, pages 2294-2327.
- [J12] Johnson MA, Thompson S, Gonzalez-Martinez J, Park HJ, Bulacio J, Najm I, Kahn K, Kerr M, **Sarma SV** and Gale JT. Performing Behavioral Tasks in Subjects with Intracranial Electrodes. *J Vis Exp*. Oct 2;(92)
- [J13] Santaniello S, Sherman D, Thakor N, Eskandar E, **Sarma SV**. (2012) Optimal Control-Based Bayesian Detection of Clinical and Behavioral State Transitions. [IEEE Trans Neural Syst Rehabil Eng](#). 2012 Sep;20(5):708-19. Epub 2012 Aug 8. PMID: 22893447
- [J14] **Sarma SV**, Cheng ML, Eden UT, Williams Z, Brown EN, Eskandar E. (2012) The Effects of Cues on Neurons in the Basal Ganglia in Parkinson's Disease. [Front Integr Neurosci](#). 2012;6:40. PMC3405280
- [J15] Santaniello S, Montgomery EB, Gale JT, **Sarma SV** (2012) Non-stationary Discharge Patterns in Motor Cortex under Subthalamic Nucleus Deep Brain Stimulation: A Review. [Front Integr Neurosci](#). 6:35. PMC3385519
- [J16] Agarwal R and **Sarma SV**. (2012) Performance limitations of relay neurons. [PLoS Comput Biol](#). Aug;8(8):e1002626. PMC3415468

- [J17] Saxena S, Schieber M, Thakor N, and **Sarma SV** (2012). Aggregate Input-Output Models of Neuronal Populations. [IEEE Trans Biomed Eng.](#) 2012 Jul;59(7):2030-9. PMID: 22552544
- [J18] Agarwal R and **Sarma SV** (2012). The effects of DBS patterns on basal ganglia activity and thalamic relay : a computational study. [J Comput Neurosci.](#) 33(1): 151-67.
- [J19] Santaniello S, Burns SP, Golby A, Singer J, Anderson WS, **Sarma SV** (2011). Quickest Detection of Seizure Onsets in Drug-Resistant Patients: An Optimal Control Approach. [Epilepsy & Behavior.](#) 22, pp 49–60. PMC 3280702.
- [J20] **Sarma SV**, Nguyen DP, Czanner G, Wirth S, Suzuki W, Wilson M., Brown EN (2011). Computing Confidence Intervals for Point Process Models. [Neural Computation.](#) 23, 2731-2745.
- [J21] **Sarma SV**, Cheng M, Williams Z, Hu R, Eskandar E, Brown EN. Using point process models to compare neural spiking activity in the subthalamic nucleus of Parkinson's patients and a healthy primate, [IEEE Trans Biomed Eng.](#) Vol. 57, No. 6, June 2010.
- [J22] Coleman TP, **Sarma SV**. A Computationally Efficient Method for Nonparametric Modeling Neural Spiking Activity with Point Processes. [Neural Computation.](#) 22(8):2002-30. August 2010.
- [J23] **Sarma SV**, Dahleh MA. Signal Reconstruction in the Presence of Finite-Rate Measurements: Finite-Horizon Control Applications. [Journal on Robust and Nonlinear Control.](#) June 2009.
- [J24] **Sarma SV**, Dahleh, MA, Salapaka S. On Time-Varying Bit-Allocation Maintaining Input-Output Stability and Performance: A Convex Parameterization. [IEEE Transactions on Automatic Control.](#) June 2008.
- [J25] **Sarma SV**, Dahleh MA. Remote Control Over Noisy Channels: A First-Order Example. [IEEE Transactions on Automatic Control.](#) February 2007.

