John D. Simeral

Curriculum Vitae October, 2021

Current Positions

Research Biomedical Engineer
Center for Neurorestoration and Neurotechnology
Rehabilitation R&D Service
VA Providence Healtcare System

Assistant Professor of Engineering (Research)
School of Engineering
Brown University

Contact

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Education

B.S. ELECTRICAL ENGINEERING — Stanford, CA
Stanford University, June 1985

M.S. ELECTRICAL & COMPUTER ENGINEERING — Austin, TX
University of Texas at Austin, December 1989
Thesis Title: *Monitoring and controlling surgical temperatures during laser angioplasty using infrared feedback*
Thesis advisor: Dr. AJ Welch

Ph.D. NEUROSCIENCE — Winston-Salem, NC
Wake Forest University School of Medicine, June 2003
Dissertation Title: *Neural coding and dynamics in the rat hippocampus*
Dissertation advisor: Dr. SA Deadwyler

Academic Appointments

1994 **Lecturer** — San Diego, CA
Dept. of Electrical and Computer Engineering
University of California San Diego

1996 – 2003 **Doctoral Student** — Winston-Salem, NC
Dept. of Physiology and Pharmacology (Dr. Sam Deadwyler)
Wake Forest University School of Medicine

2003-2009 **Postdoctoral Research Fellow** — Providence, RI
Dept. of Neuroscience (Dr. John Donoghue)
Brown University

2006-2008	**Research Scientist** Rehabilitation R&D Service Dept. of Veterans Affairs Medical Center	Providence, RI
2009-present	**Research Biomedical Engineer** Rehabilitation R&D Service Center for Neurorestoration and Neurotechnology Dept. of Veterans Affairs Medical Center	Providence, RI
2010-present	**Assistant Professor (Research)** School of Engineering Brown University	Providence, RI

Industry Positions

1986-1987	**Research Assistant**, VLSI multichip module development Microelectronics and Computer Technology Corporation (MCC)	Austin, TX
1987-1990	**Engineer**, Custom VLSI CPU design NCR Corp.	Rancho Bernardo, CA
1990-1993	**Principal Engineer**, Memory subsystem and ASIC VLSI design Teradata and NCR Joint Development Organization	Torrey Pines, CA
1993-1995	**Senior Principal Engineer,** Massively parallel systems development AT&T Corp., Global Information Solutions	Rancho Bernardo, CA

Consulting

2006	**Consultant**, Neural Engineering Cyberkinetics Neurotechnology Systems, Inc.	Foxborough, MA

Teaching Experience

1985-1986 UNIVERSITY OF TEXAS AT AUSTIN, Dept. of Electrical and Computer Engineering
Electronics Laboratory (Teaching Assistant).
Administered and graded multiple weekly electronics labs in an 18-lab engineering core course for Electrical & Computer Engineering seniors

1994 UNIVERSITY CALIFORNIA SAN DIEGO, Dept. of Electrical & Computer Engineering
Microelectronic System Design (Fall)
28 lecture course, assignments and tests for ECE / EE seniors

2005-2007 BROWN UNIVERSITY, School of Medicine
Neuroanatomy (Spring)
Lectures and gross anatomy lab (80 1st-year medical students, 3-4 lectures, 2 labs)

2007 BROWN UNIVERSITY, Dept. of Neuroscience
Neurotechnology (Fall)
Lecture

2006, 2007 BROWN UNIVERSITY, Dept. of Neuroscience
Cognitive Neuroscience (BN166, Spring)
Lecture

2007-2010 BROWN UNIVERSITY, Dept. of Biology
Biomaterials (Bio 112, Spring)
Lecture

2018 BROWN UNIVERSITY, Dept. of Computer Science
Creating modern web applications (CS 132, Spring)
Faculty advisor for semester-long group projects in web development

2015, '17-'21 BROWN UNIVERSITY, School of Engineering
Transforming Society – Technology and Choices for the Future (Engn 020, Spring)
Lecture

2020 BROWN UNIVERSITY, School of Engineering
TITLE (ENGR 1220, Spring)
Lecture

2021 BROWN UNIVERSITY, Division of Biology
From Neurons to Consciousness (NEUR 1500, for MA in Biology, Spring)
Lecture

Research Grants and Fellowships

Current support

2017 – 2022 DEPT. VETERANS AFFAIRS MERIT REVIEW AWARD, A2295R (Hochberg, PI)
BrainGate: Robust neural decoding for Veterans with ALS
$2,038,942 (total, 5 years)
NAMED INVESTIGATOR

2018 - 2022 DEPT. VETERANS AFFAIRS MERIT REVIEW AWARD, A2827-R (Simeral, PI)
Deployment of a mobile broadband BCI
$1,200,810 (Total, 4 years)
PRINCIPAL INVESTIGATOR

2018 - 2022 VA CTR. FOR NEURORESTORATION & NEUROTECH., SEED GRANT (Simeral & Paradiso, PIs)
Development and Testing of an Intelligent Visual Prosthesis
$55,402 (Total, 3 years)
CO-PRINCIPAL INVESTIGATOR

2019 - 2022 AHA 19SCLOI34780000 (Hochberg & Walsh, PIs)
Intracortical control of soft robotics for restoration of hand function after stroke
$227,361 (Total site award to Brown, 3 years)
NAMED INVESTIGATOR

