Richy Yun, PhD

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3195 Garrity Way Apt 814, Richmond, CA, 94806

Experience

Sonera

Dec 2023 – Present
Berkely, CA

Lead Neuroscientist

- Directing the neuroscience and software engineering teams in designing biomagnetic applications for the Sonera acoustic magnetic sensor
- Developing preprocessing techniques and machine learning models on complex, multimodal datasets for use in biomagnetic applications
- Enabling ambient operation of magnetic sensors through denoising

Nov 2022 – Dec 2023
Berkely, CA

Computational Neuroscientist

- First neuroscientist to join the team, tasked with building the neuroscience team as well as developing neuroscience tools from the ground up
- Testing and implementing various magnetic sensors for detecting heart, muscle, and brain activity in human subjects
- Designing and performing experiments to characterize biomagnetic signals and quantitatively compare magnetic signals to non-invasive electrical signals
- Investigating design parameters of magnetic sensors for biomagnetism and communicating decisions with the materials science and engineering teams

Laboratory of Dr. Eberhard Fetz

Jan 2017 – Sept 2022
University of Washington
Seattle, WA

Graduate Research Assistant

- Recording and processing of *in vivo* behavior, local field potentials, and single unit activity from the non-human primate motor cortex
- Delivering open- and closed- loop electrical microstimulation to measure stimulus response and induce synaptic plasticity
- Implementing unsupervised learning techniques including dimensionality reduction and clustering for behavioral brain state classification

Laboratory of Dr. Miguel Nicolelis

Jan 2014 – May 2016
Duke University
Durham, NC

Undergraduate Research Assistant

- Training rats in a brain-computer interface task using a sensory neuroprosthesis
- Designing experiments to test temperature dependence of sensory evoked potentials

Technical Skills

Coding	Python, MATLAB, C/C++, Java
Data handled	Multimodal large-scale datasets including magnetic and electrical data, behavioral data, LFPs, and single-unit recordings – up to 24 hours of 32 channels at 20 kHz
	Experience with rats, non-human primates, and human subjects
Computation	Time-frequency and state-space analysis, dimensionality reduction and clustering
Machine Learning	Spiking neural networks (integrate-and-fire), PyTorch, Tensorflow
Miscellaneous	CAD/CAM, 3D printing, digital and analog circuits, PCB design

Publications

Mishler J., **Yun R.**, Perlmutter S.I., Rao R.P., Fetz E.E. Manipulation of neural activity by an artificial spiking neural network implemented on a bidirectional brain-computer interface in macaque monkeys. [Manuscript in preparation, current version available on request]

Yun R., Mishler J., Perlmutter S.I., Fetz E.E. (2022). Paired stimulation for spike-timing dependent plasticity quantified with single neuron responses in primate motor cortex. bioRxiv. doi: https://doi.org/10.1101/2022.05.04.490684

Yun R., Mishler J., Rembado I., Rao R.P., Perlmutter S.I., Fetz E.E. (2022). Local field potentials and single unit dynamics in motor cortex of unconstrained macaques during different behavioral states. *Frontiers in Neuroscience* 2023 Nov 23; 17:1273627.

Yun R., Mishler J., Perlmutter S.I., Rao R.P., Fetz E.E. (2022). Responses of cortical neurons to intracortical microstimulation in awake primates. *eNeuro*. 2023 Apr 26; 10(4):ENEURO.0336-22.2023.

Yun R., Bogaard A.R., Richardson A.G., Zanos S., Perlmutter S.I. and Fetz E.E. (2021). Cortical stimulation paired with volitional unimanual movement affects interhemispheric communication. *Frontiers in Neuroscience* 15:782188.

Fetz E.E., Shupe L., Miles F., Jones G., **Yun R.**, Mishler J., Rembado I., Murphy L., Perlmutter S.I. (2021). Neurochip3: an autonomous multichannel bidirectional brain-computer interface for closed-loop activity-dependent stimulation, *Frontiers in Neuroscience* 15:718465.

Hartmann K., Thomson E., Zea I., **Yun R.**, Mullen P., & Canarick J. et al. (2016). Embedding a Panoramic Representation of Infrared Light in the Adult Rat Somatosensory Cortex through a Sensory Neuroprosthesis. *Journal of Neuroscience*, 36(8), 2406-2424.

Conference Abstracts

Yun R., Mishler J., Perlmutter S.I., Rao R.P., Fetz E.E.. Excitatory single-unit responses to intracortical microstimulation in primate motor cortex suggest changes in cortico-cortical synaptic strength. Program No. 038.02. Chicago, IL: Society for Neuroscience, October 2019.

Mishler J., **Yun R.**, Perlmutter S.I., Rao R.P., Fetz E.E.. Implementing an integrate-and-fire neural network on a brain-computer interface. Program No. 314.10. Chicago, IL: Society for Neuroscience, October 2019.

Yun R., Bogaard A.R., Richardson A.G., Zanos S., Fetz E.E.. Interhemispheric interactions modulate behavioral responses during a reaction time task in non-human primates. Program No. 152.04. Washington, DC: Society for Neuroscience, November 2017.

Education

Aug 2016 – Aug 2022
Seattle, WA

University of Washington
PhD in Bioengineering
Dissertation title: "Stimulus induced targeted plasticity of the macaque motor cortex using intracortical microstimulation "

Aug 2011 – May 2016
Durham, NC

Duke University
BS in Biomedical Engineering and Electrical & Computer Engineering
Minor in Computer Science
Cum Laude, Graduation with Departmental Distinction
Thesis title: "Embedding a panoramic representation of infrared light in the adult rat somatosensory cortex through a sensory neuroprosthesis"