Journal Articles (submitted or under preparation)

- [J26] Kang X, Santaniello S., Schieber M, Thakor M. **Sarma SV**. Task-Independent Kinematics Decoding With Cognitive State Transition. *IEEE TNSRE*. (Revision)
- [J27] Matthew S. D. Kerr, Kevin Kahn, Matthew A. Johnson, Susan Thompson, Jorge Gonzalez-Martinez, Hyun-Joo Park, Juan Bulacio, Catherine Liegeois-Chauvel, Sridevi V. Sarma, John T. Gale. The Role of Associative Cortices and Hippocampus during Movement Perturbations. *Scientific Reports* (Under Review)
- [J28] Kevin Kahn, Matthew S. D. Kerr, Matthew A. Johnson, Susan Thompson, Jorge Gonzalez-Martinez, Hyun-Joo Park, Juan Bulacio, John T. Gale, Sridevi V. Sarma. Lucky Rhythms in Orbital Frontal Cortex Bias Gambling Decisions in Humans. *Scientific Reports* (Under Review)
- [J29] Agarwal R, **Sarma SV**. Non-Parametric Estimation of Band-limited Probability Density Functions: Application to Neuronal Activity. *IEEE PAMI*. (Under Review)
- [J30] Agarwal R, Chen Z, Kloosterman F, Sarma SV. A Novel Nonparametric Approach for Neural Encoding and Decoding Models of Multimodal Receptive Fields. *Neural Computation*. (Under Review)
- [J31] Patel N, Jaishankar R, Saria S, Winslow R, **Sarma SV**, Santaniello S. Network-based Features Captures Physiological Interactions from Time Series Data that Discriminates Between Sepsis and Non-Sepsis Conditions. *IEEE TNSRE*. (Under Review)
- [J32] Saxena S, Gale JT, Santaniello S, Patel S, Assad J, **Sarma SV**, Eskandar E. Modulations in Oscillatory Activity of Globus Pallidus internus Neurons During a Directed Hand Movement Task - A Primary Mechanism for Motor Planning. *Frontiers in Neuroscience*. (In prep)
- [J33] Subramanian S, Hao S, Santaniello S, Yaffe R, Burns SP, Bergey G, Jouny C, Crone N, Anderson WS, **Sarma SV**. Identifying Intracranial EEG Signatures of the Epileptogenic Zone Using Network Centrality. *Science Translational Medicine*. (In prep)

Book Chapters (published)

- [B1] Santaniello S, Burns SP, Jouny CC, Bergey GK, Anderson WS, **Sarma SV** (2013) “An Optimal Control Approach to Seizure Detection in Drug-Resistant Epilepsy” in Systems and Synthetic Biology: A Systematic Approach (Kulkarni VV, Stan G-B, Raman K Eds.). New York, NY: Springer.

Peer-Reviewed Conference Proceedings (published)