2019 - 2023 DOD CDMRP-SCIRP, SC180308 (Ajiboye, PI)
Restoring multi-dimensional reaching and dexterous grasping to persons with chronic tetraplegia through Functional Electrical Stimulation
$139,545 (Total site award to Brown, 4 years)
PRINCIPAL INVESTIGATOR (SUBCONTRACT TO BROWN)

2019 - 2024 NIH-NIDCD , U01DC017844 (Hochberg, PI)
Intuitive, complete neural control of tablet computers for communication
$4,030,513 (Total, 5 years)
NAMED INVESTIGATOR

2020 - 2022 ALSA, 20-MALS-553 (Hochberg, PI)

Enabling independent home use of an intracortical Brain-Computer Interface for control of multiple communication devices.
$200,000 (Total, 2 years)
NAMED INVESTIGATOR

2020 - 2025 NIH-NIDCD, R01 2DC014034 (Henderson & Shenoy, PIs - Stanford)
Engaging new cognitive and motor signals to improve communication prostheses
$162,110 (Total site award to Brown, 5 years)
PRINCIPAL INVESTIGATOR (SUBCONTRACT TO BROWN)

2021 - 2026 NIH-NIDCD, U01DC019430 (Henderson, PI - Stanford)
Single-neuron population dynamics in human motor cortex for a speech prosthesis
$317,241 (Total site award to Brown, 5 years)
PRINCIPAL INVESTIGATOR (SUBCONTRACT TO BROWN)

2021 - 2026 NIH-NINDS, U01NS123101 (Henderson, PI - Stanford)
Cortical basis of complex motor sequences in humans for neural interfaces
$1,140,876 (Total site award to Brown, 5 years)
PRINCIPAL INVESTIGATOR (SUBCONTRACT TO BROWN)

Proposals pending

NONE.

Proposals submitted / in submission

DEPT. VETERANS AFFAIRS MERIT REVIEW AWARD (Simeral, PI)
Enhancement and optimization of a mobile iBCI for Veterans with paralysis
$1,199,552 (Total proposed site award to Providence VA, 4 years)
PRINCIPAL INVESTIGATOR

Completed support

1996 - 1997 Graduate Training Fellowship
Wake Forest University Graduate School of Arts and Sciences
$72,000
GRADUATE FELLOW

1997 - 2000 NIMH pre-doctoral Individual NRSA, F31 MH11989
Wake Forest University Graduate School of Arts and Sciences
Nonlinear systems analysis of hippocampal neuronal ensembles.
$82,344
PRE-DOCTORAL FELLOW

2003 - 2005 NIMH Postdoctoral Research Fellowship, T32 MH19118
Brown University
POST-DOCTORAL FELLOW

2011 Karen T. Romer Undergraduate Teaching and Research Award
W and F Hewlett Research Collaboration
Computer modeling of intracortical neural signals
$7,500
FACULTY ADVISOR/INVESTIGATOR for undergraduate awardee Anish Sarma

2012 Karen T. Romer Undergraduate Teaching and Research Award
W and F Hewlett Research Collaboration
Alternative methods for state decoding of neural signals
$7500
FACULTY ADVISOR/INVESTIGATOR for undergraduate awardee Matteson

2008 - 2014 NIH-NCMRR, NICHD, N01 HD53403 (Kirsch, PI)
Controller development for upper limb movement
$82,344
INVESTIGATOR (SUBCONTRACT TO BROWN)

2008 - 2015 Dept. of Veterans Affairs, Rehabilitation R&D Service, B6453R (Hochberg, PI)
Merit Review Award
Feasibility of the BrainGate system for Veterans with ALS
$544,755
RESEARCH BIOMEDICAL ENGINEER

2014 - 2016 General Electric Collaboration GEGR (Donoghue, PI)
Electrode evaluation – phase 1
$112,686 (total)
NAMED INVESTIGATOR

2015 VA Center for Neurorestoration and Neurotechnology, Seed Funding (Simeral, PI)
Haptics integration for neural control of assistive robotic arms by humans with paralysis.
$57,820
PRINCIPAL INVESTIGATOR

2015-2016 Conquer Paralysis Now foundation grant (Simeral, PI - Brown)
Preclinical testing of a high-performance wireless neural interface for individuals with SCI
$50,000 (total, 1 year)
PRINCIPAL INVESTIGATOR

2011 - 2016 Dept. of Veterans Affairs, Rehabilitation R&D Service, A6779I (Simeral, PI)
Merit Review Award
Direct intracortical control of a multijoint prosthetic arm
$1,945,112 (total, 5 years)
PRINCIPAL INVESTIGATOR

2009 - 2017 NIH-NIDCD R01 DC009899 (Hochberg, PI - MGH)
Restoring communication with an intracortical neural interface system
$369,687 (subcontract direct costs, FY 2016)
INVESTIGATOR (SUBCONTRACT TO BROWN)

2014 - 2017 NIH-NICHD, R01 HD077220 (Kirsch, PI – Case Western)
Intracortical control of FES-restored arm and hand function in people with SCI
$394,578 (subcontract direct costs, 4 years)
INVESTIGATOR (SUBCONTRACT TO BROWN)

2017 VA SHEEP REQUEST (Hochberg, PI - VA)
ShEEP request to upgrade the InMotion upper extremity interactive therapy system

