Teresa H. Sanders, PhD

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EDUCATION

Emory University, Atlanta, Georgia
Postdoctoral training, Department of Biology, 2014-2016; *Advisor*: Prof. Dieter Jaeger

Georgia Institute of Technology, Atlanta, Georgia
Ph.D., Bioengineering, 2014; *Advisor:* Prof. Mark A. Clements

University of California, Los Angeles, California
M.S., Electrical Engineering, 1988, Communication Theory, *Magna cum laude*

University of Alabama, Huntsville, Alabama
B.S., Electrical and Computer Engineering, 1986, *Magna cum laude*

ACADEMIC AND RESEARCH POSITIONS

2019 – present	Research Affiliate Molecular, Cellular, and Developmental Biology Institute of Cognitive Neuroscience **University of Colorado,** Boulder
2016 – 2018	Research Assistant Professor Departments of Pharmacology and Biomedical Engineering **Vanderbilt University**, Nashville, Tennessee
2014 – 2016	Postdoctoral Fellow Biology Department **Emory University,** Atlanta, Georgia
2008 – 2014	Graduate Research Assistant Bioengineering Program **Georgia Institute of Technology**
1986 – 2008	Missile Systems Engineer Electronic Systems Lab, Georgia Tech Research Institute, Atlanta, Georgia Imaging Guidance Design Lab and Extended Air Defense Testbed **Hughes Aircraft Company**, Canoga Park, California

SELECTED FELLOWSHIPS and AWARDS

2018	Takeda Innovators in Science (Vanderbilt Nominee)
2014 – 2015	NIH Training Grant in Translational Neurology
2013 – 2014	Center for Signal and Image Processing (CSIP) Outstanding Research Award
2012 – 2013	Texas Instruments Leadership University Fellowship
2011 – 2012	NSF Teaching Fellowship
2008 – 2011	Georgia Institute of Technology Graduate Research Assistantship
1997 – 1997	Extended Air Defense Testbed Outstanding Performance Award
1990 – 1990	Hughes Aircraft High Performance Team Award
1986 – 1988	Hughes Masters Fellow

PUBLICATIONS * corresponding author

Sanders, T.H.*, 2019. The role of phase in pathological cortico-basal-ganglia signaling, *in prep*.

Sanders, T.H.*, 2019. Persistent HDAC2 inhibition modulates neurotransmitter biosynthesis and cognition, *submitted*.

Sanders, T.H.*, Weiss, J., Hogewood, L., Chen, L., Paton, C., McMahan, R.L. and Sweatt, J.D., 2019. Cognition-Enhancing Vagus Nerve Stimulation Alters the Epigenetic Landscape. *Journal of Neuroscience*, *39*(18), pp.3454-3469.

Poplawski, S.G.,..,Sanders, T.H., et al., 2020. An antisense oligonucleotide leads to suppressed transcriptional elongation of Hdac2 and long-term memory enhancement, *Molecular Therapy-Nucleic Acids* 19, 1399-1412.

Sanders, T.H.*, 2019. Phase discontinuities underlie increased drowsiness and diminished sleep quality in older humans. *BioRxiv*, p.696658.

Sanders, T.H.*, 2017. Stimulation of cortico-subthalamic projections amplifies resting motor circuit activity and leads to increased locomotion in dopamine-depleted mice. *Frontiers in integrative neuroscience*, *11*, p.24.

Sanders, T.H.* and Jaeger, D., 2016. Optogenetic stimulation of cortico-subthalamic projections is sufficient to ameliorate bradykinesia in 6-ohda lesioned mice. *Neurobiology of disease*, *95*, pp.225-237.

Sanders, T.H.*, 2016. Phase-amplitude coupling, an indication of bursting in parkinsonism, is masked by periodic pulses. *Journal of neurophysiology*, *115*(3), pp.1587-1595.

Sanders, T.H., McCurry, M., and Clements, M.A., 2014, August. Sleep stage classification with cross frequency coupling. In *2014 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (pp. 4579-4582). IEEE.

Sanders, T.H. and Clements, M.A., 2014, April. Multimodal monitoring for neurological disorders. In *2014 40th Annual Northeast Bioengineering Conference* (pp. 1-2). IEEE.

