Krishna V. Shenoy, PhD
Curriculum Vitae
14 November 2022

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Stanford University
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Neural Prosthetic Systems Lab (NPSL)
Neural Prosthetics Translational Lab (NPTL)

Date of birth: 3 September 1968
Place of birth: Sabetha, Kansas, US
Citizenship: US
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Education

Senior Postdoctoral Scholar, Caltech, Neurobiology, Division of Biology (with RA Andersen)	1998-2001
Postdoctoral Scholar, Caltech, Neurobiology, Division of Biology (with RA Andersen)	1995-1998
PhD, MIT, Electrical Engineering and Computer Science (with CG Fonstad, Jr)	1992-1995
SM, MIT, Electrical Engineering and Computer Science (with CG Fonstad, Jr)	1990-1992
B.S. Electrical and Computer Engineering, UC Irvine (Summa Cum Laude)	1987-1990
N/A Electrical Engineering, UC San Diego	1986-1987

Positions

Investigator, Howard Hughes Medical Institute (HHMI)	2015-
Hong Seh and Vivian W. M. Lim Professor of Engineering, Stanford University	2017-
Department of Electrical Engineering, School of Engineering	2001-
By courtesy, Department of Bioengineering, Schools of Engineering and Medicine	2012-
By courtesy, Department of Neurobiology, School of Medicine	2010-
By courtesy, Department of Neurosurgery, School or Medicine	2021-
Director, Neural Prosthetic Systems Laboratory	2001-
Co-Director, Neural Prosthetics Translational Lab	2009-
Wu Tsai Neurosciences Institute	2018-
Bio-X Institute	2002-
Neurosciences PhD Program	2001-
Professor, Stanford University	2012-2017
Associate Professor, Stanford University	2008-2012
Assistant Professor, Stanford University	2001-2008
Research Assistant, Physics and Neurobiology Center, UC Irvine (with GL Shaw)	1988-1990
Summer Intern, Rockwell Semiconductor Products Division, Newport Beach, CA	1989

Scientific Advisory Boards (SAB) and Consulting

SAB, Inscopix Inc. (Kunal Ghosh, CEO), Palo Alto, CA	2018-
Founding SAB, MIND-X Inc. (Geoff Ling, Founder), Washington DC	2018-
Co-founder, advisor / consultant, Neuralink Corp. (Elon Musk, CEO), Fremont, CA	2016-
Consultant, CTRL-Labs Inc. (Thomas Reardon, President), NYC / Menlo Park / Burlingame	2019-
Founding SAB, CTRL-Labs Inc., NYC, acquired by Facebook (now Meta Platforms) in 2019	2016-2019
SAB, Heal Inc. (Nimesh Desai, CEO), Los Angeles, CA	2016-
SAB, Center for Neurotechnology, (originally) an NSF ERC at Univ. of Wash., Seattle	2016-
Member, Defense Science Research Council (DSRC), DSO and MTO offices at DARPA	2005-2009
Elected Fellow, Defense Science Research Council (DSRC), DSO and MTO at DARPA	2003-2005

Awards and Honors

National Academy of Medicine	2022
Carnegie Prize in Mind and Brain Sciences, Carnegie Mellon University & Carnegie Corp.	2018
Elected Fellow, Amer. Inst. for Med. & Biological Engineering (AIMBE) College of Fellows	2015
Elected Member, The Henry Samueli School of Engineering Hall of Fame at UC Irvine	2015
UC Irvine Distinguished Alumnus Award, The Henry Samueli School of Engineering	2013
North American Konkani Association Sammelan, Award of Excellence in Research	2012

Stanford University Postdoc Mentoring Award	2010
NIH Director's Pioneer Award	2009-2014
Charles Lee Powell Faculty Scholar, School of Engineering, Stanford University	2008-2011
Editorial Board, Journal of Neurophysiology	2008-
McKnight Technological Innovations in Neurosciences Award	2007-2009
Institute of Electrical and Electronics Engineers (IEEE), elected Senior Member	2006-
American Physiological Society, Member	2006-
Alfred P. Sloan Research Fellow	2002-2004
Robert N. Noyce Faculty Scholar, School of Engineering, Stanford University	2000-2001
William George Hoover Faculty Scholar, School of Engineering, Stanford University	2000-2001
Burroughs Wellcome Fund Career Award in Biomedical Sciences	1999-2004
National Institutes of Health (NEI) Postdoctoral Fellow	1996-1999
Alcott Postdoctoral Fellow, Caltech Division of Biology	1995-1996
Fannie and John Hertz Foundation Doctoral Thesis Prize	1996
Fannie and John Hertz Foundation Graduate Fellow	1992-1995
National Science Foundation Graduate Fellow	1990-1995
Presidential undergraduate fellow, UC Irvine	1989-1990
Hembd memorial scholar, UC Irvine	1989-1990
Tau Beta Pi, UC Irvine chapter president	1989-1990
National Science Foundation, Research Experience for Undergraduates (REU)	1988
Tau Beta Pi, national engineering honor society	1988-
Eta Kappa Nu, national electrical engineering honor society	1988-

Teaching

Intro to Neuroelectrical Engineering (EE124)	Each Winter quarter	2009-2022
Circuits II – Nonlinear circuit design (EE101B with lab)	Each Spring & Autumn quarter	2003-2008
Topics in Biomedical Engineering (EE302)	Spring quarter	2008-2009
Topics in Neuroengineering (EE418)	Each Winter quarter	2004-2008
Electronics II (EE112)	Each Winter quarter	2001-2003
Electronics III (EE113)	Spring quarter	2002-2003

Research Group (Current)

Faculty Administrator

- Ms. Beverly Davis, BS Department of Electrical Engineering

Software Engineer

- Mr. Donald Avansino, BS Departments of Neurosurgery and Electrical Engineering, joint with Prof. Jaimie Henderson (NPTL), appointed through HHMI

Clinical Neurotechnology Research Assistant (CNRA)

- Ms. Foram Kamdar, MS Department of Neurosurgery, joint with Prof. Jaimie Henderson (NPTL)

PhD Students

- Mr. Chaofei Fan, MS Department of Computer Science, joint with Prof. Jaimie Henderson (NPTL)
- Ms. Erin Kunz, MS Department of Electrical Engineering, joint with Prof. Jaimie Henderson (NPTL)
- Ms. Alisa Danielle Levin, BS Winter rotation, Department of Computer Science, joint with Prof. Jaimie Henderson (NPTL)
- Mr. Benyamin Meschede-Krasa, BS Winter rotation, Neurosciences Program, joint with Prof. Jaimie Henderson (NPTL)
- Mr. Shreyas Muralidharan, MS Department of Electrical Engineering, joint with Prof. Tirin Moore
- Ms. Jessica Verhein, BS Neurosciences Program and Medical School (MD-PhD MSTP), joint with Prof. Bill Newsome
- Mr. Guy Wilson, BS Neurosciences Program, joint with Prof. Shaul Druckmann and Prof. Jaimie Henderson (NPTL)

Postdocs

- Dr. Darrel Deo, PhD Department of Neurosurgery and Electrical Engineering, joint with Prof. Jaimie Henderson (NPTL)

- Dr. Laura Driscoll, PhD Department of Electrical Engineering, joint with Adjunct Prof. David Sussillo
- Dr. Lea Duncker, PhD Department of Electrical Engineering, joint with Prof. Scott Linderman (appointed through HHMI)
- Dr. Matthew Golub, PhD Department of Electrical Engineering, joint with Prof. Bill Newsome and Adjunct Prof. David Sussillo
- Dr. Dan O'Shea, PhD Department of Electrical Engineering
- Dr. Nishal Shah, PhD Department of Neurosurgery and Electrical Engineering, joint with Prof. Jaimie Henderson (NPTL)

Research Scientist III

- Dr. Frank Willett PhD Department of Electrical Engineering and Neurosurgery, joint with Prof. Jaimie Henderson (NPTL), appointed through HHMI

Research Group (Alumni)

PhD Students

1. Dr. Gopal Santhanam, PhD. UC Berkeley undergraduate. 2001-2006 EE PhD thesis, "Design of higher performance neural prosthetic systems," pdf. 2006-2013 Co-founder and Vice President, Total Phase, Inc. 2013- Senior Engineer at Waymo.
2. Professor Byron Yu, PhD. UC Berkeley undergraduate. 2001-2006 EE PhD thesis, "Neural dynamics of movement preparation and execution," pdf. 2007-2009 Postdoc in NPSL (joint w/ Prof. Maneesh Sahani at The Gatsby Computational Neuroscience Unit, University College London. 2010-2015 Assistant Professor, Departments of Biomedical Engineering and Electrical and Computer Engineering, Carnegie Mellon University. 2015-2019 Associate Professor. 2019- Professor.
3. Dr. Afsheen Afshar, MD, PhD. Princeton University undergraduate. 2004-2008 EE PhD thesis, "Neural mechanisms of motor preparation and applications to prostheses," pdf. 2008-2010 Completed medical school (MSTP, MD) at Stanford University. 2010-2016 Managing Director, Goldman Sachs, New York City. 2016-2017 Chief Data Science Officer, JP Morgan, New York City; first such role on Wall Street. 2017-2018 Senior Partner and Chief Artificial Intelligence Officer, Cerberus Capital, New York City; first such role in private equity. 2019- Founder and CEO, Pilot Wave Holdings Management, New York City.
4. Professor John Cunningham, PhD. Dartmouth College undergraduate. 2004-2009 EE PhD thesis, "Algorithms for understanding motor cortical processing and neural prosthetic systems," pdf. 2009 Postdoc in NPSL. 2009 Accepted Assistant Professorship in the Department of Biomedical Engineering, Washington University, Saint Louis (WUSTL). 2010-2011 Postdoc with Prof. Zoubin Ghahramani, Department of Engineering, Cambridge University. 2011-2013 Assistant Professor, WUSTL. 2013-2017 Assistant Professor, Department of Statistics & Neuroscience, Columbia University. 2017-2022Associate Professor. 2022- Professor.
5. Associate Professor Vikash Gilja, PhD. MIT undergraduate. 2004-2010 CS PhD thesis, "Towards clinically viable neural prosthetic systems," pdf. 2010-2013 Research associate, NPTL, Stanford University. 2013-2020 Assistant Professor, Department of Electrical and Computer Engineering, UCSD. 2017-2018 Neuralink Inc. 2020- Associate Professor, Department of Electrical and Computer Engineering, UCSD.
6. Associate Professor Cindy Chestek, PhD. Case Western Reserve University undergraduate. 2005-2010 EE PhD thesis, "Measurements and technology for long-term neural prosthetic systems," pdf. 2010-2012 Research associate, NPTL, Stanford University. 2012-2018 Assistant Professor, Department of Biomedical Engineering, University of Michigan. 2018- Associate Professor.
7. Dr. Rachel Kalmar, PhD. UC San Diego undergraduate. 2005-2010 Neurosciences Program PhD thesis, "Moving through the brain: A study of movement preparation in the oculomotor and reach systems," pdf. 2010- various Bay Area biomedical industry startups. 2016- Harvard graduate school
8. Assistant Professor Matthew Kaufman, PhD. Stanford University undergraduate. 2005-2011 Neurosciences Program PhD thesis, "Neural mechanisms and dynamics underlying reaching and decision making," pdf. 2011-2012 Postdoc in NPSL. 2012-2017 Postdoc with Prof. Anne

Churchland at Cold Spring Harbor Laboratory. 2017- Assistant Professor, Department of Organismal Biology and Anatomy, University of Chicago