$119,000
NAMED INVESTIGATOR

2017 NIDCD/BRCP ADMINISTRATIVE SUPPLEMENT, (Hochberg & Simeral, Co-PIs - Brown)
Maintaining communication: Implanted brain-computer interfaces for people with ALS
$25,642
CO-INVESTIGATOR

2014 - 2018 DEPT. VETERANS AFFAIRS MERIT REVIEW AWARD, P1155R (Simeral, PI)
Mobile signal processing system for broadband neural decoding
$1,058,343 (total, 4 years)
PRINCIPAL INVESTIGATOR

2016 - 2020 NINDS, U01NS098968 (CASH, PI)
Understanding the neural basis of volitional state through continuous neural recordings
$510,132 (total subcontract direct costs, 3 years)
NAMED INVESTIGATOR (SUBCONTRACT TO BROWN)

2015 - 2020 NIH-NIDCD, R01 DC014034 (Henderson, PI - Stanford)
Advanced neural decoders for communication interfaces
$203,400 (total subcontract directs, 5 years+NCE)
PRINCIPAL INVESTIGATOR (SUBCONTRACT TO BROWN)

2015 – 2021 NIH-NINDS, UH2NS095548 (Nurmikko & Hochberg, PIs) [NCE]
High-Bandwidth Wireless Interfaces for Continuous Human Intracortical Recording
$5,784,249 (total, 3 years)
NAMED INVESTIGATOR (SUBCONTRACT TO BROWN)

2020 - 2025 NIH-NINDS, U24NS113637-01A1 (Starr, PI – UCSD; Borton local subcontract PI)
Accelerating dissemination of implantable neurotechnology for clinical research
$835,000 (Total site award to Brown, 5 years)
NAMED INVESTIGATOR

Honors and Awards

Patents / patent applications

1990 Sanwo IJ, Simeral JD and Daniel RA. *ECL-to-CMOS Converter*. United States #4,888,501.
1992 Sanwo IJ, Simeral JD and Daniel RA. *ECL-to-CMOS Converter*. Canada #1,304,459.
2015 Nurmikko AV, Heelan CD, Borton DA, Komar J, Rosler D, Simeral JD. *System and Methods for Mobile Medical Monitoring*. US2015/025595.
2021 Hochberg LR, Singer-Clark T, Goss R, Kapitonava A, Simeral JD, Hosman T. Brain Computer Interface (BCI) System That Can Be Implemented On Multiple Devices. United States Provisional Application 63/274,133.

Research

2008 **Highlights of 2008 Collection** awarded by Journal of Neural Engineering "Neural control of computer cursor velocity by decoding motor cortical spiking activity in humans with tetraplegia," Kim S-P, Simeral JD, Hochberg LR, Donoghue JP and Black MJ. J. Neural Eng. 5(4):455-476, Dec 2008.

2011 **Most cited paper for 2010-2011 (top 10)**. Journal of Neural Engineering, for Simeral et al. (2011) "Neural control of cursor trajectory and click by a human with tetraplegia 1000 days after implant of an intracortical microelectrode array". Journal impact factor of 3.837, ranked 5th of 72 biomedical engineering journals on ISI.

2011 **Highlights of 2011 Collection** awarded by Journal of Neural Engineering for Simeral et al. (2011) publication "Neural control of cursor trajectory and click by a human with tetraplegia 1000 days after implant of an intracortical microelectrode array", based on 'the highest praise from our international referees and the highest number of downloads.'

2012 **Finalist, Annual g-tec BCI Award 2012** for "Intracortical control of assistive devices by individuals with tetraplegia."

2012 **Herbert Pardes Clinical Research Excellence Award, 2012**, by Massachusetts General Hospital for "Reach and grasp by people with tetraplegia using a neurally-controlled robotic arm." Nature, 2012, for most outstanding clinical research achievement of 2012.

2012 **Most cited papers for 2011-2012 (top 10)**. Journal of Neural Engineering, for Simeral et al. (2011) "Neural control of cursor trajectory and click by a human with tetraplegia 1000 days after implant of an intracortical microelectrode array". Journal impact factor of 3.837, ranked 5th of 72 biomedical engineering journals on ISI.

2012 **Martin Research Prize for Excellence in Basic Research, 2012**, by Massachusetts General Hospital for "Reach and grasp by people with tetraplegia using a neurally-controlled robotic arm," Nature, 2012.

2013 **Israel Brain Technologies B.R.A.I.N. prize** international competition.
Co-awardee with D. Rosler, A. Nurmikko, J. Donoghue and L. Hochberg. $1,000,000.

2014 **Business Insider** online video story covering BrainGate research (interview)

2018 **The Economist** online video story covering BrainGate research (filmed interview)

2018 **1st Prize, Annual BCI Society Award 2018** for "Restoring functional reach-to-grasp in a person with chronic tetraplegia using implanted functional electrical stimulation and intracortical brain-computer interfaces." (awarded with co-authors)

Service to the Profession

Focus Area leader (Restoring Communication and Mobility)

2015 - VA Center for Neurorestoration and Neurotechnology (CfNN), Providence, RI

Executive Council Member

2015 - VA Center for Neurorestoration and Neurotechnology, Providence, RI

Society Service & Conference Organization

2006 Founding member, IEEE EMBS, Providence Chapter
2011 Session Organizer and Co-Chair, Neural Engineering Track, BMES Annual Meeting, Hartford, CT, Biomedical Engineering Society, 2011.
2015 Founding member, international BCI Society, Netherlands
2016 Workshop Chair and Organizer, 6th Int'l BCI Meeting, Asilomar / Pacific Grove, CA

"Pathways to effective BCI communication and computer interaction for people with disability"

2019 Participant, NIH Conference: SCI 2020: Launching a Decade for Disruption in Spinal Cord Injury Research (co-sponsored by NINDS, NCMRR, NICHD), Rockville, MD, Feb 12-13, 2019.

