

Reza Abbasi-Asl

CONTACT INFORMATION Allen Institute for Brain Science
615 Westlake Ave North, Seattle, WA, 98109, US
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WWW: eecs.berkeley.edu/~abbasi

EDUCATION **University of California, Berkeley, CA, US** **Sep 2013 - May 2018**

- **Ph.D. in Electrical Engineering and Computer Sciences**, GPA: 3.89/4
 - Designated Emphasis in Communication, Computation and Statistics
 - Dissertation Topic: *Interpretable Machine Learning with Applications in Neuroscience*
 - Thesis Committee: Bin Yu, Jack L. Gallant, Kannan Ramchandran
- **M.Sc. in Electrical Engineering and Computer Sciences**, GPA: 3.89/4

Sharif University of Technology, Tehran, Iran **Sep 2010 - Jan 2013**

- **M.Sc. in Biomedical Engineering (Bioelectronics)**, GPA: 18.35/20

Amirkabir University of Technology, Tehran, Iran **Sep 2006 - Sep 2010**

- **B.Sc. in Electrical Engineering - Telecommunication**, GPA: 18.24/20
- **B.Sc. in Electrical Engineering - Electronics**, GPA: 18.18/20

VISITING POSITIONS **Simons Institute for the Theory of Computing, Berkeley, CA, US**
Long-Term Visiting Scholar **Jan 2015 - May 2015**

RESEARCH INTERESTS Interpretable Machine Learning, Computational Neuroscience, Computer Vision, Statistical Modeling, Image Analysis, Signal Processing

HONORS & AWARDS

- **Eli Jury Award** from UC Berkeley EECS for "outstanding achievement in the area of systems, communications, control, or signal processing" **2018**
- **Departmental Block Grant Award** from UC Berkeley EECS **2017**
- **May J. Koshland Fund in Memory of H.A. Jastro Award** from UC Berkeley Graduate Division **2016**
- **Best Paper Finalist** in 7th Iranian Conference on Machine Vision and Image Processing (MVIP 2011) **2011**
- **Excellence Award** in Biomedical Engineering from Sharif University of Technology **2010**
- **Excellence Award** in Electrical Engineering from Amirkabir University of Technology **2007**
- **Travel Award** from 7th & 8th International Workshops on Statistical Analysis of Neural Data
- **Undergraduate Entrance Scholarship** awarded to top ranked students in the nation-wide university entrance exam at Amirkabir University of Technology **2006**

PROFESSIONAL EXPERIENCE **Allen Institute for Brain Science, Seattle, WA.**
Scientist **May 2018 - Present**

- Population analysis of mouse V1 electrophysiological and 2-photon calcium imaging data
- Visual physiology of the mouse layer 4 cortical circuit in silico

Yu Group, University of California, Berkeley, CA.
Graduate Student Researcher, Mentor: Bin Yu **Sep 2013 - May 2018**

- Interpreting artificial neural networks through stability and compression
- Characterization of neurons in cortical area V4 via interpretable machine learning
(*Collaborators: Yuansi Chen, Adam Bloniarz, Michael Oliver, Ben Willmore, Jack L. Gallant*)
- Modeling dynamic brain activity in fMRI during natural vision

Neuralink, San Francisco, CA.
Research Intern, Mentor: Philip Sabes **May 2017-Aug 2017**

- Robust high-bandwidth brain-machine interface (*Collaborators: Vikash Gilja, Paul Merolla*)

- Gallant Lab**, University of California, Berkeley, CA.
Graduate Student Researcher, Mentors: Jack L. Gallant & Bin Yu **Sep 2015 - Dec 2015**
- Flatiron Institute**, Simons Foundation, New York, NY.
Summer Research Associate, Mentor: Dmitri B. Chklovskii **May 2015-Aug 2015**
 • Population coding in retinal ganglion cell (*Collaborators: Cengiz Pehlevan and Bin Yu*)
- Biomedical Signal and Image Processing Laboratory (BiSIPL)**
 Sharif University of Technology, Tehran, Iran
Research Assistant, Mentor: Emad Fatemizadeh **Sep 2010-Sep 2013**
 • Robust image registration via multi-resolution techniques
 • Nonlinear estimation of hand-grip force from forearm EMG signals
- Agfa Healthcare**, Tehran, Iran
Imaging Device Engineer, Mentor: Ahmad Noori **Sep 2011- Sep 2013**
 • Technical expert of MR, CT and Radiography digitizers

