

# Amin Nejatbakhsh

## Curriculum Vitae

+1 (917) 861-0912  
mn2822@columbia.edu  
columbia.edu/~mn2822

### Education

- 2017–Now **Ph.D. Student in Theoretical Neuroscience,**  
*Columbia University.*
- 2017–2019 **M.A. & M.Phil in Theoretical Neuroscience,**  
*Columbia University.*
- Courses: Differentiable Manifolds (D. McDuff), Sparse Representations and High Dimensional Geometry (J. Wright), Deep Generative Models (J.P. Cunningham), Graphical Models (D. Blei), Advanced, Machine Learning (J.P. Cunningham), Introduction to Theoretical Neuroscience (L.F. Abbott), Computational Statistics (L. Paninski), Statistics for Neuroscientists (L. Paninski), Survey of Neuroscience (F. Polleux), Advanced Theoretical Neuroscience (K.D. Miller)
  - GPA: 3.73/4
- 2011–2016 **B.Sc. in Computer Engineering, Minor in Pure Mathematics,**  
*Sharif University of Technology.*
- Thesis: "Design and Implementation of a Voice Recognition System Based on the Rat's Auditory System", supervised by Prof. M. Soleymani (19.8/20).
  - Courses: Medical Neuroscience (L.E. White), Biomath (A. Abbasian), Neuroscience (R. Lashgari), Synapses, Neurons and Brains (I. Segev), Computational Neuroscience (R. Rao), Machine Learning (H.R. Rabiee), Modern Information Retrieval (M. Soleymani), Machine Learning (A. Ng)
  - GPA: 17.07/20 (3.6/4)
- 2007–2010 **Diploma in Physics and Mathematics Discipline,**  
*Allameh Tabatabaei High school.*

### Fields of Interest

**Computational and Systems Neuroscience.**  
**Statistics and Dynamical Systems.**  
**Machine Learning and Optimization.**

### Research Experience

- Current **Graduate Research Assistant.**
- Developed methods for extracting neural trajectories and neural signals from volumetric videos of transgenic C-elegans under the supervision of Prof. L. Paninski in collaboration with Prof. O. Hobert and Prof. V. Venkatachalam (work in progress).
- 2017–2018 **Data Analyst.**
- Analyzed LFP and spiking data to study the effect of probabilistic cues on the attention network. Co-supervised by Prof. J. Gottlieb and Prof. R. Lashgari.
- 2015–2017 **Research Assistant in Brain Engineering Research Center at IPM.**
- Designed and implemented an experimental design and data collection system (more info).
  - Ran a distributed computing system on the computers in the lab for parallel computing.
  - Analyzed LFP signals to cluster V1 neurons.

### Presentations

- Summer 2019 **Invited Talk**, Northeastern University.
- Title: Semi-automated cell identification in NeuroPAL *C. elegans* strains.
- Fall 2017 **Society for Neuroscience (SfN)**, *Poster Session*, Washington, D.C.
- A. Nejatbakhsh, N. C. Foley, H. R. Nasrabadi, V. Davoodnia, E. Zabehe, R. Lashgari, J. Gottlieb. "Expected value correlates with reduction in alpha-beta power in monkey dorsolateral prefrontal and inferior parietal lobe".
  - J. Doostmohammadi, H. Shabani, A. Nejatbakhsh, A. Yoonessi, R. Lashgari. "Response variability of V1 neurons in awake primate".

## Honors and Awards

- 2015 **Gold Medal**, in *22nd International Mathematical Competition (IMC)*, Blagoevgrad.
- 2015 **Gold Medal**, in *39th Iranian Mathematical Society Competition (IMS)*, Yazd.
- 2014 **Ranked 3/7**, in *13th International German Open Robocup*, Magdeburg.
- Member of Paaydar Team in 3D Soccer Simulation League.
- 2014 **Ranked 2/6**, in *3rd National Sharifcup Competition*, Tehran.
- Leader of Paaydar Team in Traffic Control League.
- 2010 **Gold Medal**, in *28th Iranian National Mathematical Olympiad (INMO)*, Tehran.
- 2009 **Silver Medal**, in *27th Iranian National Mathematical Olympiad (INMO)*, Tehran.

## Publications

Eviatar Yemini, Albert Lin, Amin Nejatbakhsh, Erdem Varol, Ruoxi Sun, Gonzalo E. Mena, Aravinthan D.T. Samuel, Liam Paninski, Vivek Venkatachalam, and Oliver Hobert. Neuropal: A neuronal polychromatic atlas of landmarks for whole-brain imaging in *c. elegans*. **CELL**, 2020. In Review.

Erdem Varol and Amin Nejatbakhsh. Wasserstein total variation filtering. **International Conference on Acoustics, Speech, and Signal Processing (ICASSP)**, 2020. Submitted.

Erdem Varol, Amin Nejatbakhsh, and Conor McGrory. Temporal wasserstein non-negative matrix factorization for non-rigid motion segmentation and spatiotemporal deconvolution. **Conference on Computer Vision and Pattern Recognition (CVPR)**, 2020. Submitted.

Amin Nejatbakhsh and Erdem Varol. Robust approximate linear regression without correspondence. **International Conference on Artificial Intelligence and Statistics (AISTATS)**, 2020. Submitted.