9. Dr. Zuley Rivera Alvidrez, PhD. University of Arizona undergraduate. 2005-2011 EE PhD thesis, "Low-dimensional neural features reflect the features of muscle activation," pdf. 2011- Novelist, New York City. Board of Directors, Center for Anti-Violence Education, New York City.
10. Assistant Professor Paul Nuyujukian, MD, PhD. UCLA undergraduate. 2007-2012 BioE PhD thesis, "Towards clinically relevant neural prostheses," pdf. 2012-2014 Completed medical school (MSTP, MD) at Stanford University. 2014-2017 Postdoc with NPTL, Stanford University. 2017- Assistant Professor, Department of Bioengineering, Stanford University.
11. Dr. Werapong Goo, PhD. Duke University Undergraduate. 2009-2014 BioE, Jointly advised by Professor Karl Deisseroth. PhD thesis, "Development of optogenetics for motor systems neuroscience in non-human primates," pdf. 2014-2015 Senior Associate, Boston Consulting Group, Bangkok, Thailand. 2015-2017 Consultant, Boston Consulting Group, New York City. 2017-2019 Project Leader, Boston Consulting Group, New York City . 2019-present Head of e-commerce division, Lazada Thailand, Bangkok, Thailand.
12. Dr. Justin Foster, PhD. Columbia University undergraduate. 2007-2014 EE PhD thesis, "A freely-moving monkey treadmill model," pdf. 2014- Data Scientist, Everstring. 2016- Data Scientist, Stitch Fix.
13. Dr. K. Cora Ames, PhD. University of Chicago undergraduate. 2009-2014 Neurosciences PhD thesis, "Neural dynamics of reaching following incorrect, absent, or last-minute preparation," pdf. 2014-2019 Postdoc with Prof. Mark Churchland and Prof. Larry Abbott at Columbia University. 2020- Application Scientist at LifeCanvas Technologies, Boston, MA.
14. Assistant Professor Sergey Stavisky, PhD. 2004-2008 Brown University undergraduate. 2008-2010 BrainGate Research Engineer, Brown University. 2010-2016 Neurosciences PhD student with NPSL / Shenoy Group with PhD thesis, "Advancing motor neural prosthesis robustness and neuroscience," pdf. 2016-2021 Postdoc with NPTL, Stanford. 2021- Assistant Professor, Department of Neurosurgery, UC Davis.
15. Assistant Professor Jonathan Kao, PhD. Stanford University undergraduate. 2010-2016 EE PhD thesis, "Decoder algorithm design for high-performance and robust neural prostheses," pdf. 2016-2017 Postdoc with NPSL. 2017- Assistant Professor, Department of Electrical Engineering, UCLA.
16. Dr. Dan O'Shea, PhD. Princeton University undergraduate. 2009-2016 Neurosciences PhD thesis, "Probing the motor cortical dynamics of flexible feedback control," pdf. 2017- Postdoc with NPSL.
17. Dr. Eric Trautmann, PhD. Dartmouth University undergraduate. 2011-2018 Neurosciences PhD thesis, "Neural dynamics of motor preparation and tools for large scale neuroscience," pdf. 2018- Postdoc with NPSL. 2019- Postdoc with Prof. Mark Churchand and Prof. Michael Shadlen, Columbia University.
18. Dr. Nir Even-Chen, PhD. Technion - Israel Institute of Technology, undergraduate and masters. 2014-2018 Electrical Engineering PhD thesis, "Towards clinically viable neural prostheses through innovations in neuroscience, decoders, and interfaces," pdf. 2019 Postdoc with NPSL. 2019-2021 Lyft. 2021- Neuralink.
19. Dr. Megan Wang, PhD. University of California, Irvine undergraduate. 2014-2019 Neurosciences PhD thesis, "The role of dorsal premotor cortex in decision-making and action selection," pdf. 2019- Postdoc with Prof. Mala Murthy, Princeton University.
20. Dr. Saurabh Vyas, PhD. Johns Hopkins University undergraduate. 2014-2020 Bioengineering PhD thesis, "Neural population dynamics underlying motor learning," pdf. 2020- Postdoc with Prof. Mark Churchand, Columbia University. Most sincere congrats to Saurabh for his incredible thesis work for which he is awarded The Highest Possible Recognition from Society for Neuroscience (SFN) for his dissertation work -- The 2021 Donald B. Lindsley Prize in Behavioral Neuroscience! url
21. Dr. Xulu Sun, Ph.D. 2015-2021 Biology PhD thesis, "Cortical neural population dynamics for flexible motor control and motor learning," pdf. 2021- Postdoc with Prof. Loren Frank, UCSF.

MS Students

1. Dr. Joline Fan, MS. Princeton University undergraduate. 2009-2011 Bioengineering MS. 2011-2015 Medical school, UCSF. 2015-2019 Neurology resident, UCSF. 2019- Neurology fellow, UCSF.
2. Mr. Shikhar Shrestha, MS . IIT undergraduate. 2014-2015 Mechanical Engineering MS. 2015- Mechanical Engineering PhD program at Stanford.
3. Mr. Allan Raventos, MS. Stanford University undergraduate. 2015-2016 REU summer student and undergraduate, NPTL. 2016-2017 EE MS graduate student, NPTL
4. Ms. Iliana Bray, BS. Stanford University undergraduate. 2016-2017 REU summer student and undergraduate. 2017-2018 PhD student. 2018- PhD student with Professor Paul Nuyujukian, Stanford University
5. Mr. Avery Krieger, BS. University of Pennsylvania undergraduate. 2017-2019 PhD student. 2019- PhD student with Professor Tom Clandinin, Stanford University
6. Mr. Tucker Fisher, BS. UC Davis undergraduate. 2017-2019 PhD student. 2019- PhD student with Professor Lisa Giocomo, Stanford University
7. Mr. Naryan Murthy, MS. Brown University undergraduate. Medtronic, Santa Rosa, CA. 2019-2021 EE graduate student, joint with Prof. Jaimie Henderson, NPTL. 2021- Medtronic, Santa Rosa, CA.
8. Mr. Elias Stein, MS 2019-2021 EE graduate student, joint with Prof. Jaimie Henderson, NPTL. 2021- Special Projects Group, Apple, Cupertino, CA.

Postdocs

1. Adjunct Professor Stephen Ryu, MS, MD. Stanford Universty undergrad and masters. UC San Diego Medical School. 2002-2004 Postdoc. 2004-2006 Completing neurosurgery residency, Stanford University. 2006- Adjunct Professor, Departments of Electrical Engineering and Neurosurgery, Stanford University. 2006-2009 Clinical Assistant Professor in the Department of Neurosurgery, Stanford University. 2009- Department of Neurosurgery, Palo Alto Medical Foundation (PAMF). 2019- Chair of Neurosurgery, PAMF. 2019- Geographical Medical Director for Surgical Specialities (Palo Alto), PAMF.
2. Professor Aaron Batista, PhD. Caltech graduate school. 2003-2007 Postdoc. 2007-2015 Assistant Professor, Department of Bioengineering, University of Pittsburgh. 2015-2019 Associate Professor. 2019- Professor.
3. Professor Byron Yu, PhD. Stanford University graduate school (NPSL). 2007-2009 Postdoc (joint w/ Prof. Maneesh Sahani at The Gatsby Computational Neuroscience Unit, University College London. 2010-2015 Assistant Professor, Departments of Biomedical Engineering and Electrical and Computer Engineering, Carnegie Mellon University. 2015-2019 Associate Professor. 2019- Professor.
4. Professor John Cunningham, PhD. Stanford University graduate school (NPSL). 2009 Postdoc. 2009 Accepted Assistant Professorship in the Department of Biomedical Engineering, Washington University, Saint Louis (WUSTL). 2010-2011 Postdoc with Prof. Zoubin Ghahramani, Department of Engineering, Cambridge University. 2011-2013 Assistant Professor, WUSTL. 2013-2017 Assistant Professor, Department of Statistics & Neuroscience, Columbia University. 2017-2022 Associate Professor. 2022- Professor
5. Associate Professor Mark Churchland, PhD. UC San Francisco graduate school. 2001-2007 Postdoc. 2007-2011 Research Associate. 2011-2020 Assistant Professor, Department of Neuroscience, Columbia University. 2020- Associate Professor
6. Associate Professor Cindy Chestek, PhD. Stanford University graduate school (NPSL). 2010-2012 Research associate, NPTL, Stanford University. 2012-2018 Assistant Professor, Department of Biomedical Engineering, University of Michigan. 2018- Associate Professor.
7. Assistant Professor Vikash Gilja, PhD. Stanford University Graduate School (NPSL). 2010-2013 Research associate, NPTL, Stanford University. 2013- Assistant Professor, Department of Electrical and Computer Engineering, UCSD. 2017-2018 Neuralink Inc. 2020- Associate Professor, Department of Electrical and Computer Engineering, UCSD.
8. Professor Ilka Diester, PhD. Eberhart-Karls-University, Tubigen, Germany graduate school. 2008-2011 Postdoc. 2011-2014 Assistant Professor, Ernst Strüngmann Institute / Max Planck Institute for Brain Research, Frankfurt, Germany. 2014- Professor, University of Freiburg, Freiburg, Germany

9. Dr. Paul Kalanithi, MD. Yale University medical school. 2010-2012 Postdoc. 2012-2015 Completed neurosurgery residency at Stanford University. March 2015, passed away -- In loving memory of our dear friend and group mate. When Breath Becomes Air by Dr. Paul Kalanithi. Amazon. Obituary
10. Assistant Professor Matt Kaufman, PhD. Stanford University graduate school (NPSL). 2011-2012 Postdoc. 2012-2017 Postdoc with Prof. Anne Churchland at Cold Spring Harbor Laboratory. 2017- Assistant Professor, Department of Organismal Biology and Anatomy, University of Chicago.
11. Adjunct Professor David Sussillo, PhD. Columbia University graduate school. 2010-2014 Postdoc. 2014- Google AI. 2017- Adjunct Professor in the Department of Electrical Engineering, Stanford University.
12. Assistant Professor Chethan Pandarinath, PhD . Cornell University graduate school. 2011-2016 Postdoc in NPTL. 2016- Assistant Professor, Department of Biomedical Engineering, Emory University & Georgia Institute of Technology.
13. Assistant Professor Jonathan Kao, PhD. Stanford University graduate school (NPSL). 2016-2017 Postdoc with NPSL. 2017- Assistant Professor, Department of Electrical Engineering, University of California, Los Angeles.
14. Assistant Professor Paul Nuyujukian, MD, PhD. Stanford University graduate school (NPSL). 2014-2017 Postdoc with NPTL, Stanford University. 2017- Assistant Professor, Department of Bioengineering, Stanford University (Stanford Brain Interface Lab).
15. Dr. Matthew MacDougall, MD. UC San Diego, neurosurgery residency. 2016-2017 Neurosurgery Fellow with Prof. Jaimie Henderson, Department of Neurosurgery, Stanford University. 2016-2017 Postdoc with NPTL. 2017- Department of Neurosurgery, California Pacific Medical Center (CPMC), San Francisco, CA. 2018- Department of Neurosurgery, California Pacific Medical Center and Neuralink Inc.
16. Assistant Professor Chand Chandrasekaran, PhD. Princeton University graduate school. 2011-2018 Postdoc with NPSL, Stanford University. 2019- Assistant Professor, Departments of Anatomy and Neurobiology & Psychology and Brain Sciences, Boston University.
17. Dr. Jonathan Michaels, PhD. University of Gottingen and Deutsches Primatenzentrun GmbH graduate school. 2017-2019 Postdoc with NPSL, Stanford University. 2019- Postdoc with Prof. Andrew Pruzynski, Western University.
18. Dr. Eric Trautmann, PhD. Dartmouth University undergraduate. 2011-2018 Stanford University graduate school (NPSL). 2018-2019 Postdoc with NPSL, Stanford University. 2019- Postdoc with Prof. Mark Churchand and Prof. Michael Shadlen, Columbia University.
19. Dr. Sharlene Flesher, PhD. 2007-2011, Department of Computer Engineering Saint Mary's University, San Antonio, TX undergraduate. 2011-2017 Department of Bioengineering, University of Pittsburgh, graduate school. 2017-2020 Postdoctoral Fellow, joint with Prof. Jaimie Henderson (NPTL), NPTL. 2020- Sensor Calibration and Instrumentation Engineer (input devices), Apple, Cupertino, CA.
20. Dr. Frank Willett, PhD. 2017-2021 Postdoctoral Fellow, joint with Prof. Jaimie Henderson. 2021- Research Scientist III through HHMI, joint with Prof. Jaimie Henderson.
21. Assistant Professor Sergey Stavisky, PhD. 2004-2008 Brown University undergraduate. 2008-2010 BrainGate Research Engineer, Brown University. 2010-2016 Neurosciences PhD student with NPSL / Shenoy Group, Stanford. 2016-2021 Postdoc with NPTL, Stanford. 2021- Assistant Professor, Department of Neurosurgery, Univeristy of California at Davis, Lab website: UC Davis Neuroprosthetics Lab.