Standards Development / Regulatory

2016 Participant in NIH Workshop on Standards and Modularity of Brain-Computer Interfaces and Neuroprostheses.

2016, 2017 Educator, FDA Experiential Learning Program, FDA field trip to BrainGate at Brown U.

Reviewer (grants)

Previous: Natural Sciences and Engineering Research Council of Canada (NSERC)
American Institute of Biological Sciences
US Army Medical Research and Materiel Command (USAMRMC)
Lifespan
Wellcome Trust
American Institute of Biological Sciences (AIBS)

2017-2018: NINDS: Special Emphasis Panel, "NINDS Exploratory Clinical Trials (R01)"

2020: Natural Sciences and Engineering Research Council of Canada (NSERC)
Veterans Administration BRAVE

Reviewer (journal manuscripts)

Previous: Science Translational Medicine
Journal of Neural Engineering
Neural Information Processing Systems (NIPS)
Neuron
Annals of Neurology
Neurocomputing Review

Recent: Frontiers in Neuroscience
Neurobiology of Disease
Journal of Neuroscience Methods
IEEE Transactions on Biomedical Circuits and Systems

Reviewer (conference abstracts)

Biomedical Engineering Society (BMES)

Society Memberships

1988- Senior Member, IEEE
1996- Society for Neuroscience, member (SfN)
1996- Engineering in Medicine and Biology Society, member (IEEE EMBS)
1999-10 American Association for the ,Advancement of Science, member (AAAS)
2007-12 Biomedical Engineering Society, member (BMES)
2015- Founding Member, BCI Society, Netherlands

Service to the University

2012 Speaker, Alumni Networking & Recruiting Event, School of Engineering, Brown University, Providence, RI

2014 Organizer, Brown University 250th Anniversary Research Day (Interactive public Robotics exhibit at Sydney Frank Hall)

Service to the Community

2009 Keynote speaker, North Country Access Disabled Sports USA, Clayton, NY

2012 Invited speaker, Everett Company, Granoff Center for the Creative Arts, Providence, RI

2014 Television and radio community service programs and community outreach spotlighting BrainGate research (associated with keynote talk at Spinal Cord Injury Network, Sydney, Australia:

- ABC News 24 TV, "Morning News" with Andrew Geoghegan and Eliza Harvey
- Radio 2BG 873 AM, "Life and Technology" with Warren Moore
- Radio 2UE, "Healthy Living" with Dr. Ross Walker

2014 Keynote speaker, Spinal Cord Injury Network, Sydney, Australia.

2016 Keynote speaker, 22nd Annual Brain Injury Symposium,
Baptist Hospital Rehabilitation Center, Miami, FL

2017 Panelist, "Advances and Future Outlook in Neuroscience"
Rhode Island MedMates Life Sciences Expo 2017, Providence, RI

2017 Keynote Speaker, 28th International Symposium on ALS/MND
"The innovation landscape in ALS/MND: Beyond Pharmacotherapies"
Westin Waterfront Hotel, Boston, MA

2018 Lecturer, 2018 Translational Neuroscience and Neural Engineering Workshop
Salve Regina University, Newport, RI

2019 Live Skype interview for BBC World News TV story, "Paralysis of Thought" for BBC's Asia-facing news service (BBC Singapore)

Undergraduate Advising

2005 Aaron Glieberman, Division of Engineering undergraduate, Brown University.
CO-MENTOR (with L Hochberg) for undergraduate summer research, Brown Univ.

2009 Jacob Donoghue, Dept. of Neuroscience undergraduate, Brown University.
ASSISTANT MENTOR for Senior Honors Thesis, Brown University.

2010-2012 Anish Sarma, School of Engineering undergraduate, Brown University.
FACULTY MENTOR, Junior year EE research project
ADVISOR, Karen T. Romer UTRA award for Undergraduate Training
ADVISOR, Senior Research Thesis:
"Simulation and extraction of control-signal features from field potential oscillations in human motor cortex."

2012-2014 Evan Matteson, School of Engineering undergraduate, Brown University.
UNDERGRADUATE RESEARCH ADVISOR

2013 ADVISOR, Karen T. Romer UTRA award for Undergraduate Training
"Exploration of alternative methods for state decoding of neural signal

2013 INDEPENDENT STUDY ADVISOR (ENGN1970):
"A method of inferring intended position and velocity from closed-loop data for calibration of an intracortical brain computer interface."

2012-2014 James Besancon, School of Engineering undergraduate, Brown University
THESIS ADVISOR, Senior Honors Thesis in Engineering:
"Kinematic structures for the DEKA arm: A framework for shared control."

2014-2015 Daniel Milstein, School of Engineering undergraduate, Brown University
FACULTY MENTOR & READER (with Erik Sudderth), Senior Research Thesis:
"Assumed density filtering for neural decoding."

