

Richard Gao

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EDUCATION

PhD., Cognitive Science, University of California, San Diego **2014 – Present**
BASc., Engineering Science (Biomedical), University of Toronto. **CGPA: 3.9/4** **2014**

PUBLICATIONS & PREPRINTS

1. Moore, S. M., Seidman, J. S., Ellegood, J., **Gao, R.**, Savchenko, A., Troutman, T. D., ... & Voytek, B. (2019). Setd5 haploinsufficiency alters neuronal network connectivity and leads to autistic-like behaviors in mice. *Translational Psychiatry*, 9(1), 24.
 2. Haller, M., Donoghue, T., Peterson, E., Varma, P., Sebastian, P., **Gao, R.**, ... & Voytek, B. (2018). Parameterizing neural power spectra. *bioRxiv*
 3. Trujillo, C. A.*, **Gao, R.***, Negraes, P. D.*, Chaim, I. A., Domissy, A., Vandenberghe, M., ... & Muotri, A. R. (2018). Nested oscillatory dynamics in cortical organoids model early human brain network development. *bioRxiv*
 4. **Gao, R.**, Peterson, E. J. & Voytek, B. (2017). Inferring synaptic excitation/inhibition balance from field potentials. *Neuroimage* 158, 70–78.
 5. **Gao, R.** (2016). Interpreting the electrophysiological power spectrum. *Journal of Neurophysiology* 115, 628–630.
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PEER-REVIEWED CONFERENCE PAPERS

1. **Gao, R.**, Voytek., B. (2019). Hierarchy of cortical population characteristic timescales inferred from field potentials. *Computational and Systems Neuroscience (Cosyne)*. Poster.
2. **Gao, R.**, Liao, L., Voytek, B. (2018). Spectral power variation separates oscillatory from non-oscillatory stochastic neural dynamics. *Cognitive Computational Neuroscience*. Poster.
3. **Gao, R.**, Donoghue, T., Voytek, B. (2018) Defining Cognition: cognitive ontology via text-mining and word-embedding. *Cognitive Neuroscience Society (CNS) Annual Meeting*. Poster.
4. **Gao, R.**, Donoghue, T., Voytek., B. (2017). Automated generation of cognitive ontology via web text-mining. *CogSci Annual Meeting Proceedings*, 2067-72
5. **Gao, R.**, Voytek, B. (2016). Inferring excitatory and inhibitory synaptic parameters from the local field potential. *Computational and Systems Neuroscience (Cosyne)*. p.103. Poster.

2014 & Earlier

1. **Gao, R.** Design of a closed-loop electrical stimulation system for treatment of epilepsy. Undergraduate Honour's Thesis.
 2. **Gao, R.** Wireless acquisition of physiological signals for detection of activity engagement in children with communication difficulties. *IBBME Research Symposium*. Talk
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GRANTS & AWARDS

- UCSD CRES Undergrad Research Award (advising Lauren Liao): **\$5,000** **2018**
- Kavli Institute for Brain and Mind, Innovative Research Grant: **\$50,000** **2017**
- NSERC Postgraduate Scholarship-Doctoral: **\$21,000/year** **2016 – 2019**
- NSERC Alexander Graham Bell Canada Graduate Scholarship (Declined) **2016**
- Cosyne 2016 Travel Grant: **\$800** **2016**
- UCSD Frontiers of Innovation Scholar Program Research Grant: **\$25,000** **2015**
- UCSD Katzin Prize. Fellowship: **\$10,000/year** **2014 – 2019**

- Engineering Science Award of Excellence (CGPA 3.9/4 or above, 10 awardees) **2014**
 - NSERC Industrial Undergraduate Student Research Award. **\$6,000** **2012 – 2013**
 - NSERC Undergraduate Student Research Award. **\$6,000** **2011**
 - Queen Elizabeth Aim For the Top Scholarship. **\$3,000/year** **2009 – 2014**
 - International Baccalaureate (IB) Diploma **2009**
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RESEARCH & PROFESSIONAL EXPERIENCE

- Computational Neuroscience Summer School (2015)** **Redwood Center, UC Berkeley**
- Lectures and lab sessions on computational and theoretical neuroscience.
- Research Rotation, (2015, 4 months)** **Alysson Muotri, UCSD**
- Modeling Rett syndrome using human induced pluripotent stem cell derived neural cultures.
- Research Rotation, (2015, 4 months)** **Eran Mukamel, UCSD**
- Neural mass modeling of phase-amplitude coupling changes during anesthesia.
- Research Rotation, (2015, 4 months)** **Douglas Nitz, UCSD**
- Analyzing single unit and local field potential recordings in rat ventral tegmental area.
- Undergraduate Honour's Thesis, (2013-2014, 8 months)** **Roman Genov, UofT**
- Designing closed-loop electrical stimulation system for treatment of intractable epilepsy.
- Research Associate, (2012-2013, 16 months)** **InteraXon Inc (MUSE). Toronto**
- Developing EEG-based BCI algorithms for mindfulness meditation training.
- Undergraduate Research, (2011, 8 months)** **Tom Chau, UofT**
- Creating a GUI and physiological signal collection system for real-time analysis of affect and feedback in children with communication disorders.
- Undergraduate Research, (2010, 8 months)** **Adam Anderson, UofT**
- Classifying emotional response to affective stimuli using physiological signals.
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TEACHING