Sanders, T.H., Clements, M.A., and Wichmann, T., 2013. Parkinsonism-related features of neuronal discharge in primates. *Journal of neurophysiology*, *110*(3), pp.720-731.

Sanders, T.H., Devergnas, A., Wichmann, T., and Clements, M.A., 2013, May. Remote smartphone monitoring for management of Parkinson's Disease. In *Proceedings of the 6th International Conference on PErvasive Technologies Related to Assistive Environments* (p. 42). ACM.

Sanders, T.H., Devergnas, A., Wichmann, T., and Clements, M.A., 2013, November. Canonical correlation to estimate the degree of parkinsonism from local field potential and electroencephalographic signals. In *2013 6th International IEEE/EMBS Conference on Neural Engineering (NER)* (pp. 158-161). IEEE.

Sanders, T. H., Stokes, T. H., Moffitt, R. A., Chaudry, Q., Parry, R., and Wang, M. D., 2009. Development of an automatic quantification method for cancer tissue microarray study. *Conference proceedings: Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual Conference*, 3665–3668.

Abstracts

Chen, L., Sanders, T.H., 2018. Histone deacetylase inhibitors change DNA methylation patterns and chromatin conformations, *Society for Neuroscience*.

Sanders, K., Sanders, T.H., 2018. Local and remote signatures of effective deep brain stimulation, *North American Neuromodulation Society*.

Hogewood, L., Sanders, T.H., 2017. Cortico-subthalamic projection stimulation increases maximum running speed in 6-OHDA lesioned mice, *Society for Neuroscience*.

Sanders, T.H., 2016. Optogenetic stimulation of cortico-subthalamic projections is sufficient to ameliorate bradykinesia in non-transgenic mice with parkinsonism, *Society for Neuroscience*.

Sanders, T.H., Jaeger, D., 2015. High frequency optogenetic stimulation of cortical projections to the subthalamic nucleus using ultrafast opsins, *Society for Neuroscience*.

Sanders, T.H., Devergnas, A., Clements, M.A., and Wichmann, T., 2013. Phase-amplitude modulation reveals similar cross-individual patterns in the progression of parkinsonism, *Society for Neuroscience*.

Hylton, L., Sanders, T.H., Clements, M.A., 2013. Comparing tremor detection algorithms using acceleration data from an android smartphone, *IEEE Engineering in Medicine and Biology Conference on Neural Engineering*.

Sanders, T.H., Devergnas, A., Clements, M.A., and Wichmann, T., 2012. Identifying parkinsonism in monkeys using wavelet packet transform of local field potentials, *Biomedical Engineering Society*.

Sanders, T.H., Clements, M., and Kennedy, P., 2012. Discrimination between listening intervals and speaking attempts improves phoneme classification in a locked-in patient, *Society for Neuroscience*.

Sanders, T.H., Clements, M., and Kennedy, P., 2011. Speech phoneme detection and recognition from chronically recorded human motor cortex neurons, *Society for Neuroscience*.

INVENTIONS

Sanders, T.H., Devergnas, A.,Wichmann, T., and Clements, M.A.. Provisional Patent GTRC ID 6245; Serial number 61/750,869 for a Neurological Monitoring System.

Lo, T., Hinkle [Sanders], T., Ng, L., and Sacks, J. US Patent Award Number 5,261,010 for an automatic threshold selection algorithm.

EXTRAMURAL RESEARCH SUPPORT

Analytix Research Award, 2018, PI: Teresa H. Sanders

DARPA (N66001–17-2–4019), PI: Timothy Broderick

NIH (P50 NS071669, P51 RR-000165, P51OD011132), PI: Thomas Wichmann

NIH Training Grant (T32 NS007480/NS/NINDS), Emory University

Georgia Research Alliance, development of a neurological monitoring system, 2014, PI: Teresa H. Sanders

Texas Instruments Leadership University Fellowship, Georgia Institute of Technology

NSF (0918618), PI: Marion Usselman

Georgia Tech Research Institute, military image-based search algorithms, 2007, PI: Teresa H. Sanders

Hughes Aircraft Company, hand-written character recognition, 1995, PI: Teresa H. Sanders