PRE-PRINTS

- A. Arkhipov, N. W. Gouwens, Y. N. Billeh, S. Gratiy, R. Iyer, Z. Wei, Z. Xu, **R. Abbasi-Asl**, J. Berg, M. Buice, N. Cain, N. da Costa, S. de Vries, D. Denman, S. Durand, D. Feng, T. Jarsky, J. Lecoq, B. Lee, L. Li, S. Mihalas, G. K. Ocker, S. R. Olsen, R. C. Reid, G. Soler-Llavina, S. A. Sorensen, Q. Wang, J. Waters, M. Scanziani, C. Koch. Visual physiology of the Layer 4 cortical circuit in silico. *bioRxiv preprint (Under review in PLOS Computational Biology)*, 2018.
- **R. Abbasi-Asl** and B. Yu. Structural Compression of Convolutional Neural Networks, *arXiv preprint*, 2017.
- **R. Abbasi-Asl**, A. Ghaffari and E. Fatemizadeh. Robust Image Registration via Empirical Mode Decomposition. *arXiv preprint (Under review in IEEE Transaction on Medical Imaging)*, 2017.
- **R. Abbasi-Asl**, Y. Chen, A. Bloniarz, M. Oliver, Ben Willmore, J. L. Gallant and B. Yu. Deep Nets Meet Real Neurons: Pattern Selectivity in V4, (*Manuscript available upon request*), 2017.
- **R. Abbasi-Asl**, M. Keeshavarzi, D. Y. Chan. Brain-Computer Interface in Virtual Reality, *Under review in the 40th IEEE EMBC International Conference on Engineering in Medicine and Biology*, 2018.

PEER REVIEWED PAPERS

- **R. Abbasi-Asl** and B. Yu. Interpreting Convolutional Neural Networks Through Compression, *Neural Information Processing Conference 2017 Symposium on Interpretable Machine Learning (NIPS)*, Long Beach, CA, 2017.
- **R. Abbasi-Asl**, C. Pehlevan, B. Yu and D. B. Chklovskii. Do retinal ganglion cells project natural scenes to their principal subspace and whiten them? *IEEE Proceedings of 50th Asilomar Conference on Signals, Systems and Computers (ACSSC)*, Pacific Grove, CA, 2016.
- A. Ahadi, H. Hayati, J. Mitra, **R. Abbasi-Asl**, K. Awodele. A new method for estimating the longevity and degradation of photovoltaic systems considering weather states. *Frontiers in Energy*. 2016; 10 (3) :277 - 285.
- **R. Abbasi-Asl**, R. Khorsandi, B. Vosooghi Vahdat. Hammerstein-Wiener Model: A New Approach to the Estimation of Formal Neural Information. *Basic and Clinical Neuroscience*. 2012; 3 (4) :45-51.
 – A conference paper version published in *IEEE Proceedings of The 16th CSI Symposium on Artificial Intelligence and Signal Processing (AISP)*
- A. Ghanbari, **R. Abbasi-Asl**, A. Ghaffari, E. Fatemizadeh. Automatic B-spline Image Registration Using Histogram-based Landmark Extraction. In: *IEEE-EMBS Conference on Biomedical Engineering & Sciences (IECBES)*, 2012.
- **R. Abbasi-Asl**, E. Fatemizadeh. MMRO: A Feature Selection Criterion for MR Images Based on Alpha Stable Filter Responses. In: *IEEE Proceedings of 7th Iranian Conference on Machine Vision and Image Processing (MVIP)*, Iran, 2011.
 – **Best Paper Finalist**

- **R. Abbasi-Asl**, R. Khorsandi, Sh. Farzampour, E. Zahedi. Estimation of Muscle Force with EMG Signals Using Hammerstein-Wiener Model. In: *IFMBE Proceedings 5th Kuala Lumpur International Conference on Biomedical Engineering (BIOMED)*, Malaysia, Vol. 35, pp. 157-160, 2011.
- S. Abadpour, **R. Abbasi-Asl**, Gh. Moradi. Analysis of Push-Push Oscillators and Designing a Push-Push Oscillator in S Band. In: *IEEE Proceedings of 10th Mediterranean Microwave Symposium (MMS)*, Turkey, 2010.