Gonzalo Mena, Erdem Varol, Amin Nejatbakhsh, Eviatar Yemini, and Liam Paninski. Sinkhorn permutation variational marginal inference. **2nd Symposium on Advances in Approximate Bayesian Inference (AABI)**, 2019.

Amin Nejatbakhsh and Erdem Varol. Joint segmentation and labeling of *c. elegans* neurons. **Conference on Computer Vision and Pattern Recognition (CVPR)**, 2020. Submitted.

Conor McGrory, Amin Nejatbakhsh, and Erdem Varol. Non-linear matrix factorization methods for extracting calcium traces in moving *c. elegans* videos. **Computational and Systems Neuroscience (COSYNE)**, 2020. Submitted.

Erdem Varol, Gonzalo Mena, Amin Nejatbakhsh, Eviatar Yemini, and Liam Paninski. Probabilistic atlases of *c.elegans* neurons in neuropal. **Learning Meaningful Representations of Life Workshop at the 33rd Conference on Neural Information Processing Systems (NeurIPS)**, 2019. Submitted.

Francesco Fumarola and Amin Nejatbakhsh. Correlating non-simultaneous neural data. **Computational and Systems Neuroscience (COSYNE)**, 2020. Submitted.

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## Teaching Experience

- Spring 2020 **Teaching Assistant for Theoretical Neuroscience**,  
Instructor: Prof. L. Abbott, S. Fusi, K. Miller, A. Litwin-Kumar.
- Fall 2019 **Instructor of Probabilistic Programming Workshop (more info).**
- Summer 2017 **Instructor of Computational Neuroscience Workshop.**
- Spring 2016 & **Teaching Assistant for Engineering Probability and Statistics**,  
Fall 2015 Instructor: Prof. H. Rabiee.
- Fall 2015 **Teaching Assistant for Modern Information Retrieval**,  
Instructor: Prof. M. Soleymani-Baghshah.
- Spring 2013 **Teaching Assistant for Linear Algebra**,  
Instructor: Prof. A. Ranjbar-Motlagh.
- Summer 2015 **Instructor of iOS Application Development Workshop.**
- 2009–Now **Instructor of Mathematical and Informatics Olympiad.**

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## Working Experience

- Fall 2015 **Employee of Software Development**, *Torob Company*.  
◦ Developed an automatic feature extraction and clustering system (Python, sickit-learn)
- 2012–2014 **Employee of Mobile Application Development**, *Hasin Company*.  
◦ Developed Taaghche and Gramophone iOS Applications (Objective-C)

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## Mentoring Experience

- 2018–2019 **Daiki Tagami**, *undergraduate student in statistics and biology*, Columbia University.  
◦ Role: provided research direction and learning material for statistics, machine learning, and neural networks and co-authored a paper.

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## Professional Development

- 2017–Now **Member of Inference in Dynamical Systems Reading Group.**  
◦ A grad student and post-doc run reading group in which we discuss recent advances of statistical inference methods in linear/non-linear, parametric/non-parametric, latent/non-latent variable models (website).
- 2017–Now **Member of Machine Learning Reading Group.**  
◦ Paper discussion and presentation sessions run by Prof. Blei's group covering a variety of topics in statistics and machine learning.
- Fall 2016 **Three-day Hands-on fMRI Workshop.**  
◦ The common preprocessing and analysis methods on structural and functional MRI data using Freesurfer application was covered by Dr. M. Vaziri and Dr. R. Rajimehr.
- Fall 2016 **Two-week International IBRO School on Brain Mapping.**  
◦ Physics, theories, technologies, and analysis of brain imaging techniques such as fMRI, EEG, fNIRS, TMS, and tDCS was covered by instructors such as Prof. R. Savoy, Prof. N. Muggleton.
- Spring 2016 **Three-day Stereology Course.**  
◦ The three-dimensional interpretation (such as the computation of the volume or finding neurons and synapses) of two-dimensional cross sections of brain tissue was covered by Prof. J. Nyengaard.
- 2015–2017 **Weekly Computational Neuroscience Journal Clubs.**  
◦ Weekly paper reading sessions was held at IPM by Prof. A. Abbasian in which a wide range of the theories in computational neuroscience such as predictive coding theory, graph theory, topology, point process, and dynamical systems were discussed.

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## Professional Skills

ML & Stats Pyro, Pytorch, Tensorflow, CVX  
Neuroscience Fieldtrip, Freesurfer, Psychtoolbox, Brian SNN Simulator  
Programming Python, Matlab, Java, C, C++, Javascript, Prolog, Objective-C, Verilog  
Web Django, NodeJS, CSS, HTML  
Typesetting L<sup>A</sup>T<sub>E</sub>X, Microsoft Office

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## Languages

**English** (Fluent), **Persian** (Native), **Azerbaijani** (Intermediate), **Arabic** (Basic), **Turkish** (Basic)

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## Extracurricular Activities

Fall 2019 **7th Rank**, of Newcomer Level Ballroom Dance in Princeton Ballroom Competition.  
2017–Now Member of **GISU** Cultural Dance Group (website).  
2017–Now Player of soccer and basketball at Columbia Intramurals League  
Summer 2019 **Medal**, in NYC Triathlon (Olympic Distance).  
Spring 2015 **Gold Medal**, in Sharif University Basketball Championships Competition.  
Fall 2014 **Technical Staff**, in Association Computing Machinery (ACM-ICPC) Competition.  
2011–2017 Member of Sharif University Mountain Climbing Group.