2017-2018 Alexander Lo, Biomedical Engineering, Brown University
THESIS ADVISOR, Senior Honors Thesis in Biomedical Engineering:
"Longitudinal analysis of neural units as recorded by a multielectrode array."

2018-2019 Zoe Beckman, Biomedical Engineering, Brown University
UNDERGRADUATE RESEARCH ADVISOR, Sophomore
"Analysis of human cortical neuronal activity tracked over months and years."

2018-2019 Annabelle Iserson, Biological Sciences, Brown University
THESIS ADVISOR, Senior Honors Thesis in Health & Human Biology (AB):
"Developing methods to deploy and assess BCI technology for individuals with paralysis in their homes."

2019 Pablo Soler-Portilla, Electrical Engineering, Brown University
ADVISOR, junior-year Independent Study in Engineering:
"iBCI using embedded hardware"

2019 Alexander Reuter, rising sophomore, Brown University
MENTOR, summer internship:
"Configuring Zynq embedded systems for real-time BCI"

Graduate Student Advising

2014-2015 James Besancon, "Shared autonomy for neurorobotic devices."
5th year Masters in Engineering, Brown University
THESIS ADVISOR (ScM)
(Project Engineer, Bloomy, industrial automation, Windsor, CT)

2014-2016 Jose Albites, "BrainGate-enabled intracortical neural control of commercial tablet computers by individuals with tetraplegia."
Masters in Biomedical Engineering, Brown University (Adv: Leigh Hochberg)
MENTOR & THESIS COMMITTEE MEMBER (ScM)
(Founding Partner and Manager, Lima Bionics. Peru, 2016)

2013-2016 Jacob Komar, "Toward a mobile computing platform for neural signal processing."
PhD program in Electrical Engineering, Brown University (Adv: Arto Nurmikko)
THESIS PROJECT MENTOR, THESIS COMMITTEE (PhD)
(Founded Fresh Local 52, aeroponics engineering, Providence, RI 2016)

2015-2017 John Ciancibello
Masters Program Biomedical Engineering (2-year)
THESIS ADVISOR (ScM)
(The Feinstein Institute for Medical Research: Center For Bioelectronic Medicine)

2016-2017 Daniel Milstein
Masters Program in Computer Science, Brown University (Adv: Erik Sudderth)

THESIS PROJECT MENTOR, THESIS COMMITTEE MEMBER (ScM)
(Harvard Medical School, programmer; UMass Amherst C.S graduate program)

2013-2018 Chris Heelan, "Mobile electronics for medical prosthetic applications."
PhD program in Electrical Engineering, Brown University (with Arto Nurmikko)
THESIS CO-ADVISOR (PhD)
(Founded RI neuroprosthetics engineering company, Connexon LLC).

2018-2019 Shirin Tooloee
"Understanding How Cognitive Deficits Influence Motor Recovery in Patients with Acute Ischemic Stroke"
Masters Program in Biomedical Engineering, Brown University (5th Year)
THESIS ADVISOR (ScM)

2021- Derek Wacks
"Embedded realization of real-time neural ensemble decoding for iBCI"
Masters Program in Biomedical Engineering, Brown University (2-year program)
THESIS ADVISOR (ScM)

Postdoctoral Mentoring

2009-2011 Jie Liu (postdoctoral fellow under Hochberg). Robotic/prosthetic arm control software (accepted as RA, Rehab. Inst. Chicago 2011)

2010-2011 Nicholas Masse (postdoctoral fellow under Donoghue). Analysis of human motor cortical field potentials
(accepted Postdoctoral Fellow with David Freedman, University of Chicago)

2017-2018 David Brandman (postdoctoral fellow). Developing an embedded wireless intracortical brain computer system for people with paralysis.
(went on to Neurosurgery resident, Toronto, CAN)

2019- Daniel Thengone (postdoctoral fellow). Ten-digit movement decoding for iBCI applications for individuals with severe disability.

Technical Staff Trainees

2007-2009	Katherine Centrella	Clinical Neurotechnology Research Asst., BrainGate project (accepted to Emory School of Medicine)
2007-2010	Sergey Stavisky	Software/Hardware Engineer, BrainGate project (Stanford doctoral program in Engineering with Dr. Shenoy)
2009-2014	Dan Bacher	Software/Hardware Engineer, BrainGate project (Ximedica, medical device consulting; Kernel Project Mgr)
2009-2012	Erin Gallivan	Clinical Neurotechnology Research Asst., BrainGate project (accepted to USC Keck School of Medicine)
2010-2011	Etsub Berhanu	Neurotechnology Research Asst., BrainGate project (accepted position at US Patent Office)
2011-2014	Nick Schmansky	Mass. Gen. Hosp. Software Engineer, BrainGate project (now PI on multiple SBIRs for software commercialization)
2012-2013	Kathryn Tringale	Clinical Neurotechnology Research Asst., BrainGate project (accepted to UCSD School of Medicine)
2012-2014	Anish Sarma	Software/Hardware Engineer, BrainGate project (accepted to Cal Tech PhD program)
2012-2014	Brittany Sorice	Clinical Neurotechnology Research Asst., BrainGate project