Research Scientists

1. Dr. Beata Jarosiewicz, PhD 2010-2013 Investigator at BrainGate, Department of Neuroscience, Brown University; 2013-2016 Assistant Professor (Research), Department of Neuroscience, Brown University and Investigator at BrainGate; 2016-2018 Senior Research Scientist, Department of Neurosurgery and Electrical Engineeering, Stanford University and at NPTL; 2018-2020 Senior Clinical Research Scientist at NeuroPace, Inc.; 2020- Neuroengineer at Neuralink, Corp.

Intellectual Property

Licensing

- In 2021 Neuralink Corp. (an Elon Musk Company) and Blackrock Neurotech Inc. both licensed patents #6, #8, #12 and #13 below.
- At the same time in 2021, Blackrock Neurotech Inc. also licensed patent #10 below.
- The goal of these medical device companies' commercialization efforts is to bring BCI-based medical systems to market in order to improve the quality of life of people with profound paralysis (e.g., upper spinal cord injury, ALS, brainstem stroke) and a range of neurological injuries and disease.

Patents

13. Systems and methods [for] decoding intended symbols from neural activity. Pub. No.: US 2021/0064135 A1. Pub. Date: Mar. 4, 2021. Krishna V. Shenoy, Jaimie M. Henderson, Frank Willett. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. PENDING. pdf url

12. Systems and methods for decoding intended speech from neuronal activity. Pub. No.: US 2019/0333505 A1. Pub. Date: Oct. 31, 2019. Sergey Stavisky, Krishna V. Shenoy, Jaimie M. Henderson. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. PENDING. pdf url

11. Systems and methods for virtual keyboards for high dimensional controllers. Patent No.: US 10,949,086 B2. Pub. Date: Mar. 16, 2021. Nir Even-Chen, Krishna V. Shenoy. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. url

10. Multiplicative recurrent neural network for fast and robust intracortical brain machine interface decoders. Patent No.: US 10,223,634 B2. Date of patent: Mar. 5, 2019. David Sussillo, Jonathan C. Kao, Sergey Stavisky, Krishna V. Shenoy. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. pdf url

9. Task-outcome error signals and their use in brain-machine interfaces. Patent No.: US 10,779,764 B2. Date of patent: Sep. 22, 2020. Nir Even-Chen, Krishna V. Shenoy, Jonathan C. Kao, Sergey Stavisky. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. pdf url

8. Brain machine interface utilizing a discrete action state decoder in parallel with a continuous decoder for a neural prosthetic device. Patent No.: US 9,373,088 B2. Date of patent: Jun. 21, 2016. Paul Nuyujukian, Jonathan C. Kao, Krishna V. Shenoy. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. pdf url

7. Brain machine interfaces incorporating neural population dynamics. Patent No.: US 9,095,455 B2. Date of patent: Aug. 4, 2015. Jonathan C. Kao, Paul Nuyujukian, Mark M. Churchland, John P. Cunningham, Krishna V. Shenoy. Assignees: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA and Cambridge Enterprise Limited, Cambridge (GB). ISSUED. pdf url

6. Brain machine interface. Patent No.: US 8,792,976 B2. Date of patent: Jul. 29, 2014. Vikash Gilja, Paul Nuyujukian, Cynthia A. Chestek, John P. Cunningham, Byron M. Yu, Stephen I. Ryu, Krishna V. Shenoy. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. pdf url

5. Brain-machine interface utilizing interventions to emphasize aspects of neural variance and decode speed and angle. Pub. No.: US 2015/0245928 A1. Pub. Date: Sep. 3, 2015. Jonathan C. Kao, Chethan Pandarinath, Paul Nuyujukian, Krishna V. Shenoy. Related U.S. ApplicationData: Continuation-in-part of aplication No. 12/932,070, filed on Feb. 17, 2011, now Pat. No.: US 8,792,976; Provisional aplication No. 61/338,460, filed on Feb. 18, 2010, provisional aplication No. 61/837,014, filed on Jun. 19, 2013. ISSUED. pdf url

4. Decoding of neural signals for movement control. Patent No.: US 7,058,445 B2. Date of patent: Jun. 6, 2001. Caleb T. Kemere, Gopal Santhanam, Byron M. Yu, Teresa H. Meng, Krishna V. Shenoy. Assignee: The Board of Trustees of the Leland Stanford Junior University, Stanford, CA. ISSUED. pdf url

3. Cognitive state machine for prosthetic systems. International Publication No.: WO 03/005934 A3. Date of patent: Jan. 23, 2003. Richard A. Andersen, Bijan Pesaran, Partha Mitra, Daniella Meeker, Krishna V. Shenoy, Shiyan Cao, Joel W. Burdick. Applicant: California Institute of California, Pasadena, CA. ISSUED. pdf url

2. Cognitive state machine for prosthetic systems. Pub. No.: US 2003/0023319 A1. Richard A. Andersen, Bijan Pesaran, Partha Mitra, Daniella Meeker, Krishna V. Shenoy, Shiyan Cao, Joel W. Burdick. Provisional aplication No. 60/304,805, filed on Jul. 10, 2001. Provisional aplication No. 60/304,842, filed on Jul. 11, 2001. ISSUED. pdf url

1. Processed neural signals and methods for generating and using them. Patent No.: US 6,609,017 B1. Date of patent: Aug. 19, 2003. Krishna V. Shenoy, Richard A. Andersen, Sohaib A. Kureshi. Asignee: California Institute of Technology, Pasadena, CA. Related U.S. Application Data. Provisional aplication No. 60/095,833, filed on Aug. 7, 1998, and provisional aplication No. 60/099,222, filed on Sep. 4, 1998. ISSUED. pdf url

Book Chapters

11. Shenoy KV, Yu BM (2021) Brain Machine Interfaces (entirely new chapter, Chapter 39). Principles of Neural Science, 6th edition. Editors: Kandel ER, Koester JD, Mack SH, Siegelbaum SA. McGraw Hill. Chapter 39 BMIs

10. Shenoy KV (2014) Recording from many neurons simultaneously: From measurement to meaning. Chapter in The future of the brain: Essays by the world's leading neuroscientists. Princeton University Press. ISBN: 9780691162768 (url). Pages 78-89. pdf

9. Shenoy KV, Chestek CA (2012) Neural Prosthetics. In *Encyclopedia of Motor Control,* edited by Daniel Wolpert, *Scholarpedia*. 7(3):11854. doi:10.4249/scholarpedia. url

8. Shenoy KV, Kaufman MT, Sahani M, Churchland MM (2011) A dynamical systems view of motor preparation: Implications for neural prosthetic system design. Chapter 3 in Andrea M. Green, C. Elaine Chapman, John F. Kalaska, Franco Lepore, editors: Progress in Brain Research, Vol. 192, Amsterdam: The Netherlands. pp. 33-58. ISBN: 978-0-444-53355-5. Elsevier. pdf

7. Yu BM, Santhanam G, Sahani M, Shenoy KV (2010) Neural decoding for motor and communication prostheses. Chapter in Statistical Signal Processing for Neuroscience, K.G. Oweiss editor. Elsevier. 219-263. pdf

6. Yu BM, Cunningham JP, Shenoy KV, Sahani M (2008) Neural decoding of movements: From linear to nonlinear trajectory models. Neural Information Processing, M. Ishikawa et al. (Eds.): ICONIP 2007, Part I, LNCS. Springer-Verlag Berlin Heidelberg. ISBN 978-3-540-69154-9. 4984:586-595. pdf

5. Mumbru J, Shenoy KV, Panotopoulos G, Ay S, An X, Mok F, Psaltis D (2005) Reconfigurable Neural-Prosthetics Processors. Toward Replacement Parts for the Brain Implantable Biomimetic Electronics as Neural Prostheses, TW Berger and DL Glanzman, editors. MIT Press, ISBN 0-262-02577-9. pp335-368.

4. Andersen RA, Shenoy KV, Crowell JA, Bradley DC (2000) Neural mechanisms for self-motion perception in area MST. International Review of Neurobiology, Academic Press. 44:219-233.

3. Andersen RA, Shenoy KV, Snyder LH, Bradley DC, Crowell JA (1999) The contributions of vestibular signals to the representations of space in the posterior parietal cortex. Annals of the New York Academy of Sciences 871:282-292.

2. Andersen RA, Bradley DC, Shenoy KV (1996) Neural mechanisms for heading and structure-from-motion perception. Cold Spring Harbor Symposia on Quantitative Biology, Cold Spring Harbor Lab. Press. LXI:15-25.

1. Leng X, McGrann JV, Quillfeldt JA, Shaw GL, Shenoy KV (1994) Learning and memory processes and the modularity of the brain. Neural Bases of Learning and Memory, J. Delacour, editor. World Scientific Press.