- [C1] Sacré P, Kerr MD, Subramanian S, Kahn K, Gonzalez-Martinez J, Johnson MA, Gale JT, **Sarma SV**. (2016) Winning versus losing during gambling and its neural correlates. Proceedings for the Conference on Information Sciences and Systems (CISS). Princeton, NJ.
- [C2] Agarwal R, Chen Z, Kloosterman F, Wilson MA, **Sarma SV**. (2016) Neuronal Encoding Models of Complex Receptive Fields: A Comparison of Nonparametric and Parametric Approaches. Proceedings for the Conference on Information Sciences and Systems (CISS). Princeton, NJ.
- [C3] Kang YM, Gunnarsdottir K, Kerr M, Salas R, Ewen J, Allen R, Gamaldo C, **Sarma SV**. (2015) Score or Not to Score? A look at the distinguishing power of micro EEG analysis on an annotated sample of PSG studies conducted in an HIV cohort. Proceedings of the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Milano, Italy.
- [C4] Gunnarsdottir K, Kang YM, Kerr M, **Sarma SV**, Ewen J, Allen R, Gamaldo C, Salas R. (2015) A look at the strength of micro and macro EEG analysis for distinguishing insomnia within an HIV cohort. Proceedings of the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Milano, Italy
- [C5] Sacré P, **Sarma SV**, Guan Y, Anderson WS (2015) Electrical neurostimulation for chronic pain: on selective relay of sensory neural activities in myelinated nerve fibers. Proceedings of the 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Milano, Italy
- [C6] Sritharan D, **Sarma SV**. Fragility in Networks: Application to the Epileptic Brain. The 19th World Congress of the International Federation of Automatic Control. Capetown, South Africa, 2014
- [C7] Santaniello S, **Sarma SV**, Winslow R. Computing Network-Based Features from Physiological Time Series: Application to Sepsis Detection. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.
- [C8] Ehrens D, Sritharan D, **Sarma SV**. Instability Detector of a Fragile Neural Network: Application to Seizure Detection in Epilepsy. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.
- [C9] Hao S, Subramanian S, Jordan A, Yaffe R, Santaniello S, Jouny C, Bergey G, Anderson WS, **Sarma SV**. Computing Network-Based Features from Intracranial EEG Time Series Data: Application to Seizure Focus Localization. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.
- [C10] Agarwal R, Santaniello S, **Sarma SV**. Generalizing Performance Limitations of Relay Neurons: Application to Parkinson's Disease. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.
- [C11] Kerr M, Kahn K, Park HJ, Thompson S, Hao S, Bulacio J, Gonzalez-Martinez JA, Gale JT, **Sarma SV**. High Frequency Neural Correlates of Robust Movements in Humans Extracted from SEEG. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.
- [C12] Kahn K, Kerr M, Park HJ, Thompson S, Bulacio J, Gonzalez-Martinez JA, **Sarma SV**, and Gale JT. Oscillations in Human Orbitofrontal Cortex During Even Chance Gambling. Proceedings of the 36th Annual IEEE Engineering in Medicine and Biology Society Conference. Chicago, IL 2014.