		(accepted to Speech & Language Pathology program at B.U.)
2013-2015	James Besancon	Engineering summer intern (2013), BrainGate (Project Engineer, Bloomy, industrial automation)
2013-2018	Jad Saab	Systems Engineer, BrainGate project (Insight Data Science, New York City)
2016-2020	Jessica Kelemen	Clinical Neurotechnology Research Asst., BrainGate project
2017-2018	Benjamin Shanahan	Systems Engineer, BrainGate project (SpaceX (2020+); Software Engineer with NeuroPace (2018-'20))
2017-2018	Jannis Brea	User Experience Designer, BrainGate project (To MD program, Feinberg School of Medicine, Northwestern)
2015-	Tommy Hosman, MS	Systems Engineer, BrainGate project (Applying to PhD programs in machine learning for 2022)
2019-	Tyler Singer-Clark, BS	Software Engineer, BrainGate project (Applying to PhD programs in BCI for 2022)
2020-	Ronnie Gross, BS	UI/UX Design Engineer, BrainGate project
2021-	Rekha Crawford, BS	Research Engineer, BrainGate project (Accepted to Brown BME Masters Program, 2022)

Publications

Book Chapters

[1] **Simeral JD**, Hampson RE, Deadwyler SA. Behaviorally relevant neural codes in hippocampal ensembles: Detection on single trials. In Synaptic Plasticity: From Basic Mechanisms To Clinical Applications. eds. Baudry M and Schreiber S) (Cambridge: MIT Press) pp 459-476. 2005. ISBN: 9780429113789

[2] Hampson RE, **Simeral JD**, Deadwyler SA. Cognitive processes in replacement brain parts: A code for all reasons. In Toward Replacement Parts for the Brain. eds. Berger TW and Glanzman DL (Cambridge: MIT Press) pp 111-128, 2005. MIT Press

[3] Hampson RE, **Simeral JD**, Berger TW, Song D, Chan RH, Marmarelis VZ, Deadwyler SA. Cognitively relevant recording in hippocampus: Beneficial feedback of ensemble codes in a closed-loop paradigm. In Electrophysiological Recording Techniques (Neuromethods), vol. 54. eds. Vertes RP and Stackman RW Jr (Totowa: Humana Press) pp 215-239. 2008. doi: 10.1007/978-1-60327-202-5_9

[4] Hampson RE, **Simeral JD**, Deadwyler SA. Neural population recording in behaving animals: constituents of the neural code for behavior. In Neural Population Encoding, eds. Holscher CR and Munk MH (Cambridge: Cambridge University Press) pp 111-128. 2008. ResearchGate

[5] Vogel J, Haddadin S, **Simeral JD**, Stavisky SD, Bacher D, Hochberg LR, Donoghue JP, van der Smagt P. Continuous control of the DLR light-weight robot III by a human with tetraplegia using the BrainGate2 neural interface system. In Experimental Robotics (Springer Tracts in Advanced Robotics), vol. 79. eds. Khatib O, Kumar V and Sukhatme G. (Springer-Verlag, Berlin Heidelberg) pp 125-136. 2014. Springer

[6] Milstein D, Pacheco J, Hochberg LR, **Simeral JD**, Jarosiewicz B, Sudderth EB. Multiscale Semi-Markov Dynamics for Intracortical Brain-Computer Interfaces. In Advances in Neural

Information Processing Systems 30 (NIPS 2017), eds. Guyon I, Luxburg UV, Bengio S, Wallach H, Fergus R, Vishwanathan W and Garnett R. 2017. pdf

Refereed journal articles

[1] Sanwo IJ, **Simeral JD**, Milby GH. High-Speed ECL-to-CMOS and CMOS-to-ECL Converters. *NCR Journal*, 4(2):10-16, 1990.

[2] Hampson RE, **Simeral JD**, Deadwyler SA. Distribution of spatial and nonspatial information in dorsal hippocampus. *Nature*, 402:610-614, 1999. doi: 10.1038/45154

[3] Hampson RE, **Simeral JD**, Deadwyler SA. What ensemble recordings reveal about functional hippocampal cell encoding. *Progress in Brain Research*, 130:345-57, 2001. doi: 10.1016/S0079-6123(01)30023-7

[4] Hampson RE, **Simeral JD**, Deadwyler SA. "Keeping on track": firing of hippocampal neurons during delayed-nonmatch-to-sample performance. *J Neuroscience* 22:RC198, 2002. doi: 10.1523/JNEUROSCI.22-02-j0002.2002

[5] Hampson RE, **Simeral JD**, Kelly EJ, Deadwyler SA. Tolerance to the memory disruptive effects of cannabinoids involves adaptation by hippocampal neurons. *Hippocampus*. 13:543-556, 2002. doi: 10.1002/hipo.10081

[6] Song Y-K, Patterson WR, Bull CW, Beals J, Hwang N, Deangelis AP, Lay C, McKay JL, Nurmikko AV, Fellows MR, **Simeral JD**, Donoghue JP, Connors BW. Development of a chipscale integrated microelectrode/microelectronic device for brain implantable neuroengineering applications. *IEEE Trans Neural Systems and Rehabilitation Engineering*, 13(2):220-226, 2005. doi: 10.1109/TNSRE.2005.848337

[7] Donoghue JP, Hochberg LR, Nurmikko AV, Black MJ, **Simeral JD**, Friehs G. Neuromotor Prosthesis Development. *Med Health R I*, 90(1):12-15, 2007. PMID: 17487029, pdf

[8] Song YK, Patterson WR, Bull CW, Borton DA, Li Y, Nurmikko AV, **Simeral JD**, Donoghue JP. A brain implantable microsystem with hybrid RF/IR telemetry for advanced neuroengineering applications. *Conf. Proceedings of the IEEE Engineering in Medicine and Biology Society*, 2007, 445-8, 2007. doi: 10.1109/IEMBS.2007.4352319

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[93] Milstein D, Kung HT, Pacheco JL, Hochberg LR, **Simeral JD**, Jarosiewicz B, Sudderth EB. Multiscale Semi-Markov Dynamics for Intracortical Brain-Computer Interfaces. *Microsoft New England Machine Learning Day 2018*. Cambridge, MA. 2018.