SERVICE

(a) International

Conference Activities

2019 Session Chair, Neural and Molecular Mechanisms of Memory, Society for Neuroscience 49th Annual Meeting

Journal and Conference Review - Ad hoc

2019 – present *Brain Stimulation*

2018 – present *Movement Disorders*, the Official Journal of the International Parkinson and Movement Disorder Society

2018 – present *Neurobiology of Disease*

2018 – present *Transactions on Neural Systems and Rehabilitation Engineering*

2016 – present IEEE Engineering in Medicine and Biology Conference

2013 – 2014 *Journal of Neurophysiology*

2013 International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

Grant Proposal and Scholarship Review – Ad hoc

2018 Auckland Medical Research Foundation, New Zealand

2015 – 2017 UCLA Scholarship Review

(b) National and Regional

2009 – present Biomedical Engineering Society
Diversity Host, Career Workshop Advisor

2012 – 2012 Intel International Science and Engineering Fair Finalist Judge, Atlanta, GA

2008 – 2013 LEGO Robotics Georgia Championship Judge

(c) Intramural

University committees

2015 – present UCLA Honor Scholar Evaluation Committee

2015 – 2015 Emory Postdoctoral Research Symposium

2014 – 2015 Emory Neuroscience Joint Lab Committee

2013 – 2014 Georgia Tech Undergraduate Research Competition Committee

CONSULTING

1995 – 1997 *Stone Engineering, Aerodyne*

TEACHING

(a) Courses

2017 – 2017 Biomedical Numerical Methods – Instructor

2016 – 2016 Systems Pathophysiology – Course outline / design

2013 – 2013 Random Signals and Applications – Instructor

2012 – 2015 Numerous guest lectures on Wavelet Transform Methods, Kalman Filters, Neural Signal Processing, Basal Ganglia Anatomy, Parkinson's disease, Optogenetics, and other Topics at Vanderbilt, Georgia Tech, and Emory University

2005 – 2007 AP Physics - Substitute Teacher, Fayette County School System, Georgia

1986 Circuits II

1985 – 1986 Engineer-in-Training Prep Course Organizer

(b) Training and Supervision of Laboratory Personnel

(i) Staff

Dates	Staff	Position
2017 – 2018	Joseph Weiss	Research Assistant II

(ii) Students

Dates	Student	Program
2018 – 2018	Katie Sanders,	Biomedical Engineering student, Johns Hopkins University
2018 – 2018	Haley Dotter,	Neuroscience student, Vanderbilt University
2017 – 2018	Ben Litt,	Biomedical Engineering student, Vanderbilt University
2017 – 2018	Luke Hogewood,	Biomedical Engineering/Pre-med student, Vanderbilt University
2017 – 2018	Lan Chen,	Neuroscience/Pre-med student, Vanderbilt University
2014 – 2015	Po-Han Chen,	Undergrad Research Fellow in biological quantitative science, Emory University
2013 – 2014	Lydia Hylton,	PURA Student/Presidential Scholar, now: Associate Consultant, Bain & Company
2013 – 2014	Mark McCurry,	Georgia Tech PhD Student, now: Imaging Scientist, Aware Inc., Bedford MA
2013 – 2013	Georgia Institute of Technology	Biomedical Engineering Design Team
2011 – 2012	Mentor and Robotics Instructor for at risk students,	E. Cobb Middle School, Atlanta, GA

(iii) Postdoctoral Associates

Dates	Postdoc
2018 – 2018	Yun Young (Susan) Yim, Ph.D.

INVITED PRESENTATIONS

CU Boulder Institute for Cognitive Science Seminar, Boulder CO, 2020*, Leveraging neuromodulation to understand molecular, cellular, and physiological dynamics*

Society for Neuroscience Annual Meeting, Chicago, 2019, *Alternate biochemical pathways for enhanced cognition*

Society for Neuroscience Annual Meeting, San Diego, 2018, *Vagus Nerve Stimulation epigenetically modulates learning and memory*

International Conference on Excitatory Transmission, Les Diablerets, Switzerland, 2017, *Optogenetic modulation of cortico-subthalamic excitatory transmission in dopamine-depleted animals*

Vanderbilt University Biomedical Engineering Seminar, 2017, *Decoding and modulating neural signals*