- [C13] Burns SP, Santaniello S, Anderson WS, **Sarma SV** (2013). State Dynamics of the Epileptic Brain. Proceedings of 2013 ASME Dynamic Systems and Control Conference. Stanford CA.
- [C14] Rahul Agarwal R, **Sarma SV** (2012). Using Linear Systems Theory to Study Nonlinear Dynamics of Relay Cells. Proc. Of the 9th International Conference on Informatics in Control, Automation and Robotics. Rome, July 28-31.
- [C15] Santaniello S, Burns SP, **Sarma SV** (2012). Quickest Seizure Onset Detection in Drug-Resistant Epilepsy". Proc. IEEE American Control Conference. Montreal, June 27-29.
- [C16] Burns SP, Sritharan D, Jouny C, Bergey G, Crone N, Anderson WS, and **Sarma SV** (2012). A Network Analysis of the Dynamics of Seizure. Proc. 34th IEEE International Conf on Eng in Biol and Med (EMBC). San Diego, CA, Aug 28 - Sep 1.
- [C17] Pedoto G., Santaniello S, Fiengo G, Luigi Glielmo L, Hallett M, Zhuang P, **Sarma SV** (2012). Process Modeling Reveals Anatomical Non-Uniform Distribution across the Subthalamic Nucleus in Parkinson's Disease. Proc. 34th IEEE International Conf on Eng in Biol and Med (EMBC). San Diego, CA, Aug 28 - Sep 1.
- [C18] Santaniello S, Gale JT, Montgomery, Jr. EB, **Sarma SV** (2012) "Reinforcement Mechanisms in Dorsal Striatum during High Frequency STN DBS: A Point Process Study". Proc. 34th IEEE International Conf on Eng in Biol and Med (EMBC). San Diego, CA, Aug 28 - Sep 1.
- [C19] Yaffe R, Burns S, Park H J, Gale J, Bulacio J, Gonzalez-Martinez J, **Sarma S V.** (2012) Brain state evolution during seizure and under anesthesia: a network-based analysis of stereotaxic EEG activity in drug-resistant epilepsy patients. Proc. 34th IEEE International Conf on Eng in Biol and Med (EMBC). San Diego, CA, Aug 28 - Sep 1.
- [C20] **Sarma SV**, Santaniello S (2011) Quickest Detection of State-Transition in Point Processes: Application to Neuronal Activity. Proc. 18th IFAC World Conference, Milan, Italy, Aug. 28-Sep. 2.
- [C21] Kahn K, Sheiber M, Thakor N, **Sarma SV** (2011) Neuron Selection for Decoding Dexterous Finger Movements. Proceedings of the 33rd IEEE EMBS Conference.
- [C22] Santaniello S, Sherman D, Mirksi M, Thakor N, **Sarma SV** (2011) A Bayesian Framework for Analyzing iEEG Data from a Rat Model of Epilepsy. Proceedings of the 33rd IEEE EMBS Conference.
- [C23] Huberdeau D, Walker H, Huang H, Montgomery E, **Sarma SV** (2011) Analysis of Local Field Potential Signals: A Systems Approach. Proceedings of the 33rd IEEE EMBS Conference.
- [C24] Kerr M, Burns S, Gale J, **Sarma SV** (2011) Multivariate Analysis of SEEG Signals During Seizure. Proceedings of the 33rd IEEE EMBS Conference.
- [C25] Saxena S, Gale JT, Eskandar EN, **Sarma SV** (2011) Modulations in the Oscillatory Activity of the Globus Pallidus internus neurons during a Behavioral Task - A Point Process Analysis. Proceedings of the 33rd IEEE EMBS Conference.
- [C26] Agarwal R, **Sarma SV** (2011) An analytical study of relay neuron's reliability: Dependence on input and model parameters. Proceedings of the 33rd IEEE EMBS Conference. (**IBM Poster finalist**)
- [C27] Santaniello S, Gale JT, Montgomery EB Jr., and **Sarma SV** (2010) Modeling the Effects of Deep Brain Stimulation on Sensorimotor Cortex in Normal and MPTP Conditions. IEEE Engineering in Medicine and Biology Conference Proceedings, 2010.
- [C28] Santaniello S, Gale JT, Montgomery EB Jr., and **Sarma SV.** (2010) Modeling the Motor Striatum under Deep Brain Stimulation in Normal and MPTP Conditions. IEEE Engineering in Medicine and Biology Conference Proceedings, 2010.
- [C29] Saxena S, Santaniello S, Gale JT, Montgomery EB Jr., and **Sarma SV.** (2010) Point Process Models show Temporal Dependencies of Basal Ganglia Nuclei under Deep Brain Stimulation. IEEE Engineering in Medicine and Biology Conference Proceedings, 2010.
- [C30] Pedoto G, Santaniello S, Gale JT, Montgomery Jr. EB, Fiengo G, Glielmo L, and **Sarma SV.** (2010) System Identification of Local Field Potentials under Deep Brain Stimulation in a Healthy Primate. IEEE Engineering in Medicine and Biology Conference Proceedings, 2010.