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[96] Thengone DJ, Hosman T, Saab J, **Simeral JD**, Hochberg LR. Tracking longitudinal changes in sleep features in an intracortical brain-computer interface user with tetraplegia. Program No. 590.07. 2018 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2018. Online.

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[98] Kelemen JN, Milstein D, Hochberg LR, Brandman DM, **Simeral JD**. Closed-loop BCI simulation through replay of recorded neural signals. Program No. 672.06. 2018 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2018. Online.

[99] Heelan CD, Shanahan BE, Hochberg LR, Nurmikko AV, **Simeral JD**. Processing thousands of full-broadband neural channels in real-time on a mobile platform. Program No. 672.08. 2018 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2018. Online.

[100] Hosman T, Vilela M, Saab J, Heelan CD, Brandman D, **Simeral JD**, Hochberg LR. Comparison of decoding accuracy: retrospectively trained recurrent neural network and Kalman vs the same-day Kalman decoder. Program No. 672.07. 2018 Neuroscience Meeting Planner. San Diego, CA: *Society for Neuroscience*, 2018. Online.

[101] Pun ETK*, Catoya A*, Vargas-Irwin CE, Cash SS, **Simeral JD**, Hochberg LR. Identifying changes in volitional state and BCI task engagement based on the intrinsic structure of neural ensemble activity patterns in motor cortex of people with tetraplegia. Program No. 315.06. 2019 Neuroscience Meeting Planner. Chicago, OL: *Society for Neuroscience*, 2019. Online.

[102] Thengone DJ, Hosman T, **Simeral JD**, Hochberg LR. Development of a novel auditory-reliant intracortical brain computer interface for effector control and communication in patients with tetraplegia. Program No. 406.18. 2019 Neuroscience Meeting Planner. Chicago, OL: *Society for Neuroscience*, 2019. Online.

[103] Wilcoxen KG, Hosman T, Hynes JB, Saab J, Buchbinders BR, Schmansky N, Cash SS, Eskandar EN, **Simeral JD**, Franco B, Kelemen J, Vargas-Irwin CE, Hochberg LR. Human middle frontal gyrus exhibits activity related to both eye movements and intended hand movements. Program No. 315.03. 2019 Neuroscience Meeting Planner. Chicago, OL: *Society for Neuroscience*, 2019. Online.

[104] Rubin D, Hosman T, Kelemen J, Coughlin B, Kimchi E, **Simeral J**, Hochberg L, Cash S. Learned motor patterns replayed in human motor cortex during sleep. *Annual Computational and Systems Neuroscience (COSYNE) Conference*. 208; 2-112. 2021.

[105] **Simeral JD**, Hosman T, Singer-Clark T, Kelemen JN, Kapitonava A, Rosler DM, Nurmikko AV, Hochberg LR. Broadband wireless intracortical BCI enables independent use at home. *7th Annual NIH BRAIN Initiative Investigators Meeting*. p283. Washington, DC, 2021.

[106] Singer-Clark T, Gross R, Hosman T, Kapitonava A, **Simeral JD**, Hochberg LR. Enabling a high quality user experience during independent home use of an iBCI by an individual with tetraplegia. Program No. 2021-S-5065. 2021 Neuroscience Meeting Planner. Chicago, OL: *Society for Neuroscience*, 2021. Online.

[107] Hosman T, Vargas-Irwin CE, Kapitonava A, Hochberg LR, **Simeral JD**. Interaction of effector and direction encoding in motor cortex of a person with tetraplegia during a bimanual task. Program No. 2021-S-8952. 2021 Neuroscience Meeting Planner. Chicago, OL: *Society for Neuroscience*, 2021. Online.

[108] Rubin D, Hosman T, Kapitonava A, **Simeral JD**, Cash S, Hochberg LR. Decoding speech from human motor cortex using an intracortical brain computer interface. American Academy of Neurology 74th Annual Meeting, Seattle, WA. 2022. *(submitted)*

Lectures and Presentations

National / International Invited & Keynote Lectures

"Architecture of the AT&T WorldMark Massively Parallel Computer System"
International NCR ASIC TIES Developers Conference, Breckenridge, CO.,
June 22, 1991 (Invited lecture).

"Toward neural control of assistive technologies for individuals with motor disability"
North Country Access Disabled Sports USA, Clayton, NY.
July 19, 2008 (Keynote speaker).

"Intracortical neural interfaces for the restoration of communication and mobility"
Frontiers in Neuroengineering Monte Verita Conference, Locarno, Switzerland.
September 8, 2010 (Keynote speaker).