Journal Papers

As sometimes requested: Google Scholar – Citations 23,332, h-index 72, i10-index 293; Google Scholar | NIH PubMed | ORCiD | NIH RePORTER | Stanford CAP Profile | Wikipedia | NeuroTree | Facebook | LinkedIn | Twitter

Preprints

145. Driscoll L, Shenoy KV, Sussillo D (2022) Flexible multitask computation in recurrent networks utilizes shared dynamical motifs. bioRxiv. url

144. Boucher PO, Wang T, Carceroni L, Kane G, Shenoy KV, Chandrasekaran C (2022) Neural population dynamics in dorsal premotor cortex underlying a reach decision. bioRxiv. url

143. Chandrasekaran C, Soldado-Magraner J, Peixoto D, Newsome WT, Shenoy KV, Sahani M (2019) Brittleness in model selection analysis of single neuron firing rates. bioRxiv. url

142. Peixoto D, Kiani R, Chandrasekaran C, Ryu SI, Shenoy KV, Newsome WT (2018) Population dynamics of choice representation in dorsal premotor and primary motor cortex. BioRxiv. url

141. Gao P, Trautmann E, Yu BM, Santhanam G, Ryu SI, Shenoy KV, Ganguli S (2017) A theory of multineuronal dimensionality, dynamics and measurement. bioRxiv. url

2022

140. Sylwestrak EL*, Jo Y*, Vesuna S*, Wang X, Holcomb B, Tien RH, Kim DK, Fenno L, Ramakrishnan C, Allen WE, Chen R, Shenoy KV, Sussillo D, Deisseroth K (2022) Cell-type-specific population dynamics of diverse reward computations. Cell. 185:3568-3587. url pdf

139. Paulk AC, Kfir Y, Khanna A, Mustroph M, Trautmann EM, Soper DJ, Stavisky SD, Welkenhuysen M, Dutta B, Shenoy KV, Hochberg LR, Richardson M, Williams ZM, Cash SS. (2022) Large- scale neural recordings with single neuron resolution using Neuropixels probes in human cortex. Nature Neuroscience. 25:252-263. pdf

138. Sun X*, O'Shea DJ*, Golub MD, Trautmann EM, Vyas S, Ryu SI, Shenoy KV (2022) Cortical preparatory activity indexes learned motor memories. Nature. 602:274-279. pdf

2021

137. Lee EK, Balasubramanian H, Tsolias A, Anakwe S, Medalla M, Shenoy KV, Chandrasekaran C (2021) Non-linear dimensionality reduction on extracellular waveforms reveals physiological, functional, and laminar diversity in premotor cortex. eLife. 10:e67490. doi.org/10.7554/eLife.67490. pdf

136. Deo DR, Rezaii PG, Hochberg LR, Okamura AM, Shenoy KV*, Henderson JM* (2021) Effects of peripheral haptic feedback on Intracortical brain-computer interface control and associated sensory responses in motor cortex. IEEE Transactions on Haptics. doi.org/10.1109/TOH.2021.3072615. pdf

135. Simeral JD, Hosman T, Saab J, Flesher SN, Vilela M, Franco B, Kelemen J, Brandman DM, Ciancibello JG, Rezaii PG, Rosler DM, Shenoy KV**, Henderson JM**, Nurmikko AV, Hochberg LR (2021) Home use of a wireless intracortical brain-computer interface by individuals with tetraplegia. IEEE Transactions in Biomedical Engineering. doi.org/10.1109/TBME.2021.3069119. pdf

134. Trautmann EM*, O'Shea DJ*, Sun X*, Marshel JH, Crow A, Hsueh B, Vesuna S, Cofer L, Bohner G, Allen W, Kauvar I, Quirin S, MacDougall M, Chen Y, Whitmire M, Ramakrishnan C, Sahani M, Seidemann E, Ryu SI, Deisseroth K**, Shenoy KV** (2021) Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface. Nature Communications. 12:1-20. pdf

133. Willett FR, Avansino DT, Hochberg LR, Henderson JM*, Shenoy KV* (2021) High-performance brain-to-text communication via imagined handwriting. Nature. 593:249-254. pdf

132. Shenoy KV, Kao JC (2021) Measurement, manipulation and modeling of brain-wide neural population dynamics. Invited Commentary. Nature Communications. 12:633. pdf

131. Rastogi A, Willett FR, Abreu J, Crowder DC, Murphy B, Memberg WD, Vargas-Irwin CE, Miller JP, Sweet J, Walter BL, Rezaii PG, Stavisky SD, Hochberg LR, Shenoy KV, Henderson JM, Kirsch RF, Ajiboye AB (2021) The neural representation of force across grasp types in motor cortex of humans with tetraplegia. eNeuro 10.1523/ENEURO.0231-20.2020. pdf

130. Peixoto D*, Verhein JR*, Kiani R, Kao JC, Nuyujukian P, Chandrasekaran C, Brown J, Fong S, Ryu SI, Shenoy KV, Newsome WT (2021) Decoding and perturbing decision states in real time. Nature. 589:604-609. pdf

2020

129. Al Borno M, Vyas S, Shenoy KV, Delp SL (2020) High-fidelity musculoskeletal modeling reveals a motor planning contribution to the speed-accuracy tradeoff. eLife. 9:e57021. pdf

128. Wilson GH*, Stavisky SD*, Willett FR, Avansino DT, Kelemen JN, Hochberg LR, Henderson JM**, Druckmann S,** Shenoy KV** (2020) Decoding spoken English phonemes from intracortical electrode arrays in dorsal precentral gyrus. Journal of Neural Engineering. 17:066007 pdf

127. Tremblay S, Acker L, Afraz A, Albaugh DL, Amita H, Andrei AR, Angelucci A, Aschner A, Balan PF, Basso MA, Benvenuti G, Bohlen MO, Caiola MJ, Calcedo R, Cavanaugh J, Chen Y, Chen S, Chernov MM, Clark AM, Debes SR, Deisseroth K, Desimone R, Dragoi V, Egger SW, Eldridge M, El-Nahal HG, Fabbrini F, Federer F , Fetsch CR, Fortuna MG, Friedman RM, Fujii N, Gail A, Galvan A, Ghosh S, Gieselmann MA, Gulli RA, Hikosaka O, Hosseini EA, Hu X, Hüer J, Inoue K, Janz R, Jazayeri M, Jiang R, Ju N, Kar K, Klein C, Kohn A, Komatsu M, Maeda K, Martinez-Trujillo JC, Matsumoto M, Maunsell JHR, Mendoza-Halliday D, Monosov IE, Muers RS, Nurminen L, Ortiz-Rios M, O'Shea DJ, Palfi S, Petkov CI, Pojoga S, Rajalingham R, Ramakrishnan C, Remington ED, Revsine C, Roe AW, Sabes PN, Saunders R, Scherberger H, Schmid MC, Schultz W, Seidemann E, Senova Y-S, Shadlen MN, Siu C, Smith Y, Solomon SS, Sommer MA, Spudich JL, Stauffer WR, Takada M, Tang S, Thiele A, Treue S, Vanduffel W, Vogels R, Whitmire MP, Wichmann T, Wurtz RH, Xu H, Yazdan-Shahmorad A, Shenoy KV, DiCarlo J, Platt ML (2020) An open resource for non-human primate optogenetics. Neuron. 1075-1090.e6. pdf

126. Jiang X, Saggar H, Ryu SI, Shenoy KV, Kao JC (2020) Structure in neural activity during observed and executed movements is shared at the neural population level, not in single neurons. Cell Reports. 32:108006. pp. 1-14. pdf

125. Even-Chen N*, Muratore DG*, Stavisky SD, Hochberg LR, Henderson JM, Murmann B**, Shenoy KV** (2020) Power-saving design opportunities for wireless intracortical brain-computer interfaces. Nature Biomedical Engineering. 4:984-996. pdf

124. Nason SR, Vaskov AK, Willsey MS, Welle EJ, An H, Vu PP, Bullard AJ, Nu CS, Kao JC, Shenoy KV, Jang T, Kim H-S, Blaauw D, Patil PG, CA Chestek (2020) A low-power band of neuronal spiking activity dominated by local single units improves the performance of brain-machine interfaces. Nature Biomedical Engineering. pdf

123. Stavisky SD, Willett FR, Avansino DT, Hochberg LR, Shenoy KV**, Henderson JM** (2020) Speech-related dorsal motor cortex activity does not interfere with iBCI cursor control. Journal of Neural Engineering. 17:016049 (13pp). pdf

122. Vyas S. Golub MD, Sussillo D, Shenoy KV (2020) Computation through neural population dynamics. Annual Review of Neuroscience. 43:249-275. pdf

121. Vyas S, O'Shea DJ, Ryu SI, Sheony KV (2020) Causal role of motor preparation during error-driven learning. Neuron. 106:329-339. pdf

120. Willett FR*, Deo DR*, Avansino DT, Rezaii PG, Hochberg LR, Henderson JM**, Shenoy KV** (2020) Hand knob area of motor cortex in people with tetraplegia represents the whole body in a compositional way. Cell. 181:396–409. pdf

119. Rastogi A, Vargas-Irwin C, Willett F, Abreu J, Crowder DC, Murphy B, Memberg W, Miller J, Sweet J, Walter B, Cash S, Rezaii PG, Franco B, Saab J, Stavisky SD, Shenoy KV**, Henderson J**, Hochberg LR, Kirsch R, Ajiboye AB (2020) Neural representation of observed, imagined, and attempted grasping force in motor cortex of individuals with chronic tetraplegia. Scientific Reports. 10:1429. pdf

118. Williams A, Poole B, Maheswaranathan N, Dhawale AK, Fisher T, Wilson CD, Brann DH, Trautmann E, Ryu SI, Shusterman R, Rinberg D, Ölveczkylveczky BP, Shenoy KV, Ganguli S (2020) Discovering precise temporal patterns in large-scale neural recordings through robust and interpretable time warping. Neuron. 105: 1–14. pdf

2019

117. Stavisky SD, Willett FR, Wilson GH, Murphy BA, Rezaii PG, Avansino D, Memberg WD, Miller JP, Kirsch RF, Hochberg LR, Ajiboye AB, Druckmann S, Shenoy KV**, Henderson JM** (2019) Neural ensemble dynamics in dorsal motor cortex during speech in people with paralysis. eLife. 8:e46015. pdf

116. Trautmann EM, Stavisky SD, Lahiri S, Ames KC, Kaufman MT, O'Shea DJ, Vyas S, Sun X, Ryu SI, Ganguli S, Shenoy KV (2019) Accurate estimation of neural population dynamics without spike sorting. Neuron. 103:1-17. pdf

115. Ames KC, Ryu SI, Shenoy KV (2019) Simultaneous movement preparation and execution in a last-moment reach correction task. Nature Communications. 10(1):2718. pdf

114. Willett FR, Young DR, Murphy BA, Memberg WD, Blabe CH, Pandarinath C, Stavisky SD, Rezaii PG, Saab J, Walter BL, Sweet JA, Miller JP, Henderson JM, Shenoy KV, Simeral J, Jarosiewicz B, Hochberg LR, Kirsch RF, Ajiboye AB (2019) Principled BCI decoder design and parameter selection using a feedback control model. Scientific Reports. 9(1):8881. pdf

113. Milekovic T, Bacher D, Sarma A, Simeral J, Saab J, Pandarinath C, Yvert B, Sorice B, Blabe C, Oakley E, Tringale K, Eskandar E, Cash S, Shenoy KV, Henderson JM, Hochberg LR, Donoghue JP (2019) Volitional control of single-electrode high gamma local field potentials (LFPs) by people with paralysis. Journal of Neurophysiology. 121:1428-1450. pdf

112. Even-Chen N*, Sheffer B*, Vyas S, Ryu SI, Shenoy KV (2019) Structure and variability of delay activity in premotor cortex. PLoS Computational Biology. 15(2): e1006808. pdf

111. Wang M*, Montanede C*, Chandrasekaran C, Peixoto D, Shenoy KV** & Kalaska JF** (2019) Macaque dorsal premotor cortex exhibits decision-related activity only when specific stimulus-response associations are known. Nature Communications. 10:1793 pdf

110. Chandrasekaran C*, Bray IE*, Shenoy KV (2019) Frequency shifts and depth dependence of premotor beta band activity during perceptual decision-making. Journal of Neuroscience. 39:1420-1435. pdf

109. Young D, Willett F, Memberg W, Murphy B, Rezaii PG, Walter B, Sweet J, Miller J, Shenoy KV, Hochberg LR, Kirsch R, Ajiboye AB (2019) Closed-loop cortical control of virtual reach and posture using cartesian and joint velocity commands. Journal of Neural Engineering. 16:026011 (14pp). pdf

2018

108. Nuyujukian P*, Sanabria JA*, Saab J*, Pandarinath C, Jarosiewicz B, Blabe C, Franco B, Mernoff ST, Eskandar EN, Simeral JD, Hochberg LR**, Shenoy KV**, Henderson JM** (2018) Cortical control of a tablet computer by people with paralysis. PLoS One. 13:e0204566 pdf