- [C31] **Sarma SV**, Cheng M, Williams ZM, Hu R, Eskandar E, Brown EN. Using Point Process Models to Determine the Impact of Visual Cues on Basal Ganglia Activity and Behavior of Parkinson's Patients. *Proceedings of IEEE Conference on Decision and Control*, 2009.
- [C32] **Sarma SV**, Cheng M, Williams ZM, Hu R, Brown EN, Eskandar E. Modeling Neural Spiking Activity in the Sub-Thalamic Nucleus of Parkinson's Patients a Healthy Primates. *Proceedings of the International Federation of Automatic Control*. July 2008. **(finalist for best application paper)**
- [C33] Czanner G, **Sarma SV**, Eden UT, Brown EN. A Signal-to-Noise Ratio Estimator for Generalized Linear Model Systems. *Proceedings of World Congress on Engineering*, 2008.
- [C34] **Sarma SV**, Dahleh MA. Real-Time Finite-Rate Tracking: Performance Limitations. *Proceedings of American Control Conference*. June 2007.
- [C35] Coleman TP, and **Sarma SV**. Using Convex Optimization for Nonparametric Statistical Analysis of Point Processes. *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, June 24-29, 2007.
- [C36] **Sarma SV**, Dahleh MA. Real-Time Finite-Rate Tracking. *Proceedings of IEEE Conference on Decision and Control*. December 2006.
- [C37] **Sarma SV**, Dahleh MA. Real-Time Finite-Rate Navigation. *Proceedings of Allerton Conference in Communication, Control, and Computing*. September 2006.
- [C38] **Sarma SV**, Dahleh MA. Synthesis of Simple Feedforward Networks: A First-Order Example. *IEEE Proceedings of Conference on Decision and Control*. December 2005.
- [C39] **Sarma SV**, Martins NC, Dahleh MA. Control with Communication Constraints: Stability and Performance Issues. *Proceedings of Allerton Conference in Communication, Control, and Computing*. September 2005.
- [C40] **Sarma SV**, Dahleh MA, Salapaka S. On Time-Varying Bit-Allocation Maintaining Input-Output Stability: A Convex Parameterization. *Proceedings of IEEE Conference on Decision and Control*, 2004.
- [C41] **Sarma SV**, Dahleh MA, Salapaka, S. Synthesis of Efficient time-Varying Bit-Allocation Strategies Maintaining Input-Output Stability. *Proceedings of Allerton Conference in Communication, Control and Computing*, 2004.
- [C42] **Sarma SV**, Massaquoi S, Dahleh MA. Reduction of a Wave-Variable Biological Arm Control Model. *Proceedings of American Control Conference*, Chicago, 2000.

Patents

- [P1] **Sarma SV**, Subramanian S., Hao S. Computational tool for pre-surgical evaluation of patients with medically refractory epilepsy. Patent (filed October 2012)
- [P2] **Sarma SV**. Quickest Detection on Dependent Data: Application to Seizure Prediction in Epilepsy Patients. Patent (filed January 2012)
- [P3] **Sarma SV**, Brown EN, Eskandar E, System and Method for Dynamically Configurable Deep Brain Stimulation. Patent Number 8521294.

ADVISEES

Current

- *Postdoctoral Fellows*: Pierre Sacre
- *PhD*: Robert Yaffe
- *MS*: Kristín María Gunnarsdóttir, Vijay Sadashivaiah
- *Undergraduates*: Doran Walsten, Han Huang, Melissa Lin, Debra Han

Alumni (graduates)

- *Postdoctoral*: Samuel Burns, Sabato Santaniello
- *PhD*: Gilda Pedoto, Rahul Agarwal, Kevin Kahn, Matthew Kerr
- *MS*: Shreya Saxena, Rahul Agarwal, Duluxan Sritharan
- *Undergraduates*: Stephanie Lien, Saurabh Vyas, Joon Lee, Yaqing Su, Nancy Zhong, Stephanie Hao, Sandya Subramanian, Austin Jordan, Nisu Patel, Rohan Jaishankar, Amy Kang
- *High School Interns*: Harika Peddibhotla

