Curriculum Vitae

Omid Sani

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(Last updated on: 10/23/2021)
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Education

2020–present **Postdoctoral scholar**, *University of Southern California*, Los Angeles, USA.

2015–2020 **PhD, Electrical Engineering**, *University of Southern California*, Los Angeles, USA.
Adviser: Professor Shanechi (nseip.usc.edu)

2017–2019 **MSc, Computer Science**, *University of Southern California*, Los Angeles, USA.

2013–2015 **MSc, Biomedical Engineering**, *Sharif University of Technology*, Tehran, Iran.
Adviser: Professor Shamsollahi (sharif.edu/~mbshams)

2009–2013 **BSc, Electrical Engineering**, *Sharif University of Technology*, Tehran, Iran.

2002–2009 **Middle and high school**, *Allameh Helli, NODET (National Organization for Development of Exceptional Talents)*, Tehran, Iran.

Research Interests

Brain-Machine Interfaces, Neuroscience, Machine Learning, Signal Processing, Control Theory

Honors and awards

2021 Received the William F. Ballhaus Jr. Prize for Excellence in Graduate Engineering Research, awarded to one PhD dissertation across USC Viterbi School of Engineering (news story)

2019 Received the MHI Scholar award in the USC ECE department

2019 A winner of the 2019 international BCI Award for our work on closed-loop BCIs for treatment of neuropsychiatric disorders (`https://www.bci-award.com/2019`)

2015 Received the Annenberg Fellowship with admission to USC ECE PhD program

2013 Admitted to Sharif University of Technology MSc program as an Exceptional Talent

2013 Awarded by the department as one of the distinguished BSc projects of the year

2013 IEEE Iran section Best BSc Thesis Award of the year 2014 (jointly won with another thesis)

2009 Ranked 61st in the Nationwide Mathematics and Physics University Entrance Exam (among more than 270,000 contestants in the country)

2009–2015 Member of Exceptional Talents Community of Sharif University of Technology

2009–2015 Received the National Elites Foundation Fellowship

2005/2001 Accepted in the NODET high/middle school entrance examination

Publications (Google Scholar: scholar.google.com/citations?user=HMRETvYAAAAJ)

Journal Papers

2021 **O. G. Sani**, H. Abbaspourazad, Y. T. Wong, B. Pesaran, M. M. Shanechi, *"Modeling behaviorally relevant neural dynamics enabled by preferential subspace identification"*, **Nature Neuroscience** (2021), `https://doi.org/10.1038/s41593-020-00733-0`

2021 Y. Yang*, S. Qiao*, **O. G. Sani**, J. I. Sedillo, B. Ferrentino, B. Pesaran, M. M. Shanechi, 2021. *"Modelling and prediction of the dynamic responses of large-scale brain networks during direct electrical stimulation"*, **Nature Biomedical Engineering** (2021), `https://doi.org/10.1038/s41551-020-00666-w` (*: equal contribution)

Media coverage highlights:

⟶ News and Views article by J. I. Chapeton and K. A. Zaghloul *Modelling multiregional brain activity*, Nature Biomedical Engineering 5, 293–294 (2021)

⟶ Selected as the journal cover article in Nature Biomedical Engineering

2019 Y. Yang*, **O. G. Sani***, E. F. Chang, M. M. Shanechi, *"Dynamic network modeling and dimensionality reduction for human ECoG activity"*, **Journal of Neural Engineering** (2019), `https://doi.org/10.1088/1741-2552/ab2214` (*: equal contribution)

2018 **O. G. Sani***, Y. Yang*, M. B. Lee, H. E. Dawes, E. F. Chang†, M. M. Shanechi†, *"Mood variations decoded from multi-site intracranial human brain activity"*, **Nature Biotechnology** (2018), `https://doi.org/10.1038/nbt.4200` (*: equal contribution, †: senior authors)

Media coverage highlights:

⟶ The Wall street Journal: Brain Data Could Read Moods, Potentially Treat Depression

⟶ ScienceNews: Brain-zapping implants that fight depression are inching closer to reality