107. Stavisky SD, Kao JC, Nuyujukian P, Pandarinath C, Blabe C, Ryu SI, Hochberg LR, Henderson JM, Shenoy KV (2018) Brain-machine interface cursor position only weakly affects monkey and human motor cortical activity in the absence of arm movements. Scientific Reports.8:1635.7pdf

106. Pandarinath C, O'Shea DJ, Collins J, Jozefowicz R, Stavisky SD, Kao JC, Trautmann EM, Kaufman MT, Ryu SI, Hochberg LR, Henderson JM, Shenoy KV, Abbott LF, Sussillo D (2018) Inferring single-trial neural population dynamics using sequential auto-encoders. Nature Methods.15:805-815. pdf

105. Williams AH, Kim TH, Wang F, Vyas S, Ryu SI, Shenoy KV, Schnitzer M, Kolda TG, Ganguli S (2018) Unsupervised discovery of demixed, low-dimensional neural dynamics across multiple timescales through tensor components analysis. Neuron.98:1-17 pdf

104. Milekovic T, Sarma A, Bacher D, Simeral J, Saab J, Pandarinath C, Sorice B, Blabe C, Oakley E, Tringale K, Eskandar E, Cash S, Henderson JM, Shenoy KV, Donoghue JP, Hochberg LR (2018) Stable long-term BCI-enabled communication in ALS and locked-in syndrome using LFP signals. Journal of Neurophysiology. 120:343-360. pdf

103. O'Shea DJ*, Kalanithi P*, Ferenczi E, Hsueh B, Chandrasekaran C, Goo W, Diester I, Ramakrishnan C, Kaufman MT, Ryu SI, Yeom KW, Deisseroth K**, Shenoy KV** (2018) Development of an optogenetic toolkit for neural circuit dissection in squirrel monkeys. Scientific Reports. 8:1-20. pdf

102. Vyas S, Even-Chen N, Stavisky SD, Ryu SI, Nuyujukian P, Shenoy KV (2018) Neural population dynamics underlying motor learning transfer. Neuron. 97: 1-10. pdf

101. O'Shea DJ, Shenoy KV (2018) ERAASR: An algorithm for removing electrical stimulation artifacts from multielectrode array recordings. Journal of Neural Engineering. 15:026020 (17pp) pdf

100. Willett FR, Murphy BA, Young D, Memberg WD, Blabe CH, Pandarinath C, Franco B, Saab J, Walter BL, Sweet JA, Miller JP, Henderson JM, Shenoy KV, Simeral JD, Jarosiewicz B, Hochberg LR, Kirsch RF, Ajiboye AB (2018) A comparison of intention estimation methods for decoder calibration in intracortical brain-computer interfaces. IEEE Transactions in Biomedical Engineering. 65:2066-2078. pdf

99. Even-Chen N, Stavisky SD, Pandarinath C, Nuyujukian P, Blabe CH, Hochberg LR, Henderson* JM, Shenoy* KV (2018) Feasibility of automatic error detect-and-undo system in human intracortical brain-computer interfaces. IEEE Transactions in Biomedical Engineering. 65:1771-1784. pdf

98. Brandman D, Hosman T, Saab J, Burkhart M, Shanahan B, Ciancibello J, Sarma A, Milstein D, Vargas-Irwin C, Franco B, Kelemen J, Blabe C, Murphy B, Young D, Willett F, Pandarinath C, Stavisky S, Kirsch R, Walter B, Ajiboye A, Cash S, Eskandar E, Miller J, Sweet J, Shenoy KV, Henderson JM, Jarosiewicz B, Harrison M, Simeral J, Hochberg, LR (2018) Rapid calibration of an intracortical brain computer interface for people with tetraplegia. Journal of Neural Engineering. 15:026007. pdf

2017

97. Even-Chen N, Stavisky S, Kao J, Ryu SI, Shenoy KV (2017) Augmenting intracortical brain-machine interface with neurally driven error detectors. Journal of Neural Engineering. 14:066007 (16pp). pdf

96. Chandrasekaran C, Peixoto D, Newsome WT, Shenoy KV (2017) Laminar differences in decision-related neural activity in dorsal premotor cortex. Nature Communications. 8:614. pdf

95. Kao JC, Ryu SI, Shenoy KV (2017) Leveraging neural dynamics to extend functional lifetime of brain-machine interfaces. Scientific Reports. 7: 7395:1-16. pdf

94. Stavisky SD, Kao JC, Ryu SI, Shenoy KV (2017) Motor cortical visuomotor feedback activity is initially isolated from downstream targets in output-null neural state space dimensions. Neuron. 95:195-208. pdf

93. Pandarinath C*, Nuyujukian P*, Blabe CH, Sorice B, Saab J, Willett F, Hochberg LR, Shenoy KV**, Henderson JM** (2017) High performance communication by people with paralysis using an intracortical brain-computer interface. eLife. 6:e18554 pdf

92. Willett FR, Murphy B, Memberg W, Blabe C, Pandarinath C, Walter B, Sweet J, Miller J, Henderson JM, Shenoy KV, Hochberg LR, Kirsch R, Ajiboye AB (2017) Signal-independent noise in intracortical brain-computer interfaces causes movement time properties inconsistent with Fitts' law. Journal of Neural Engineering. 14:026010. pdf

91. Stavisky SD, Kao, JC, Ryu SI, Shenoy KV (2017) Trial-by-trial motor cortical correlates of a rapidly adapting visuomotor internal model. Journal of Neuroscience. 37:1721-1732. pdf

90. Kao JC*, Nuyujukian P*, Ryu SI, Shenoy KV (2017) A high-performance neural prosthesis incorporating discrete state selection with hidden Markov models. IEEE Transactions on Biomedical Engineering. 64:935-945. pdf

89. Nuyujukian P, Kao JC, Ryu SI, Shenoy KV (2017) A non-human primate brain computer typing interface. Proceedings of the IEEE.105:66-72. pdf

88. Willett F, Pandarinath C, Jarosiewicz B, Murphy B, Memberg W, Blabe C, Saab J, Walter B, Sweet J, Miller J, Henderson J, Shenoy KV, Simeral J, Hochberg LR, Kirsch R, Ajiboye AB. (2017) Feedback control policies employed by people using intracortical brain-computer interfaces. Journal of Neural Engineering. 14:016001 (16pp). pdf

87. O'Shea DJ, Trautmann EM, Chandrasekaran C, Stavisky SD, Kao JC, Sahani M, Ryu SI, Deisseroth K, Shenoy KV (2017) The need for calcium imaging in nonhuman primates: New motor neuroscience and brain-machine interfaces. Experimental Neurology. 287:437-451pdf

2016

86. Sussillo D*, Stavisky SD*, Kao JC*, Ryu SI, Shenoy KV (2016) Making brain-machine interfaces robust to future neural variability. Nature Communications. 7:13749. doi:10.1038/ncomms13749 pdf

85. O'Shea DJ, Shenoy KV (2016) The importance of planning in motor learning. Neuron. 92:669-671. pdf Preview Article

84. Seely J, Kaufman MT, Ryu SI, Shenoy KV, Cunningham JP, Churchland MM (2016) Tensor analysis reveals distinct population structure that parallels the different computational roles of areas M1 and V1. PLoS Computational Biology. 12 (11): e1005164. doi:10.1371/journal.pcbi.1005164 pdf

83. Kaufman MT, Seely J, Ryu SI, Shenoy KV, Churchland MM (2016) The largest response component in motor cortex reflects movement timing but not movement type. eNeuro. 3(4) e0085-16. 2016:1-25. pdf

2015

82. Jarosiewicz B, Sarma AA, Bacher D, Masse NY, Simeral JD, Sorice B, Oakley EM, Blabe C, Pandarinath C, Gilja V, Cash SS, Eskandar E, Friehs G, Henderson JM, Shenoy KV, Donoghue JP, Hochberg LR (2015) Virtual typing by people with tetraplegia using a self-calibrating intracortical brain-computer interface. Science Translational Medicine. 7:1-10. pdf supp_mats

81. Gilja V*, Pandarinath C*, Blabe CH, Nuyujukian P, Simeral JD, Sarma AA, Sorice BL, Perge JA, Jarosiewicz B, Hochberg LR, Shenoy KV**, Henderson JM** (2015) Clinical translation of a high performance neural prosthesis. Nature Medicine. 21:1142-1145. pdf

80. Adamantidis A, Arber S, Bains JS, Bamberg E, Bonci A, Buzsáki G, Cardin JA, Costa RM, Dan Y, Goda Y, Graybiel AM, Häusser M, Hegemann P, Huguenard JR, Insel TR, Janak PH, Johnston D, Josselyn SA, Koch C, Kreitzer AC, Lüscher C, Malenka RC, Miesenböck G, Nagel G, Roska B, Schnitzer MJ, Shenoy KV, Soltesz I, Sternson SM, Tsien RW, Tsien RY, Turrigiano GG, Tye KM, Wilson RI (2015) Nature Neuroscience. 18:1202-1212. pdf

79. Kao JC, Nuyujukian P, Cunningham JP, Churchland MM, Ryu SI, Shenoy KV (2015) Single-trial dynamics of motor cortex and their applications to brain-machine interfaces. Nature Communications. 6:7759. doi: 10.1038/ncomms8759. pdf

78. Blabe C, Gilja V, Chestek CA, Shenoy KV, Anderson K, Henderson JM (2015) Assessment of brain-machine interfaces from the perspective of people with paralysis. Journal of Neural Engineering. 12:043002. pdf

77. Pandarinath C, Gilja V, Blabe CH, Nuyujukian P, Sarma AA, Sorice BL, Eskandar EN, Hochberg LR, Henderson JM**, Shenoy KV** (2015) Neural population dynamics in human motor cortex during movements in people with ALS. eLife. 4:e07436. pdf

76. Sussillo D, Churchland MM, Kaufman MT, Shenoy KV (2015) A neural network that finds a naturalistic solution for the production of muscle activity. Nature Neuroscience. 18:1025-1033. pdf

75. Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2015) Vacillation, indecision and hesitation in moment-by-moment decoding of monkey motor cortex. eLife. 4:e04677. pdf

74. Stavisky SD, Kao JC, Nuyujukian P, Ryu SI, Shenoy KV (2015) A high performing brain-machine interface driven by low-frequency local field potentials alone and together with spikes. Journal of Neural Engineering. 12:036009. pdf

73. Christie B, Tat D, Irwin Z, Gilja V, Nuyujukian P, Foster J, Ryu SI, Shenoy KV, Thompson D, Chestek CA (2015) Comparison of spike sorting and thresholding of voltage waveforms for intracortical brain-machine interface performance. Journal of Neural Engineering.12:006019. pdf

72. Nuyujukian P, Fan JM, Kao JC, Ryu SI, Shenoy KV (2015) A high-performance keyboard neural prosthesis enabled by task optimization. IEEE Transactions on Biomedical Engineering. 62:21-29. pdf

2014

71. Nuyujukian P, Kao JC, Fan J, Stavisky S, Ryu SI, Shenoy KV (2014) Performance sustaining intracortical neural prostheses. Journal of Neural Engineering. 11:066003. pdf

70. Foster JD, Nuyujukian P, Freifeld O, Gao H, Walker R, Ryu SI, Meng TH, Murmann B, Black MJ, Shenoy KV (2014) A freely-moving monkey treadmill model. Journal of Neural Engineering. 11:046020. pdf

69. Bishop WE, Chestek CA, Gilja V, Nuyujukian P, Foster JD, Ryu SI, Shenoy KV, Yu BM (2014) Self-recalibrating classifiers for intracortical brain computer interfaces. Journal of Neural Engineering. 11:026001. pdf