"From a spike-centered brain universe to its underlying synaptic landscape: future technologies for brain reverse engineering and neuroprosthetics"
The European Future Technologies Conference and Exhibition FET11, Budapest, Hungary.
May 5, 2011 (Symposium speaker)

"Engineering, neuroscience, and clinical evaluation of the BrainGate Neural Interface System."
Neuroengineering Symposium, Beckman Institute, Urbana-Champaign, IL.
June 16, 2011 (Invited lecture).

"BrainGate and the future of brain-computer interface technology."
The Spinal Cord Injury Network Connections 2014 Conference, Sydney, Australia.
Oct 13, 2014 (Keynote speaker).

"How could brain-computer interfaces enable reliable, potent assistive technology?"
Assistive Technology Industry Association (ATIF) Conference, Orlando, FL.
February 4, 2016 (Platform lecture, CME Education Session)

"Effective BCI: Different approaches, common clinical purpose"
International BCI Society Meeting, Pacific Grove, CA

June 2, 2016 (Workshop organizer)

"Intracortical brain-machine interfaces: Experience from pilot clinical trials"

22nd Annual Brain Injury Symposium, Baptist Health South Florida, Miami, FL
October 15, 2016 (Keynote speaker)

"Recent advances in neural engineering for individuals with ALS/MND"

28th Annual International Symposium on ALS/MND, Westin Hotel, Boston, MA
Beyond Pharmacotherapies; The innovation landscape in ALS
Dec 9, 2017 (Keynote speaker)

"Technological development and implementation of BCIs for home use"

International BCI Society Meeting, Brussels, Belgium
June, 2022 (Workshop organizer) *(submitted)*

Other National Meeting Presentations

"Ensemble spiking activity as a source of cortical control signals in individuals with tetraplegia"

Biomedical Engineering Society Annual Meeting, Los Angeles, CA.
September 27, 2007 (Platform lecture).

"Toward neural control of assistive technologies for individuals with motor disability"

ONR Workshop on Biorobotics and Human Interaction, Arlington, VA.
June 2, 2008.

"Advances in mobile wireless signal processing toward intracortical BCI deployment"

Nanosymposium on Peripheral Neural Interfaces for Reach and Grasp
Society for Neuroscience Annual Meeting, Washington, DC.
November 15, 2017 (Microsymposium lecture).

"Evolution of a real-time system for intracortical BCI: from NHPs to living room"

Translational Neuroscience and Neuroengineering Summer Workshop, Salve Regina University, Newport, RI
June 8, 2018 (Workshop instructor / lecturer)

Regional /Local Lectures

"Toward neural control of assistive technologies for individuals with motor disability."

Dept. Neuroscience, Brown University, Providence, RI
October 14, 2008.

"BrainGate2: Toward Neural Control of Assistive Technologies for Individuals with Motor Disability."

VA Medical Center, Providence, RI
March 18, 2009

"Progress in the pilot clinical trial of the BrainGate intracortical neural interface system."

VA Medical Center, Providence, RI
December 15, 2010

"Developing the BrainGate2 neural interface system across institutional boundaries."
Brown University Research Day, Providence, RI
August 27, 2010 (Invited lecture)

"Developing neural interface technology and assistive solutions for individuals with tetraplegia and locked-in syndrome."
IEEE Engineering in Medicine and Biology Society, Providence Chapter
March 22, 2011 (Invited lecture)

"Engineering the BrainGate neural interface system at Brown."
Engineering Alumni Networking and Recruiting Event, Brown Univ., Providence, RI
February 4, 2012

"Rapid and flexible data investigation in the BrainGate pilot clinical trial."
Institute for Computational and Experimental Research in Mathematics, Brown University, Providence RI
May 18, 2012.

"Human-robot interaction: BrainGate2 for people with motor disability or upper limb loss"
Symposium on Human Robot Interaction, Brown University, Providence RI.
December 10, 2012.

"Neural engineering for brain-computer interface neurotechnology"
Neural Engineering guest lecture, University of Rhode Island, Kingston RI.
March 12, 2015.

"Brain-machine prostheses: independence for individuals with paralysis or amputation"
Prosthetics Industrial Design, Rhode Island School of Design (RISD), Providence, RI
April 6, 2016 (Invited lecture).

"Developing a high-performance intracortical BCI for individuals with tetraplegia"
Engineering Graduate Student Seminar Series, University of Rhode Island, Kingston RI.
October 19, 2016 (Invited lecture).

"Advances and future outlook in neuroscience: multi-site BrainGate BCI research"
Panel presentation, MedMates forum on neuroscience economic opportunities, Providence RI.
April 26, 2017 (Invited panel lecture).

"Intracortical brain-computer interface – a look behind the technology curtain."
VA Medical Center, Providence, RI
May 15, 2020

Novel Microelectronics

2014- Mobile Signal Processor for Medical & iBCI applications
A small-form, battery-powered hybrid embedded system processor for real-time neural signal processing and decoding. Developed through VA Merit-funded research for use in the BrainGate Neural Interface System pilot clinical trial and beyond.

2020- Mobile Dual-Band Wireless Receiver for iBCI Applications

A small-form, battery-powered dual-band microwave RF receiver developed through VA Merit-funded research for deployment in the BrainGate pilot clinical trial. A robust redesign of a laboratory prototype from the Nurmikko lab.