⟶ IEEE Spectrum: The Mood Ring of Algorithms Could Zap Your Brain to Help You Feel Better

⟶ New Atlas: Tracking brain waves to decode mood could help fight depression

⟶ USC News: Breakthrough brain research could yield new treatments for depression

⟶ News and Views article by A. Etkin *Decoding mood*, Nature Biotechnology 36, 932–933 (2018)

⟶ Selected as the journal cover article in Nature Biotechnology

2018 V. R. Rao*, K. K. Sellers*, D. L. Wallace, M. B. Lee, M. Bijanzadeh, **O. G. Sani**, Y. Yang, M. M. Shanechi, H. E. Dawes, E. F. Chang, *"Direct Electrical Stimulation of Lateral Orbitofrontal Cortex Acutely Improves Mood in Individuals with Symptoms of Depression"*, **Current Biology** (2018), `https://doi.org/10.1016/j.cub.2018.10.026` (*: equal contribution)

Media coverage highlights:

⟶ NPR: Scientists Improve Mood By Stimulating A Brain Area Above The Eyes

⟶ ScienceNews: Zaps to a certain spot in the brain may ease depression

Journal Papers Under Review

2021 **O. G. Sani**, B. Pesaran, M. M. Shanechi, *"Where is all the nonlinearity: flexible nonlinear modeling of behaviorally relevant neural dynamics using recurrent neural networks "* bioRxiv 2021.09.03.458628, https://doi.org/10.1101/2021.09.03.458628

Conference Papers

2016 **O. G. Sani**, R. Chavarriaga, M. B. Shamsollahi, and J. d R. Millán, *"Detection of movement related cortical potential: Effects of causal vs. non-causal processing"*, in 2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2016, pp. 5733–5736, `https://doi.org/10.1109/EMBC.2016.7592029`

Conference Abstracts

2020 **O. G. Sani**, H. Abbaspourazad, Y. T. Wong, B. Pesaran, M. M. Shanechi, *"Preferential subspace identification (PSID) for modeling behaviorally relevant neural dynamics"*, in Neuromatch Conference 3.0, 26-30 Oct, 2020. Video: `https://youtu.be/Yq1ShXkkWyY`

2020 **O. G. Sani**, B. Pesaran, M. M. Shanechi, *"Modeling behaviorally relevant neural dynamics with a novel preferential subspace identification (PSID)"*, in Computational and Systems Neuroscience (Cosyne), 27 Feb-1 Mar. 2020, Denver, Colorado.

2020 Y. Yang, S. Qiao, **O. G. Sani**, I. Sedillo, B. Ferrentino, B. Pesaran, M. M. Shanechi, *"Modeling large-scale brain network dynamics in response to electrical stimulation"*, in Computational and Systems Neuroscience (Cosyne), 27 Feb-1 Mar. 2020, Denver, Colorado.

2019 **O. G. Sani**, B. Pesaran, M. M. Shanechi, *"A new Preferential Subspace IDentification (PSID) algorithm for dissociating and modeling behaviorally relevant neural dynamics"*, Society for Neuroscience (SfN), 19–23 Oct. 2019, Chicago, IL.

2018 **O. G. Sani**, M. M. Shanechi, *"Learning dynamic neural encoding models with behaviorally-relevant latent states"*, Society for Neuroscience (SfN), 3–7 Nov. 2018, San Diego, CA.

2018 **O. G. Sani**, Y. Yang, M. B. Lee, H. Dawes, E. F. Chang, M. M. Shanechi, *"Decoding mood state from multisite ECoG activity in human subjects"*, in Computational and Systems Neuroscience (Cosyne), 1–4 Mar. 2018, Denver, Colorado.

2018 Y. Yang, **O. G. Sani**, K. K. Sellers, E. F. Chang, M. M. Shanechi, *"A novel framework for dynamic modeling of brain-network response to electrical stimulation"*, in Computational and Systems Neuroscience (Cosyne), 1–4 Mar. 2018, Denver, Colorado.