68. Kaufman MT, Churchland MM, Ryu SI, Shenoy KV (2014) Cortical activity in the null space: permitting preparation without movement. Nature Neuroscience. 17:440-448. pdf

67. Ames KC, Ryu SI, Shenoy KV (2014) Neural dynamics of reaching following incorrect or absent motor preparation. Neuron. 81:438-451. pdf

66. Fan JM, Nuyujukian P, Kao JC, Chestek CA, Ryu SI, Shenoy KV (2014) Intention estimation in brain-machine interfaces. Journal of Neural Engineering. 11:016004. pdf

65. Shenoy KV, Carmena JM (2014) Combining decoder design and neural adaptation in brain-machine interfaces. Neuron. 84:665-680. pdf

64. Kao JC, Stavisky SD, Sussillo D, Nuyujukian P, Shenoy KV (2014) Information systems opportunities in brain-machine interface decoders. Proceedings of the IEEE. 102:666-682. pdf. Review Article

63. Shenoy KV (2014) Prostheses: hopes & hurdles. Voices article on "Studying circuits with therapy in mind," by Shenoy KV, Mayberg H, Brown P, Delp S, Nirenberg S, Walsh V, Shannon RV. Cell. 156:861-863. pdf

2013

62. Mante V*, Sussillo D*, Shenoy KV, Newsome WT (2013) Context-dependent computation by recurrent dynamics in prefrontal cortex. Nature. 503:78-84. pdf

61. Cowley BR, Kaufman MT, Butler ZS, Churchland MM, Ryu SI, Shenoy KV, Yu BM (2013) DataHigh: Graphical user interface for visualizing and interacting with high-dimensional neural activity. Journal of Neural Engineering.10:066012. pdf

60. Kaufman MT, Churchland MM, Shenoy KV (2013) The roles of monkey M1 neuron classes in movement preparation and execution. Journal of Neurophysiology. 110:817-825. pdf

59. Ozden I, Wang J, Lu Y, May T, Lee J, Goo W, O'Shea DJ, Kalanithi P, Diester I, Diagne M, Deisseroth K, Shenoy KV, Nurmikko AV (2013) A Coaxial Optrode As Multifunction Write-Read Probe for Optogenetic Studies in Non-Human Primates. Journal of Neuroscience Methods. 291:142-154. pdf

58. Dethier J*, Nuyujukian P*, Ryu SI, Shenoy KV, Boahen K (2013) Design and validation of a real-time spiking-neural-network decoder for brain-machine interfaces. Journal of Neural Engineering. 10:036008 (12pp). pdf

57. Chestek CA, Gilja V, Blabe CH, Foster BL, Shenoy KV, Parvizi J, Henderson JM (2013) Hand posture classification using electrocorticography signals in the gamma band over human sensorimotor brain areas. Journal of Neural Engineering. 10:02602 (11pp). pdf

56. Shenoy KV, Sahani M, Churchland MM (2013) Cortical control of arm movements: A dynamical systems perspective. Annual Review of Neuroscience. 36:337-359. pdf Review Article

2012

55. Gilja V*, Nuyujukian P*, Chestek CA, Cunningham JP, Yu BM, Fan JM, Churchland MM, Kaufman MT, Kao JC, Ryu SI, Shenoy KV (2012) A high-performance neural prosthesis enabled by control algorithm design. Nature Neuroscience. 15:1752-1757. pdf

54. Churchland MM*, Cunningham JP*, Kaufman MT, Foster JD, Nuyujukian P, Ryu SI, Shenoy KV (2012) Neural population dynamics during reaching. Nature. 487:51-56. pdf

53. Gao H, Walker RM, Nuyujukian P, Makinwa KAA, Shenoy KV, Murmann B, Meng TH (2012) HermesE: A 96-channel full data rate direct neural interface in 0.13 um CMOS. IEEE Journal of Solid State Circuits. 47:1043-1054. pdf

52. Zhao M, Batista AP, Cunningham JP, Chestek CA, Rivera-Alvidrez Z, Kalmar R, Ryu SI, Shenoy KV, Iyengar S (2012) An L1-regularized logistic model for detecting short-term neuronal interactions. Journal of Computational Neuroscience. 32:479-497. pdf

51. Sussillo D, Nuyujukian P, Fan JM, Kao JC, Stavisky SD, Ryu SI, Shenoy KV (2012) A recurrent neural network for closed-loop intracortical brain-machine interface decoders. Journal of Neural Engineering. 9:026027. pdf

50. Shenoy KV, Nurmikko AV (2012) Brain models enabled by next-generation neurotechnology. Pulse Magazine, IEEE Engineering in Medicine and Biology Society. 3: 31-36. pdf

49. Schnitzer JJ (2012) 2010 DARPA neural engineering, science, and technology forum [Guest Editorial]. Pulse Magazine, IEEE EMBS. 3:10. pdf

2011

48. Afshar A, Santhanam G, Yu BM, Ryu SI, Sahani M*, Shenoy KV* (2011) Single-trial neural correlates of arm movement preparation. Neuron. 71:555-564. pdf

47.Chestek CA, Gilja V, Nuyujukian P, Foster JD, Fan JM, Kaufman MT, Churchland MM, Rivera-Alvidrez Z, Cunningham JP, Ryu SI, Shenoy KV (2011) Long-term stability of neural prosthetic control signals from silicon cortical arrays in rhesus macaque motor cortex. Journal of Neural Engineering. 8:045005. pdf

46. O'Driscoll S, Shenoy KV, Meng TH (2011) Adaptive resolution ADC array for an implantable neural sensor. IEEE Transactions on Biomedical Circuits and Systems. 5:120-130. pdf

45. Cunningham JP, Nuyujukian P, Gilja V, Chestek CA, Ryu SI, Shenoy KV (2011) A closed-loop human simulator for investigating the role of feedback-control in brain-machine interfaces. Journal of Neurophysiology. 105:1932-1949. pdf

44. Diester I, Kaufman MT, Mogri M, Pashaie R, Goo W, Yizhar O, Ramakrishnan C, Deisseroth K, Shenoy KV (2011) An optogenetic toolbox designed for primates. Nature Neuroscience. 14:387-397. pdf

43. Gilja V, Chestek CA, Diester I, Henderson JM, Deisseroth K, Shenoy KV (2011) Challenges and opportunities for next-generation intra-cortically based neural prostheses. IEEE Transactions on Biomedical Engineering. 58:1891-1899. pdf

2010

42. Churchland MM, Cunningham JP, Kaufman MT, Ryu SI, Shenoy KV (2010) Cortical preparatory activity: Representation of movement or first cog in a dynamical machine? Neuron. 68:387-400. pdf

41. Kaufman MT, Churchland MM, Santhanam G, Yu BM, Afshar A, Ryu SI, Shenoy KV (2010) The roles of monkey premotor neuron classes in movement preparation and execution. Journal of Neurophysiology. 104:799-810. pdf

40. Miranda H, Gilja V, Chestek CA, Shenoy KV, Meng TH (2010) HermesD: A high-rate long-range wireless transmission system for simultaneous multichannel neural recording applications. IEEE Transactions on Biomedical Circuits and Systems. 4:181-191. pdf

39. Churchland MM*, Yu BM*, Cunningham JP, Sugrue LP, Cohen MR, Corrado GS, Newsome WT, Clark AM, Hosseini P, Scott BB, Bradley DC, Smith MA, Kohn A, Movshon JA, Armstrong KM, Moore T, Chang SW, Snyder LH, Lisberger SG, Priebe NJ, Finn IM, Ferster D, Ryu SI, Santhanam G, Sahani M, Shenoy KV (2010) Stimulus onset quenches neural variability: a widespread cortical phenomenon. Nature Neuroscience. 13:369-378. pdf

38. Gilja V*, Chestek CA*, Nuyujukian P, Foster JD, Shenoy KV (2010) Autonomous head-mounted electrophysiology systems for freely-behaving primates. Current Opinion in Neurobiology. 20:676-686. pdf

2009

37. Cunningham JP, Gilja V, Ryu SI, Shenoy KV (2009) Methods for estimating neural firing rates and their application to brain-machine interfaces. Neural Networks, special issue on brain-machine interfaces. 22:1235-1246. pdf

36. Chestek CA*, Gilja V*, Nuyujukian P, Kier R, Solzbacher F, Ryu SI, Harrison RA, Shenoy KV (2009) HermesC: Low-power wireless neural recording system for freely moving primates. IEEE Transactions in Neural Systems and Rehabilitation Engineering, special issue on wireless neurotechnology. 17:330-338. pdf

35. Harrison RR, Kier RJ, Chestek CA, Gilja V, Nuyujukian P, Ryu SI, Gregor B, Solzbacher F, Shenoy KV (2009) Wireless neural recording with single low-power integrated circuit. IEEE Transactions in Neural Systems and Rehabilitation Engineering, special issue on wireless neurotechnology. 17:322-329. pdf

34. Santhanam G, Yu BM, Gilja V, Afshar A, Ryu SI, Sahani M, Shenoy KV (2009) Factor-analysis methods for higher-performance neural prostheses. Journal of Neurophysiology. 102:1315-1330. pdf

33. Yu BM, Cunningham JP, Santhanam G, Ryu SI, Shenoy KV*, Sahani M* (2009) Gaussian-process factor analysis for low-dimensional single-trial analysis of neural population activity. Journal of Neurophysiology. 102:614-635. pdf

32. Ryu SI, Shenoy KV (2009) Human cortical prostheses: Lost in translation? Neurosurgical Focus, special issue on advances in brain-machine interfaces, Parag Patil guest editor. 27:E5. pdf

2008

31. Cunningham JP, Yu BM, Gilja V, Ryu SI, Shenoy KV (2008) Toward optimal target placement for neural prosthetic devices. Journal of Neurophysiology. 100:3445-3457. pdf

30. Kemere C, Santhanam G, Yu BM, Afshar A, Ryu SI, Meng TH, Shenoy KV (2008) Detecting neural state transitions using hidden Markov models for motor cortical prostheses. Journal of Neurophysiology. 100:2441-2452. pdf

29. Batista AP, Yu BM, Santhanam G, Ryu SI, Afshar A, Shenoy KV (2008) Cortical neural prosthesis performance improves when eye position is monitored. IEEE Transactions in Neural Systems and Rehabilitation Engineering. 16:24-31. pdf

28. Linderman MD, Santhanam G, Kemere CT, Gilja V, O'Driscoll S, Yu BM, Afshar A, Ryu SI, Shenoy KV, Meng TH (2008) Signal processing challenges for neural prostheses. IEEE Signal Processing Magazine, special issue on brain-computer interfaces. 25:18-28. pdf

2007

27. Santhanam G*, Linderman MD*, Gilja V, Afshar A, Ryu SI, Meng TH, Shenoy KV (2007) HermesB: A continuous neural recording system for freely behaving primates. IEEE Transactions in Biomedical Engineering. 54:2037-2050. pdf

26. Chestek CA*, Batista AP*, Santhanam G, Yu BM, Afshar A, Cunningham JP, Gilja V, Ryu SI, Churchland MM, Shenoy KV (2007) Single-neuron stability during repeated reaching in macaque premotor cortex. Journal of Neuroscience. 27:10742-10750. pdf

25. Achtman N*, Afshar A*, Santhanam G, Yu BM, Ryu SI, Shenoy KV (2007) Free-paced high-performance brain-computer interfaces. Journal of Neural Engineering. 4:336-347. pdf

24. Batista AP, Santhanam G, Yu BM, Ryu SI, Afshar A, Shenoy KV (2007) Reference frames for reach planning in macaque dorsal premotor cortex. Journal of Neurophysiology. 98:966-983. pdf