University of Colorado Center for Neuroscience Seminar, 2016, *The role of cortico-subthalamic projections in normal and pathological basal ganglia function*

American Society for Neurochemistry Annual Meeting, Denver, Colorado, 2015, *Optogenetic modulation of basal ganglia circuit activity*

Society for Neuroscience Annual Meeting, Washington, D.C., 2014, *Comparison between short-term beta phase cross-frequency-coupling and beta band power in subthalamic nucleus local field potentials recorded from monkeys with parkinsonism*

Stanford University Optogenetic Innovation Lab, 2014, *Optogenetic stimulation for ameliorating parkinsonism*

University of California, San Francisco, Featured Speaker at Phil Starr lab meeting, 2014, *Multimodal assessment of Parkinson's disease using electrophysiology and automated motor scoring*

Emory University Systems E-phys Group Meeting, 2014, *Kalman filters in real-time, closed-loop systems*

Wesley Woods Sleep & Movement Disorders Centers, Atlanta, Georgia, 2014, *EEG and Motor Assessment*

Yerkes National Primate Center, Atlanta, Georgia, 2013-2014, *Biomedical Signal Processing Tools, Accelerometers and Gyroscopes for Movement Analysis*

Georgia Institute of Technology, 2013, Center for Signal and Image Processing (CSIP) Seminar, *Frequency Analysis Techniques for Neural Decoding*

Georgia Institute of Technology, 2013, Biomedical Engineering Graduate and Postdoc (GaP) Seminar, *Basal ganglia, cortex, and motor changes in Parkinson's disease*

PROFESSIONAL AFFILIATIONS

American Academy for the Advancement of Science, 2015 – Present

American Physiological Society, 2013 – Present

Society for Neuroscience, 2010 – Present

IEEE (EMBS, Signal Processing, and WIE subgroups), September 2008 – Present
Promoted to Senior Member January 2020

American Society for Neurochemistry, International Society for Neurochemistry, 2015-2017

Omicron Delta Kappa, Tau Beta Pi (Cataloger), Eta Kappa Nu (President), 1985 – 1986

LICENSES

DEA License, Tennessee, 2016 – 2019

Pilot License, 1996

ADDITIONAL TRAINING

2018 Applied Biosystems CRISPR/Cas9 Course, Carlsbad, California

2016 UCLA head-mounted microscope workshop, San Diego, California

2015 Emory University PI Training, Atlanta, Georgia

2015 Stanford University Optogenetics Innovation Lab, Palo Alto, California

INDUSTRY EXPERIENCE (1986 – 2008)

GEORGIA TECH RESEARCH INSTITUTE (GTRI) and HUGHES AIRCRAFT COMPANY

GTRI. Designed and built the guided missile model for the Electronic Counter Measures Benchmark software model. Analyzed radar antenna, target cross-section, and missile fly-out test data. Obtained Internal Research and Development funding and served as lead for a project to detect and classify ground targets using Image Driven Data Mining.

Hughes Electro-Optical and Radar Sensor Group. Specified and coordinated requirements, data, and software implementation for a large distributed weapon system testbed (300 team members). Moderated preliminary and critical design reviews, fielded questions, ensured design accuracy, and captured customer input for discussion in future Software Review Boards where we made decisions regarding software upgrade priorities and program direction. This required knowledge of all aspects of the test bed, from environmental modeling to weapon system behavior as well as software design and database parameters of the system. Served two 9-week assignments to provide on-site direction and technical support for algorithm development, weapon system construction, and threat scenario analysis at SHAPE Technical Center in The Hague, Netherlands, and at Fort Bliss War Fighting Center.

Hughes Imaging Guidance Design Lab. Designed and prototyped EO and IR missile system trackers. Responsible for paper concept to algorithm analysis and simulation, hardware / software specifications, real-time implementation, in-lab testing and troubleshooting, and eventually served as the lead engineer for field tests of the missile prototype. Leadership responsibilities included directing the flight test team, ensuring the system was operational and flightworthy, and planning missions with airfield personnel (see High Performance Team Award). Other work involved rapid prototyping of experimental real-time missile signal processing applications including image enhancement, correlation tracking, gradient and intensity-based thresholding and tracking, target reacquisition, passive range estimation using optical flow, and an automatic bilevel correlator threshold (see patents).