- Writing Center (Writing Hub)** **Graduate Writing Consultant, UC San Diego**
- Holding one-on-one consultations for graduate students from all departments, working on high-level writing concerns in various professional documents, including manuscripts, research statements, resumes/CVs, etc. Paid position.
- Seminar: Representation in the Mind (2018 Spring)** **Co-Organizer, UC San Diego**
- Graduate seminar on the past, present, and future of representation in the mind and other intelligent systems. Covers topics including neural, embodied, and distributed representation.
- Introduction to Data Science (2017 & 2018)** **Teaching Assistant, UC San Diego**
- Intro level class on broad topics of data science, including data munging and visualization in Python, statistics and ML, text-mining, and privacy. Class hosted on JupyterHub.
- Introduction to Cognitive Science (2016, 2015)** **Teaching Assistant, UC San Diego**
- Intro level class on various subfields of cognitive science, including neuroscience, psychology, linguistics, machine intelligence, and social and embodied cognition.
- Machine Learning I (2015)** **Teaching Assistant, UC San Diego**
- Advanced undergraduate class on machine learning algorithms, including Bayesian techniques, clustering, linear classifiers, artificial neural networks, and others.
- Introduction to Statistical Analysis (2015)** **Teaching Assistant, UC San Diego**
- Intro level undergraduate class on probability, statistics, and hypothesis testing.
- Praxis I: Engineering Design (2014)** **Design Studio Leader, University of Toronto**
- Freshmen class on engineering design processes, communication skills, and critical thinking. Led studios and active learning sessions for designing and reverse engineering artifacts.
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REVIEW SERVICES

Journal of Neuroscience (2), PLOS Computational Biology (1), Journal of Cognitive Neuroscience (1), NeuroImage (1)

MENTORSHIP

Tanner Turner, UCSD Applied Mathematics & Computer Science	2016 – 2017
Lauren Liao, UCSD Mathematics (Probability & Statistics)	2016 – 2019
Sitan (Stan) Liu, UCSD Exchange student from Sichuan University	2017
Dylan Christiano, UCSD Cognitive Science	2017 – 2018
Julio Dominguez, UCSD Cognitive Science	2017 – 2018
Christopher Caligiuri, Canyon Crest Academy	2017 –

References Available Upon Request

REJECTIONS (FailCV)

Papers

- Izhikevich et al.
 - o J Neuro Methods (1st review)
- Negraes, Gao Trujillo et al., (?):
 - o Nature (editor), Nature Biotechnology (1st review), Science (1st review), Nature (1st review), Cell (1st review)
- Gao et al., 2017, NeuroImage:
 - o Neuron (editor), PNAS (editor, 30 days!), NN (editor), eLife (editor), JNeuro (1st review), JNPhys (1st review)
- Gao, 2015, JNeurophysiol:
 - o PLOS, TINS, NeuroImage

Grants

- KIBM2015
- NSERC2015

Conferences

- Cosyne 2018

Summer schools

- Cajal Institute summer school 2018
- Okinanwa Comp Neuro (OCNC2017)
- UW/Allen Brain 2016, 2018
- Woods Hole 2016

PhD applications

- MIT
- Duke
- Caltech (interview)

2019

6. **Gao, R.**, Voytek., B. Hierarchy of cortical population characteristic timescales inferred from field potentials. *Computational and Systems Neuroscience (Cosyne)*. Peer-reviewed abstract & poster presentation.

2018

7. **Gao, R.**, Liao, L., Voytek, B. Spectral power variation separates oscillatory from non-oscillatory stochastic neural dynamics. *Cognitive Computational Neuroscience*. Peer-reviewed abstract & poster presentation.
8. **Gao, R.**, Donoghue, T., Voytek, B. Defining Cognition: cognitive ontology via text-mining and word-embedding. *Cognitive Neuroscience Society (CNS) Annual Meeting*. Poster.

2017

1. Liao, L., **Gao, R.**, Voytek, B. Differentiating noise from structure in electrophysiological power spectra. *Society for Neuroscience (SfN) Annual meeting*. Poster.
2. **Gao, R.**, et al. Network oscillations in human iPSC-derived cortical organoids. *Society for Neuroscience (SfN) Annual meeting*. Poster.

2016

3. **Gao, R.**, Voytek, B. Spiking correlates and temporal variability of oscillatory frequency modulation. *Society for Neuroscience (SfN) Annual meeting*. Poster.
4. **Gao, R.**, Voytek, B. Inferring excitatory and inhibitory synaptic parameters from the local field potential. *Computational and Systems Neuroscience (Cosyne)*. p.103. Peer-reviewed abstract & poster presentation.

2015

5. **Gao, R.**, Voytek, B. Exploring the neural basis of the electrophysiological power spectrum. *Society for Neuroscience (SfN) Annual meeting*. Poster
 6. Noto, T., Cole, S.R., **Gao, R.**, Peterson, E.J., Voytek, B. Neural network properties can be inferred from electrophysiological power spectral geometry. *Society for Neuroscience (SfN) Annual meeting*. Poster
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