23. Churchland MM, Shenoy KV (2007) Temporal complexity and heterogeneity of single-neuron activity in premotor and motor cortex. Journal of Neurophysiology. 97:4235-4257. pdf

22. Yu BM, Kemere C, Santhanam G, Afshar A, Ryu SI, Meng TH, Sahani M*, Shenoy KV* (2007) Mixture of trajectory models for neural decoding of goal-directed movements. Journal of Neurophysiology. 97:2763-3780. pdf

21. Churchland MM, Shenoy KV (2007) Delay of movement caused by disruption of cortical preparatory activity. Journal of Neurophysiology. 97:348-359. pdf

20. Churchland MM, Yu BM, Sahani M, Shenoy KV (2007) Techniques for extracting single-trial activity patterns from large-scale neural recordings. Current Opinion in Neurobiology, special issue on new technologies. 17:609-618. pdf

2006

19. Churchland MM, Afshar A, Shenoy KV (2006) A central source of movement variability. Neuron. 52:1085-1096. pdf

18. Churchland MM, Santhanam G, Shenoy KV (2006) Preparatory activity in premotor and motor cortex reflects the speed of the upcoming reach. Journal of Neurophysiology. 96:3130-3146. pdf

17. Santhanam G*, Ryu SI*, Yu BM, Afshar A, Shenoy KV (2006) A high-performance brain-computer interface. Nature. 442:195-198. pdf

16. Churchland MM, Yu BM, Ryu SI, Santhanam G, Shenoy KV (2006) Neural variability in premotor cortex provides a signature of motor preparation. Journal of Neuroscience. 26:3697-3712. pdf

2005

15. Zumsteg ZS, Kemere C, O'Driscoll S, Santhanam G, Ahmed RE, Shenoy KV, Meng TH (2005) Power feasibility of implantable digital spike sorting circuits for neural prosthetic systems. IEEE Transactions in Neural Systems and Rehabilitation Engineering. 13:272-279. pdf

2004

14. Kemere C, Shenoy KV, Meng TH (2004) Model-based neural decoding of reaching movements: a maximum likelihood approach. IEEE Transactions on Biomedical Engineering. 51:925-932. pdf

2003

13. Shenoy KV, Meeker D, Cao S, Kureshi SA, Pesaran B, Mitra P, Buneo C A, Batista AP, Burdick JW, Andersen RA (2003) Neural prosthetic control signals from plan activity. NeuroReport. 14:591-596. pdf

2002

12. Shenoy KV, Crowell JA, Andersen RA (2002) Pursuit-Speed Compensation in Cortical Area MSTd. Journal of Neurophysiology.88:2630-2647. pdf

11. Sugihara H, Murakami I, Shenoy KV, Andersen RA, Komatsu H (2002) Response of MSTd neurons to simulated 3D-orientation of rotating planes. Journal of Neurophysiology 87:273-285. pdf

1999

10. Shenoy KV, Bradley DC, Andersen RA (1999) Influence of gaze rotation on the visual response of primate MSTd neurons. Journal of Neurophysiology. 81:2764-2786. pdf

1998

9. Crowell JA, Banks MS, Shenoy KV, Andersen RA (1998) Visual self-motion perception during head turns. Nature Neuroscience. 1:732-737. pdf

1997

8. Wang H, Luo J, Shenoy KV, Fonstad Jr. CG, Psaltis D (1997) Monolithic integration of SEEDs and VLSI GaAs circuits by epitaxy on electronics. IEEE Photonic Technology Letters. 9:607-609. pdf

1996

7. Bradley DC, Maxwell M, Andersen RA, Banks MS, Shenoy KV (1996) Neural mechanisms for heading perception in primate visual cortex. Science. 273:1544-1547. pdf

6. Braun EK, Shenoy KV, Fonstad Jr. CG, Mikkelson JM (1996) Elevated temperature stability of GaAs digital integrated circuits. IEEE Electron Device Lett. 17:37-39. pdf

1995

5. Shenoy KV, Fonstad Jr. CG, Grot AC, Psaltis D (1995) Monolithic optoelectronic circuit design and fabrication by epitaxial growth on commercial VLSI GaAs MESFETs. IEEE Photon. Technol. Lett. 7:508-510. pdf

1994

4. Grot AC, Psaltis D, Shenoy KV, Fonstad Jr. CG (1994) Integration of LEDs and GaAs circuits by MBE regrowth. IEEE Photon. Technol. Lett. 6:819-821. pdf

3. Shenoy KV, Fonstad Jr. CG, Mikkelson JM (1994) High temperature stability of refractory-metal VLSI GaAs MESFETs. IEEE Electron Device Lett. 15:106-108. pdf

2. McGrann JV, Shaw GL, Shenoy KV, Matthews RB (1994) Computation by symmetry operations in a highly structured model of the brain. Phys. Rev. E. 49:5830-5839. pdf

1993

1. Shenoy KV, Kaufman J, McGrann JV, Shaw GL (1993) Learning by selection in the Trion model of cortical organization. Cerebral Cortex. 3:239-248. pdf

Peer reviewed conference papers
Over 70, not listed here, available at url

Not peer reviewed conference abstracts
Over 250, not listed here, available at url

Invited Talks

1. 12/6/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, James H. Clark Center, Stanford University. Via Zoom.
2. 12/2/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited Keynote talk, Centre for Transformative Neuroscience - Launch Evert, Newcastle University. Via Zoom.
3. 11/9/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk for Alumni audience, Stanford University. Via Zoom.
4. 10/6/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk for Neurology Grand Rounds, Brigham and Women's Hospital, Harvard University. Via Zoom.
5. 9/21/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, NCAN Center, New York, invited talk. Via Zoom.
6. 9/18/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited Keynote talk, Tencent / Nature WE Summit, Beijing. Virtual via pre-recording / green screen.
7. 9/10/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Georgia State University. Virtual via Zoom.
8. 6/10/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, The Deutsches Primatenzentrum (DPZ) GmbH (German Primate Center), Göttingen, Germany. Virtual via Zoom.
9. 6/2/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Department of Bioengineering Seminar, Imperial College London, London. Virtual via Zoom.
10. 5/20/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Neuroengineering Seminar Series, NeuroEngineering Initiative, Department of Electrial and Computer Engineering, Rice University, Houston, TX. Virtual via Zoom.
11. 5/6/21 "Similar low-dimensional neural population dynamics in dorsal premotor motor cortex during human speech and hand movements," 10th International IEEE EMBS Conference on Neural Engineering. Virtual via Zoom.
12. 4/20/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Bernstein Center Freiburg, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany. Virtual via Zoom.
13. 4/14/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Robarts Research Synergy Series on Brain-Machine Interfaces, Western University, London, Ontario, Candada. Virtual via Zoom.
14. 4/9/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited keynote talk, University of Texas at Dallas' 10th anniversary of the founding of the Department of Bioengineering. Virtual via Zoom.
15. 4/1/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, At the interface of brain and machine, Nature Symposium, Beijing, China. Virtual via Zoom.
16. 3/15/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, CNS Colloquium. New York University. Virtual via Zoom.

17. 2/12/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Grand Rounds, Department of Neurology, School of Medicine, Stanford University, Stanford, CA. Virtual via Zoom.
18. 1/20/21 "Cortical basis of speech and handwriting in humans for neural interfaces," Invited talk, Translational Neuroengineering Technology (TNT) Network, School of Medicine & University & Applied Physics Lab, Johns Hopkins University. Virtual via Zoom.
19. 9/25/20 "Brain-machine interfaces: From basic science and engineering to clinical trials," Invited talk, Theory Center, Columbia University, New York City, NY. Virtual via Zoom.
20. 8/24/19 "Brain-machine interfaces: From basic science and engineering to clinical trials," Invited talk, Neural Interfaces Seminar, Stanford University, Stanford, CA.
21. 5/6/19 "Brain-machine interfaces: From basic science and engineering to clinical trials," Invited talk, National Institutes of Health Neuroscience Seminar Series, Bethesda, MD.
22. 3/22/19 "Brain-machine interfaces: From basic science and engineering to clinical trials," Keynote talk, 9th International IEEE EMBS Conference on Neural Engineering, San Francisco, CA.
23. 10/18/18 "Brain-machine interfaces: From basic science and engineering to clinical trials," 2018 Andrew Cargenie Mind and Brain Prize acceptance talk, Carnegie Mellon University, Pittsburgh, PA.
24. 7/17/18 "Brain-machine interfaces: From basic science and engineering to clinical trials," Brain-Machine Interface Symposium invited talk, IEEE EMBS annual meeting, Honolulu, HI
25. 6/26/18 "Brain-machine interfaces: From basic science and engineering to clinical trials," Neuroscience Seminar invited talk, Gatsby Computational Neuroscience Unit, University College London, London, UK
26. 5/10/18 "Neural population dynamics underlying motor learning transfer," M^5 Meeting invited talk, Northwestern University, Chicago, IL
27. 2/15/18 "Brain-machine interfaces: From basic science and engineering to clinical trials," AAAS invited talk, Austin, TX
28. 10/26/17 "Neural population dynamics and dimensions in the motor system," HHMI meeting at Janelia Farm, Ashburn, VA
29. 10/19/17 "Neural population dynamics underlying motor preparation and generation," Princeton Neuroscience Institute Seminar, Princeton University, Princeton, NJ
30. 10/5/17 "Brain-machine interfaces: From basic science and engineering to clinical trials," UCSF, Neuroscience Seminar, San Francisco, CA
31. 12/16/16 "Brain-machine interfaces: Engineering challenges and opportunities," Qualcomm, San Diego, CA
32. 12/15/16 "Brain-machine interfaces: From basic science and engineering to clinical trials," 2016 Rockwood Memorial Lecture, University of California at San Diego and Salk Institute, La Jolla, CA
33. 10/27/16 "Brain-machine interfaces: From basic science and engineering to clinical trials," invited talk, Department of Molecular and Cellular Biology and Electrical Engineering and Computer Science, University of California at Berkeley, Berkeley, CA
34. 10/6/16 "Brain-machine interfaces: From basic science and engineering to clinical trials," invited talk, NSF ERC Center for Sensorimotor Neural Engineering, University of Washington, Seattle, WA
35. 5/21/16 "Brain-machine interfaces: From basic science to clinical trials," invited talk, McKnight Foundation, Minneapolis, MN
36. 5/17/16 "Brain-machine interfaces: From basic science to clinical trials," invited talk, Department of Neurobiology, Duke University, Durham, NC
37. 4/16/16 "Brain-machine interfaces: From basic science to clinical trials," invited talk, Simons Foundation, Amelia Island, FL
38. 2/3/16 "Implanted integrated circuit requirements for brain-machine interfaces," invited talk, IEEE International Solid State Circuits Conference (ISSCC), San Francisco, CA
39. 11/20/15 "Toward clinically viable brain-machine interfaces," invited talk, Google [x], Mountain View, CA
40. 11/10/15 "Toward clinically viable brain-machine interfaces," Keynote talk, Lefler Symposium, Department of Neurobiology, School of Medicine, Harvard University, Boston, MA
41. 10/20/15 "Cortical control of arm movements: A dynamical systems approach," Special lecture (plenary talk), Annual Meeting of the Society for Neuroscience, McCormick Place, Chicago, IL