SELECTED
CONFERENCE
ABSTRACTS

- **R. Abbasi-Asl**, M. Keeshavarzi, D. Y. Chan. Brain-Computer Interface in Virtual Reality, *7th International BCI Meeting*, Pacific Grove, CA, 2018. (Accepted abstract and poster presentation)
- **R. Abbasi-Asl**, Y. Chen, A. Bloniarz, M. Oliver, J. L. Gallant and B. Yu. Deep Nets Meet Real Neurons: Pattern Selectivity in V4, *8th International Workshop on Statistical Analysis of Neuronal Data (SAND8)*, Pittsburgh, PA, 2017. (Accepted abstract and poster presentation)
- **R. Abbasi-Asl**, Y. Chen, A. Bloniarz, J. L. Gallant and B. Yu. Artificial Neurons Meet Real Neurons: Pattern Selectivity In V4, *INFORMS Annual Meeting*, Nashville, TN, 2016. (Invited oral presentation)
- **R. Abbasi-Asl**, Y. Chen, A. Bloniarz, J. Mairal, J. L. Gallant and B. Yu. Explaining V4 Neurons Pattern Selectivity via Convolutional Neural Network, *7th International Workshop on Statistical Analysis of Neuronal Data (SAND7)*, Pittsburgh, PA, 2015. (Accepted abstract and poster presentation)
- Feature Representation for Modeling Visual Cortex Area V4: Dictionary Learning vs. Deep Convolutional Networks, *Berkeley Statistics Annual Research Symposium (BSTARS)*, Berkeley, US, 2015. (Poster presentation and thunder talk)
- **R. Abbasi-Asl**, R. Khorsandi, N. Mozaffari, Sh. Farzampour. A Novel Model for Estimation of the Forearm Motor Forces Using EMG Signals. In: *Proceedings of The 1st International Congress of Neuromuscular and Electrodiagnostic Medicine*, Iran, 2011. (Accepted abstract and poster presentation)

MANUSCRIPTS
IN PREPARATION

- **R. Abbasi-Asl** and B. Yu. Compressed and interpretable models of neurons in area V4 of visual cortex. (in preparation)
- **R. Abbasi-Asl**, A. Nunez-Elizalde, M. Oliver, J. L. Gallant and B. Yu, Temporally-modified convolutional networks can predict fMRI responses evoked by naturalistic movies. (in preparation)

TEACHING
EXPERIENCE

University of California, Berkeley, CA, US
Graduate Student Instructor

- EE 120: Signals and Systems Spring 2016 & Spring 2017
- EE 20: Structure and Interpretation of Systems and Signals Spring 2015

Sharif University of Technology, Tehran, Iran

Teaching Assistant

- Medical Imaging Systems Fall 2012
- Introduction to Biomedical Engineering Fall 2012
- Biomedical Image Analysis and Processing Spring 2012
- Neural Modeling Spring 2012

Laboratory Supervisor

- Analog Circuits Spring 2011

Tehran Polytechnic (Amirkabir University of Technology), Tehran, Iran

Teaching Assistant

- Engineering Mathematics (2 sections) Fall 2010
- Probability and Statistics (2 sections) Spring 2010