GRANTS AND CONTRACTS

1. *Blaustein Pain Grant (Sarma PI) \$40K over 1 year* 3/1/15-2/28/2016
Towards Pain Control: Synergizing Computational and Biological Approaches to Develop a Tractable Model of the Dorsal Horn Circuit
To construct a tractable computational model of the dorsal horn circuit. Model parameters and topological structure will be constrained to match our novel experimental data that will be generated using state-of-the-art electrophysiological techniques and powerful mouse genetic approaches that delineate the effects of neurostimulation on various subsets of spinal cord neurons and supraspinal processing.
2. *Maryland Innovation Initiative Phase 1 (Sarma PI) \$150K over 9 months* 10/1/15-6/30/2016
A Novel Tool for Seizure Localization in Medically Refractory Epilepsy
The goal of this work is to develop two working prototypes of *EZTrack*, a computational tool that identifies region of interest where the seizure focus of an epilepsy patient likely resides.
3. *JHU Catalyst Award (Sarma PI) \$75K over 1 year* 7/1/15-6/30/2016
Towards a Quantitative Diagnosis of Sleep Disorders: Analysis of Spatio-Temporal Dynamics of Sleep EEG in Good and Bad Sleepers
The goal of this work is to identify quantitative features from sleep EEG recordings that distinguish between good and bad sleepers.
4. *Coulter Foundation (Sarma PI) \$80K over 1 year* 8/1/15-7/31/2016
A Novel Tool for Seizure Localization in Medically Refractory Epilepsy
The goal of this work is to refine and validate *EZTrack*, a computational tool that identifies region of interest where the seizure focus of an epilepsy patient likely resides.
5. *NSF CRCNS/NIH R01 (Sarma coPI) \$1M over 5 years* 09/01/10 - 08/31/15
Optimizing Placement of Deep Brain Stimulation Electrodes
The goal of this work is to use statistical modeling to validate existence of sweet spot within the basal ganglia that is most pathological and hence the optimal target for deep brain stimulation electrode placement. Model will also be used to design navigation strategies to optimally place electrode in OR.
6. *NSF CAREER (Sarma PI) \$399K over 4 years* 03/01/11-02/28/15
Modeling and Control of Neuronal Networks
This research involves the modeling and control of neuronal networks in the brain with applications to the treatment of Parkinson's disease using deep brain stimulation. Her project includes the construction of a general approach for modeling complex neuronal networks where interactions occur between different brain nuclei, the design of computationally efficient control strategies for such networks, and applying these methodologies to the problem of restoring pathological network dynamics arising from Parkinson's disease with deep brain stimulation.
7. *NSF EFRI (Sarma Lead PI, 3 co-PIs) \$2M over 4 years* 01/01/11-01/01/16

Robust Decoder-Compensator Architecture for Interactive Control of High-Speed and Loaded Movements

This research involves developing a novel model-based Robust Decoder-Compensator (RDC) architecture for interactive control of fast movements in the presence of uncertainty. The RDC is a feedback interconnection that 1) decodes cortical signals to produce actuator commands that reflect motor intent, 2) corrects for spurious signals generated by the cerebellum in the absence of proprioceptive feedback, and 3) makes robust the interconnection to account for mismatches between models and reality. A unique experimental paradigm will be exploited wherein neural spike and local field potential data from patients with implantable electrodes admitted for epilepsy surgery will be collected.

Recently Completely

Burroughs Wellcome Fund (Sarma PI) \$500K over 5 years 1/15/08-1/15/13
Improved Therapies for Parkinson's Disease Using Advanced Engineering Methods

The goal of this work is to develop a new dynamic feedback stimulation paradigm that will allow for low-powered DBS signals to be administered in a close-loop fashion, thereby adapting to patient's needs and eliminating the need for frequent battery replacement surgeries for patients.

Coulter Foundation (Sarma PI) \$100K over 1 year 8/1/14-7/31/2015

A Novel Tool for Seizure Localization in Medically Refractory Epilepsy

The goal of this work is to refine and validate *EZTrack*, a computational tool that identifies a region of interest where the seizure focus of an epilepsy patient likely resides.

L'Oreal For Women in Science (Sarma PI) 5/22/08 – 5/22/09

Using Technology to Improve Deep Brain Stimulation for Parkinson's Disease

The goal of this work is to employ engineering principles to automate the post-operative calibration process of DBS. Creating such a system would relieve patients of frequent physician visits, significantly cut medical costs and allow neurologists to treat more DBS patients.