42. 10/01/15 "Toward Clinically Viable Brain-Machine Interfaces," Stanford Neurosciences Institute (SNI) 2nd Annual Symposium, Stanford University, Stanford, CA
43. 9/28/15 "Toward Clinically Viable Brain-Machine Interfaces," plenary symposium talk, American Neurological Association (ANA) Annual Meeting, Chicago, IL
44. 8/26/14 "Neural Dynamics of Reaching: The Need for New Neurotechnologies," Plenary talk, 1st International IEEE EMBS Workshop on Advanced NeuroTechnologies for BRAIN Initiatives (ANTBI), Sheraton Hotels & Towers, Chicago, IL
45. 6/20/14 "Toward Clinically Viable Brain-Machine Interfaces," The William and Flora Hewlett Foundation, Menlo Park, CA
46. 5/7/14 "Toward Clinically Viable Brain-Machine Interfaces," Thomas A. McMahon Memorial Lecture, School of Eningeering and Applied Sceiences, Harvard University, Cambridge, MA
47. 3/24/14 "Brain Prostheses," Keynote talk, Electrical and Computer Engineering Department Head's Association, Annual Meeting, Napa, CA
48. 5/11/13 "Brain Prostheses," 2013 TEDxStanford, Stanford University, Stanford, CA
49. 5/8/13 "Motor Cortical Control and Prostheses: A Dynamical Systems Perspective," 2013 McGovern Institute Symposium: Neural Control of Movement -- Models, Representations & Brain-Machine Interfaces, MIT, Cambridge, MA
50. 4/10/13 "Mind Over Matter," Congressional Biomedical Research Caucus, Co-chairs Congresswoman Jackie Speier (D-CA) and Congressmen Rush Holt (D-NJ), Steve Stivers (R-OH), and Charlie Dent (R-PA), US House of Representatives, Rayburn Building, Washington D.C. Organized by the Coalition for the Life Sciences (working with the Howard Hughes Medical Institute, and the Society for Neuroscience)
51. 3/4/13 "Translating Thought to Action in the Motor Cortex," Rewiring the Brain Symposium, Berg Hall, Li Ka Shing Center for Learning and Knowledge, School of Medicine, Stanford University, Stanford, CA
52. 1/20/12 "Neural Prosthetics," TEDxStanford, Stanford University, Stanford, CA
53. 8/31/12 "Toward High-Performance Clinically-Viable Brain Machine Interfances," Keynote talk, IEEE EMBC. Hilton Bay Shore, San Diego, CA.
54. 8/31/11 "Monkey Models for Brain-Machine Interfaces: The Need for Maintaining Diversity," IEEE EMBC, Boston Marriott Copley Place, Boston, MA
55. 7/11/11 "Toward a Single-Trial Understanding of Motor Preparation," Sloan-Swartz Summer Meeting, HHMl Janella Farm campus, Washington, DC
56. 6/8/11 "High-Performance Neural Prosthetic Systems," Society for Brain Mapping and Therapeutics (SBMT; formerly IBMISPS), UCSF, San Francisco, CA
57. 6/6/11 "Dynamical Systems and Optogenetic Investigations of Motor Control," SBMT, UCSF, San Francisco, CA
58. 5/27/11 "Emerging Directions for Higher-Performance Neural Prosthetic Systems," Alfred P. Nobel Symposium, Stockholm, Sweeden
59. 5/14/11 "Toward Clinically-Viable Brain-Machnie Interfaces," Plenary Talk, Biological Psychiatry Annual Meeting, Hyatt Regency, San Francisco, CA
60. 4/26/11 "Toward a Single-Trial View of Motor Preparation and Learning," Neural Control of Movement (NCM) Annual Meeting (Satellite), Peurto Rico
61. 4/7/11 "Toward a Single-Trial Understanding of Motor Preparation," Neuroscience, John Hopkins University, Baltimore, MD
62. 4/4/11 "Toward a Single-Trial Understanding of Motor Preparation and Neural Variance," Neural Variability Symposium, Banbury Center, CSHL, NY
63. 2/28/11 "Toward Clinically Useful Neural Prostheses," Neuromodulation Symposium, Berg Hall, Li Ka Shing Center for Learning and Knowledge, School of Medicine, Stanford University, Stanford, CA
64. 2/24/11 "Toward Clinically-Viable Intra-Cortically Based Neural Prostheses," Department of Bioengineering, University of Pennsylvania, Philadelphia, PA
65. 2/23/11 "Toward a Single-Trail Understanding of Motor Preparation," Mohoney Institute of Neurological Sciences, University of Pennsylvania, Philadelphia, PA
66. 12/10/10 "Toward Clinically Viable Cortically-Controlled Prosthetic Systems," Keynote, launch of Center for Neural Engineering and Prostheses (CNEP), University of California at Berkeley & University of California at San Francisco, Berkeley, CA

67. 11/12/10 "Toward a Single-Trial View of Motor Preparation," Keynote, Advances in Computational and Motor control (ACMC), pre-meeting at Society for Neuroscience, San Diego, CA
68. 10/28/10 "Toward a Single-Trial View of Motor Preparation," Department of Brain and Cognitive Science, MIT, Cambridge, MA
69. 9/23/10 "Toward High-Performance Cortically-Controlled Prostheses," Aspen Brain Meeting, New York Academy of Science, Aspen, CO
70. 9/15/10 "Neural Prosthetics / Brain Machine Interfaces," Neurocritical Care Society Meeting, Marriott, San Francisco, CA
71. 9/10/10 "Toward High-Performance Cortically-Controlled Prostheses," Department of Bioengineering retreat, University of Utah, Park City, UT
72. 5/09/10 "Toward High-Performance Cortically-Controlled Motor Prostheses," GRSNC Symposium, University of Montreal, Montreal, Canada
73. 5/7/10 "Brain-Machine Interfaces," Neuroengineering Grand Challenges Symposium, IEEE EMBS, Bethesda, MD
74. 4/7/10 "Neural Basis of Motor Preparation and Prostheses," Department of Bioengineering, University of California, Berkeley, Berkeley, CA
75. 3/6/10 "Brain Machine Interfaces," Leading Matters (together with Prof. Bill Newsome), Stanford University alumni event, Newport Beach, CA
76. 12/17/09 "Toward a Single-Trial Understanding of Motor Preparation," Neuroscience, Princeton University, Princeton, NJ
77. 12/15/09 "High Performance Neural Prostheses," Neuroscience, Columbia University, New York, NY
78. 12/14/09 "Toward a Single-Trial Understanding of Motor Preparation," Neuroscience, Cornell Weill Medical School, New York, NY
79. 11/03/09 "Neural Basis of Motor Preparation and Prostheses," Department of Bioengineering, University of Southern California, Los Angeles, CA
80. 9/11/09 "Toward a Single-Trial Understanding of Motor Preparation," Neuroscience, Yale University, New Haven, CT
81. 5/9/09 "Brain Machine Interfaces," Leading Matters (together with Prof. Carla Shatz), Stanford University alumni event, Newport Beach, CA
82. 2/12/09 "High-Performance Cortically-Controlled Prosthesis Design," Integrated Neural Interfaces Symposium, IEEE ISSCC, San Francisco, CA
83. 1/8/09 "Neural Basis of Reach Preparation and Communication Prostheses," Neuroscience, Brown University, Providence, RI
84. 1/6/09 "Neural Basis of Reach Preparation and Communication Prostheses," Neuroscience, Harvard University School of Medicine, Boston, MA
85. 12/4/08 "Toward High-Performance Cortically-Controlled Prostheses," Next Generation Medical Electronics Symposium, Department of Electrical Engineering and Computer Science, MIT, Cambridge, MA
86. 11/19/08 "Dynamical Systems Perspectives of Motor Cortical Activity," Symposium, Society for Neuroscience, Washington, DC
87. 10/11/08 "Neural Prostheses", Future of Human Health Symposium (alumni weekend), Stanford University, Stanford, CA
88. 10/03/08 "Toward High-Performance Cortically-Controlled Prostheses," Department of Electrical and Computer Engineering, University of Utah, Salt Lake City, UT
89. 6/26/08 "Extracting Dynamical Structure Embedded in Premotor Cortical Activity," AREADNE conference, Santorini, Greece
90. 5/16/08 "Toward High Performance Communication Prostheses," International Conference o Cognitive and Neural Systems (ICCNS), Boston University, Boston, MA
91. 2/29/08 "Neural Basis of Reach Preparation", Keynote, COSYNE annual conference, Salt Lake City, UT
92. 2/20/08 "Neural Basis of Reach Preparation and Communication Prostheses," Neuroscience, University of Washington, Seattle, WA
93. 2/1/08 "Neural Basis of Motor Preparation and Cortical Prostheses," Neuroscience, Baylor College of Medicine, Houston, TX

94. 2007 "Neural Basis of Reach Preparation and Communication Prostheses," Department of Biomedical Engineering, University of Pittsburgh, Pittsburgh, PA
95. 2007 "Extracting Dynamical Structure Embedded in Premotor Cortical Activity," Neural Coding, Computation and Dynamics (NCCD) meeting, Lyon, France
96. 2007 Gatsby Computational Neuroscience Unit, University College London, London, UK
97. 2007 National Academy of Engineering regional meeting, Stanford University, Stanford, CA
98. 2007 "New Approaches to Examining Neural Processing in Motor and Premotor Cortex," Neural Control of Movement (NCM) Annual Meeting, Seville, Spain
99. 2007 Department of Electrical Engineering, Caltech, Pasadena, CA
100. 2006 Neuroscience, Northwestern University, Chicago, IL
101. 2006 "Brain-Computer Interfaces," Ninth Annual Chinese-American Kavli Frontiers of Science Symposium, U.S. National Academy of Science, Irvine, CA
102. 2006 "Invasive Brain-Machine Interface: Neural Spike Coding, Sorting, Analysis," Innovative Neural Interfaces Workshop, IEEE EMBC, New York, NY
103. 2006 "Increasing the Peformance of Cortically-Controlled Prostheses," Applied Neurocomputation Workshop, IEEE IMBC, New York, NY
104. 2006 Neural Engineering Symposium, University of Texas at Dallas, Dallas, TX
105. 2006 Department of Electrical Engineering, University of California at Santa Cruz, Santa Cruz, CA
106. 2005 "Decoding Movement Plans for use in Neural Prosthetic Systems," Japanese-American Frontiers of Science Symposium, U.S. National Academy of Science, Kanagawa, Japan
107. 2005 Neuroscience, Columbia University, New York, NY
108. 2005 NCM annual meeting, Key Biscayne, FL
109. 2005 COSYNE annual conference, Snowbird, UT
110. 2004 CNS annual conference, Baltimore, MD
111. 2004 Statistical Analysis of Neuronal Data (SAND) Workshop, 2nd Annual Meeting, Pittsburgh, PA
112. 2004 American Medical Writers Association, annual meeting, Berkeley, CA
113. 2004 Computer Science & Telecommunications Board (CSTB), National Research Council of the U.S. National Academies, Palo Alto, CA
114. 2002 Computational Neuroscience - Positions and Perspectives, Max Plank Institute, Frankfurt, Germany
115. 2001 Neural Information and Coding (NIC) Workshop, Big Sky, MT
116. 2000 Department of Brain and Cognitive Science, MIT, Cambridge, MA
117. 2000 Department of Biomedical Engineering, University of Southern California, Los Angeles, CA
118. 2000 Biomedical Engineering Program and Department of Electrical Engineering, University of California at Los Angeles, Los Angeles, CA
119. 2000 Department of Bioengineering, Columbia University, New York, NY
120. 2000 Department of Bioengineering, Washington University in Saint Louis, Saint Louis, MO
121. 1999 Department of Electrical Engineering, Stanford University, Stanford, CA
122. 1999 European Conference on Visual Perception (ECVP), Annual Conference, Trieste, Italy
123. 1999 Department of Bioengineering, University of California at Irvine, Irvine, CA
124. 1997 Principles of Behaving Systems Workshop, “Motor Control and Posterior Parietal Cortex,” University of Cambridge, UK