

Stanford



Daniel J O'Shea

Research Engineer

Bioengineering

 Curriculum Vitae available Online

Bio

BIO

I am currently a postdoctoral scholar working with Dr. Karl Deisseroth (Stanford) and Dr. Eiman Azim (Salk Institute) to understand the brain-wide computations that underlie skilled behavior, focusing on how internal predictive models are engaged within the cerebellum to guide dynamics in the cerebral cortex. Previously, I worked with Dr. Krishna Shenoy in the Neural Prosthetics Systems lab, as well as Dr. Maneesh Sahani at the Gatsby Computational Neuroscience Unit.

I study the neural mechanisms that control movement, and more broadly, how neural populations spanning interconnected brain regions perform the distributed computations that drive skilled behavior. I develop experimental and computational tools to understand the neural population dynamics that establish speed and dexterity. I construct dynamical systems models of neural computations, which I then test and refine using targeted perturbations of neural activity via optogenetic and electrical stimulation. I engineer robotic systems to facilitate precision movement behaviors and to deliver mechanical perturbations to probe flexible, feedback control. I aim to discover insights into brain-wide computations in health and in neurological disease, with an eye towards identifying effective, targeted neuromodulation to treat movement disorders

ACADEMIC APPOINTMENTS

- Research Engineer, Bioengineering

HONORS AND AWARDS

- Graduate Research Fellowship, National Science Foundation (2009-2012)
- Stanford Graduate Fellowship, Stanford University (2009-2014)
- NSF IGERT Research Fellowship, Stanford Center for Mind, Brain, and Computation (2012-present)

LINKS

- Google Scholar: <https://scholar.google.com/citations?user=VEMio4gAAAAJ&hl=en>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

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I aim to discover insights into brain-wide computations in health and in neurological disease, with an eye towards identifying effective, targeted neuromodulation to treat movement disorders.

Publications

PUBLICATIONS

- **Cortical preparatory activity indexes learned motor memories.** *Nature*
Sun, X., O'Shea, D. J., Golub, M. D., Trautmann, E. M., Vyas, S., Ryu, S. I., Shenoy, K. V.
1800
- **Dendritic calcium signals in rhesus macaque motor cortex drive an optical brain-computer interface.** *Nature communications*
Trautmann, E. M., O'Shea, D. J., Sun, X., Marshel, J. H., Crow, A., Hsueh, B., Vesuna, S., Cofer, L., Bohner, G., Allen, W., Kauvar, I., Quirin, S., MacDougall, et al
2021; 12 (1): 3689
- **Causal Role of Motor Preparation during Error-Driven Learning.** *Neuron*
Vyas, S. n., O'Shea, D. J., Ryu, S. I., Shenoy, K. V.
2020
- **An Open Resource for Non-human Primate Optogenetics.** *Neuron*
Tremblay, S. n., Acker, L. n., Afraz, A. n., Albaugh, D. L., Amita, H. n., Andrei, A. R., Angelucci, A. n., Aschner, A. n., Balan, P. F., Basso, M. A., Benvenuti, G. n., Bohlen, M. O., Caiola, et al
2020
- **Accurate Estimation of Neural Population Dynamics without Spike Sorting.** *Neuron*
Trautmann, E. M., Stavisky, S. D., Lahiri, S. n., Ames, K. C., Kaufman, M. T., O'Shea, D. J., Vyas, S. n., Sun, X. n., Ryu, S. I., Ganguli, S. n., Shenoy, K. V.
2019
- **Inferring single-trial neural population dynamics using sequential auto-encoders** *NATURE METHODS*
Pandarinath, C., O'Shea, D. J., Collins, J., Jozefowicz, R., Stavisky, S. D., Kao, J. C., Trautmann, E. M., Kaufman, M. T., Ryu, S. I., Hochberg, L. R., Henderson, J. M., Shenoy, K. V., Abbott, et al
2018; 15 (10): 805+
- **Development of an optogenetic toolkit for neural circuit dissection in squirrel monkeys** *SCIENTIFIC REPORTS*
O'Shea, D. J., Kalanithi, P., Ferenczi, E. A., Hsueh, B., Chandrasekaran, C., Goo, W., Diester, I., Ramakrishnan, C., Kaufman, M. T., Ryu, S. I., Yeom, K. W., Deisseroth, K., Shenoy, et al
2018; 8: 6775
- **ERAASR: an algorithm for removing electrical stimulation artifacts from multielectrode array recordings** *JOURNAL OF NEURAL ENGINEERING*
O'Shea, D. J., Shenoy, K. V.
2018; 15 (2): 026020
- **The need for calcium imaging in nonhuman primates: New motor neuroscience and brain-machine interfaces** *EXPERIMENTAL NEUROLOGY*
O'Shea, D. J., Trautmann, E., Chandrasekaran, C., Stavisky, S., Kao, J. C., Sahani, M., Ryu, S., Deisseroth, K., Shenoy, K. V.
2017; 287: 437-451
- **The Importance of Planning in Motor Learning.** *Neuron*
O'Shea, D. J., Shenoy, K. V.
2016; 92 (4): 669-671
- **The need for calcium imaging in nonhuman primates: New motor neuroscience and brain-machine interfaces.** *Experimental neurology*
O'Shea, D. J., Trautmann, E., Chandrasekaran, C., Stavisky, S., Kao, J. C., Sahani, M., Ryu, S., Deisseroth, K., Shenoy, K. V.
2016
- **A coaxial optrode as multifunction write-read probe for optogenetic studies in non-human primates.** *Journal of neuroscience methods*
Ozden, I., Wang, J., Lu, Y., May, T., Lee, J., Goo, W., O'Shea, D. J., Kalanithi, P., Diester, I., Diagne, M., Deisseroth, K., Shenoy, K. V., Nurmikko, et al
2013; 219 (1): 142-154
- **Principles for applying optogenetic tools derived from direct comparative analysis of microbial opsins.** *Nature methods*

Mattis, J., Tye, K. M., Ferenczi, E. A., Ramakrishnan, C., O'Shea, D. J., Prakash, R., Gunaydin, L. A., Hyun, M., Fenno, L. E., Gradinaru, V., Yizhar, O., Deisseroth, K.
2012; 9 (2): 159-172

● **Principles for applying optogenetic tools derived from direct comparative analysis of microbial opsins** *NATURE METHODS*

Mattis, J., Tye, K. M., Ferenczi, E. A., Ramakrishnan, C., O'Shea, D. J., Prakash, R., Gunaydin, L. A., Hyun, M., Fenno, L. E., Gradinaru, V., Yizhar, O., Deisseroth, K.
2012; 9 (2): 159-172

● **Neocortical excitation/inhibition balance in information processing and social dysfunction** *NATURE*

Yizhar, O., Fenno, L. E., Prigge, M., Schneider, F., Davidson, T. J., O'Shea, D. J., Sohal, V. S., Goshen, I., Finkelstein, J., Paz, J. T., Stehfest, K., Fudim, R., Ramakrishnan, et al
2011; 477 (7363): 171-178