MENTORING EXPERIENCE	<p>University of California, Berkeley, CA, US <i>Research Mentor</i></p> <ul style="list-style-type: none"> • Zhiyue Hu, Undergraduate Research Assistant Summer - Fall 2017 • Dennis Mingyi Wang, Undergraduate Research Assistant Summer - Fall 2017 <p>Sharif University of Technology, Tehran, Iran <i>Research Mentor</i></p> <ul style="list-style-type: none"> • Zahra Shabgard, M.Sc. Research Assistant 2012
INVITED TALKS	<ul style="list-style-type: none"> • Redwood Seminar, UC Berkeley, CA 2018 • Allen Institute, Seattle, WA 2018 • University of San Fransisco, CA 2018 • Salesforce Research, Palo Alto, CA 2018 • Qualcomm Research, San Diego, CA 2018 • Tehran Polytechnic, Tehran, Iran 2017 • Tabriz University, Tabriz, Iran 2016
SELECTED GRADUATE COURSEWORK	<p>University of California, Berkeley, CA, US Statistical Learning Theory, Statistical Models: Theory and Application, Topics in Deep Learning, Visual Cognitive Neuroscience, Stochastic Systems: Estimation and Control, Theoretical Statistics</p> <p>Sharif University of Technology, Tehran, Iran Sparsity and Blind Source Separation, Advanced Biomedical Signal Processing, Medical Imaging Systems, Numerical Optimization, Biomedical Image Analysis and Processing, Neural Modeling</p>
ACADEMIC SERVICES	<ul style="list-style-type: none"> • Invited Reviewer for the Nature Scientific Reports, Innovations in Theoretical Computer Science Conference, IEEE Symposium on Computers & Informatics, IEEE Conference on Control, Systems & Industrial Informatics • Chairman of publicity committee in IEEE Iran section, AUT Student Branch 2009 - 2010 • Chairman of scientific committee in 2nd AUT Communication and Electronics Week 2009
AFFILIATIONS & MEMBERSHIPS	<ul style="list-style-type: none"> • Berkeley AI Research Laboratory (BAIR), CA, US 2014-present • NSF Center for Science of Information (CSoI) 2013-present • Berkeley Laboratory of Information and System Sciences (BLISS), CA, US 2013-present • IEEE Brain Community 2016-present • American Statistical Association (ASA) 2014 • Institute of Mathematical Statistics (IMS) 2014 • Institute for Electrical and Electronics Engineers (IEEE) 2008-2010, 2014-present • Iranian Society of Machine Vision and Image Processing 2010-2013 • Iranian National Organization for Development of Exceptional Talents 1999-2006
SKILLS	<p>Computer Skills</p> <ul style="list-style-type: none"> • Python, MATLAB, R, C/C++, Octave, Bash Scripting • Experience using machine learning toolboxes (Caffe, TensorFlow, Keras, SPAMS) • OS X, Linux, Windows, Vim, L^AT_EX, Microsoft Office. <p>Languages</p> <ul style="list-style-type: none"> • English (fluent), Persian (native), Azerbaijani (native)
HOBBIES	<p>Photography (check it out at: eecs.berkeley.edu/~abbasi/photography), Hiking, Persian Calligraphy</p>
REFERENCES	<p>Bin Yu (e-mail: binyu@stat.berkeley.edu)</p> <ul style="list-style-type: none"> • Chancellor's Professor, Statistics, Electrical Engineering and Computer Sciences, UC Berkeley <p>Jack Gallant (e-mail: gallant@berkeley.edu)</p> <ul style="list-style-type: none"> • Chancellor's Professor, Psychology, Affiliate with Bioengineering and Vision Science, UC Berkeley <p>Kannan Ramchandran (e-mail: kannanr@eecs.berkeley.edu)</p>

- Professor, Electrical Engineering and Computer Science, UC Berkeley

Philip Sabes (e-mail: sabes@neuralink.com)

- Co-Founder and Principal Investigator, Neuralink; Professor Emeritus, UCSF

Dmitri Mitya Chklovskii (e-mail: dchklovskii@simonsfoundation.org)

- Group Leader for Neuroscience, Flatiron Institute, Simons Foundation

Emad Fatemizadeh (e-mail: fatemizadeh@sharif.edu)

- Associate Professor, Electrical Engineering, Sharif University of Technology