2017 **O. G. Sani**, Y. Yang, E. F. Chang, M. M. Shanechi, *"Real-time decoding of mood from human large-scale ECoG activity"*, Society for Neuroscience (SfN), 11–15 Nov. 2017, DC.

Book Chapters

2021 **O. G. Sani***, Y. Yang*, M. M. Shanechi, *"Brain-Machine Interfaces for Closed-Loop Electrical Brain Stimulation in Neuropsychiatric Disorders"*, in Springer Handbook of Neuroengineering, Ed. N. Thakor (2021) (*: equal contribution).

2021 Y. Yang*, **O. G. Sani***, M. B. Lee, H. E. Dawes, E. F. Chang, M. M. Shanechi, *"Developing a Closed-Loop Brain-Computer Interface for Treatment of Neuropsychiatric Disorders Using Electrical Brain Stimulation"*, Brain-Computer Interface Research: A State-of-the-Art Summary 9, Springer International Publishing (2021) (*: equal contribution).

Research Experience

2015-present **Neural Systems Engineering & Information Processing Lab (NSEIP Lab)**, *USC*, California, USA (`https://nseip.usc.edu`)
PhD Thesis: Modeling and control of behaviorally relevant brain states.

2012-2015 **Biomedical Signal and Image Processing Laboratory (BiSIPL)**, *Sharif University of Technology*, Tehran, Iran.
MSc Thesis: Detection of Movement Related Cortical Potentials in EEG
BSc Thesis: Event Related Potentials in Brain Computer Interfaces
→ Implemented an online brain computer interface (`https://youtu.be/nr-rgvlxnzE`). .

Summer 2014 **Internship at the CNBI Lab (`http://cnbi.epfl.ch`)**
International Summer Research Program, *EPFL*, Lausanne, Switzerland.
→ The program provides full funding for living, housing and travel expenses.
→ The results from our research were presented at EMBC conference in 2016.

Teaching Experience

Fall 2013 to Spring 2015 **Teaching Assistant**, *Sharif University of Technology*, EE Department.
MATLAB instructor for the "Digital Signal Processing" course - Instructed by: Dr. Shamsollahi

Coding Experience

Matlab, Python, C++, Pascal, PHP, JavaScript, HTML, CSS, LaTeX

Selected Projects

2019 **IPDB** (ipdb.page): A database of academic publications with community Q&A and rating features. *Tech:* Python, Django, Javascript.

2019 **SelfA** (pleaselet.me/SelfA): Web-based tool for administering self-report psychometric questionnaires and providing experimental task instructions. *Tech:* Firestore database, Angular.

2018 **TweetAs** (pleaselet.me/tweetas): Builds an n-gram language model from prior tweets of a twitter account and generates new tweets. *Tech:* Python, MongoDB, Angular.

2018 **WeSay** (pleaselet.me/wesay): A social collaboration project where people vote on how to complete a sentence. *Tech:* Google cloud functions, Firestore database, Angular.

2017 **Parrot Bot** (telegram.me/parrrotbot): A Telegram bot that builds an n-gram language model from each person and imitates them. *Tech:* Python, MongoDB.

2017 **PackMan** (github.com/OmidS/PackMan): Package management for MATLAB.

2016 **Poem Bot** (telegram.me/sherbot): Telegram bot for Persian poems. *Tech:* Node.js, SQLite.

2015 **20Q** (20q.app): An online social 20 questions game. *Tech:* Node.js, loopback, Angular.

2013 **QuickSSVEP** (omids.github.io/quickssvep): A web based SSVEP stimulator.

2013 **Onlinify** (github.com/OmidS/onlinify): A MATLAB toolbox for online processing of EEG data recorded with BCI2000, transferred with Fieldtrip Buffer.

English Language Proficiency

TOEFL **Internet based TOEFL score: 114/120**.

taken 2014 Reading: 30/30; Listening: 30/30; Speaking: 27/30; Writing skills: 27/30.

GRE **GRE General Test:**.

taken 2012 Verbal: 156 (% Below: 69); Quantitative: 169 (% Below: 98); Writing: 4.5 (% Below: 73).