Curriculum Vitae

Smrithi Sunil | smrithi.x.sunil@gmail.com

Education

PhD in Biomedical Engineering
Boston University, Boston, MA
September 2021, GPA: 3.92/4.0
Advisor: David Boas
Thesis: Widefield optical imaging of neurovascular coupling during stroke recovery

Bachelor of Science in Biomedical Engineering
Minor in Electrical Engineering
Case Western Reserve University, Cleveland, OH
May 2015, GPA: 3.6/4.0

Research Experience

Scientist I

Allen Institute for Neural Dynamics
Allen Institute, Seattle, WA
November 2021 - Present

- I develop and utilize imaging techniques to study the dynamics of neuromodulators and neurotransmitters across different brain regions during decision making behaviors in mice.
- The goal of this research is to understand how neuromodulators like dopamine, serotonin, and acetylcholine influence decision making.

Graduate Research Assistant

Advised by David Boas
Department of Biomedical Engineering
Boston University, Boston, MA
November 2017 - September 2021

- I studied the longitudinal evolution of neurovascular coupling during stroke recovery in a mouse model of photothrombosis.

- The goal of this research was to guide the use of functional neuroimaging in human stroke patients.

Catalyst Fellow

Catalyst
Massachusetts Institute of Technology, Boston, MA
Spring 2020

- An immersive and collaborative program that accelerates and heightens the potential impact of biomedical research on health technology.
- Spearheaded a team to explore and develop a proposal for a low-cost non-invasive hemoglobin monitor that can be deployed in low-resource settings in Africa and India to combat severe anemia and malaria.

Graduate Research Assistant

Advised by Jason Ritt
Department of Biomedical Engineering
Boston University, Boston, MA
December 2015 - October 2017

- I used closed-loop real-time optogenetic feedback to understand the involvement of cortical sensory areas in active sensing motor outputs on short timescales.
- The goal of this research was to understand how sensory information is integrated in cortical circuits.

Undergraduate Research Assistant

Advised by Bolu Ajiboye
Department of Biomedical Engineering
Case Western Reserve University, Cleveland, OH
September 2014 - February 2015

- Recorded and evaluated EEG signals during hand grasp movements performed by patients using a joystick.

Undergraduate Research Assistant

Advised by Jeffrey Capadona
Department of Biomedical Engineering
Case Western Reserve University, Cleveland, OH
January 2012 - August 2014

- Performed experiments to understand the role of macrophages and microglia in neuroinflammation after intracortical electrode implantation.

Publications

- **Sunil, S.**, Jiang J., Shah S., Kura S., Kilic K., Erdener, S.E., Ayata C., Devor A., Boas D.A. Targeted photothrombotic stroke leads to disruptions in neurovascular coupling. (bioRxiv)
- **Sunil, S.**, Zilpelwar, S., Boas, D. A., Postnov, D. D. Guidelines for obtaining an absolute blood flow index with laser speckle contrast imaging. (bioRxiv)
- Kılıç, K., Desjardins, M., Tang, J., Thunemann, M., **Sunil, S.**, Erdener, Ş. E., Postnov, D. D., Boas, D. A., & Devor, A. (2021). Chronic Cranial Windows for Long Term Multimodal Neurovascular Imaging in Mice. Frontiers in Physiology, 11.
- **Sunil, S.**, Evren, S., Cheng, X., Kura, S., Tang, J., Jiang, J., Karrobi, K., Kılıç, K., Roblyer, D., & Boas, D. A. (2021). Stroke core revealed by tissue scattering using spatial frequency domain imaging. NeuroImage: Clinical, 29, 102539.
- Yang, J., Chen, I. A., Chang, S., Tang, J., Lee, B., Kılıç, K., **Sunil, S.**, Wang, H., Varadarajan, D., Magnain, C. V, Chen, S.-C., Costantini, I., Pavone, F. S., Fischl, B., & Boas, D. A. (2020). Improving the characterization of ex vivo human brain optical properties using high numerical aperture optical coherence tomography by spatially constraining the confocal parameters. Neurophotonics, 7(4), 1–16.
- Kılıç, K., Tang, J., Erdener, Ş. E., **Sunil, S.**, Giblin, J. T., Lee, B. S., Postnov, D. D., Chen, A., & Boas, D. A. (2020). Chronic Imaging of Mouse Brain: From Optical Systems to Functional Ultrasound. Current Protocols in Neuroscience, 93(1), e98.
- **Sunil, S.**, Erdener, S. E., Lee, B. S., Postnov, D., Tang, J., Kura, S., Cheng, X., Chen, I. A., Boas, D. A., & Kılıç, K. (2020). Awake chronic mouse model of targeted pial vessel occlusion via photothrombosis. Neurophotonics, 7(1), 1–18.
- Tang, J., Erdener, S. E., **Sunil, S.**, & Boas, D. A. (2019). Normalized field autocorrelation function-based optical coherence tomography three-dimensional angiography. Journal of Biomedical Optics, 24(3), 036005.
- Hermann, J. K., Lin, S., Soffer, A., Wong, C., Srivastava, V., Chang, J., **Sunil, S.**, Sudhakar, S., Tomaszewski, W. H., Protasiewicz, G., Selkirk, S. M., Miller, R. H., & Capadona, J. R. (2018). The Role of Toll-Like Receptor 2 and 4 Innate Immunity Pathways in Intracortical Microelectrode-Induced Neuroinflammation. Frontiers in Bioengineering and Biotechnology, 6, 113.
- Freedman, D. S., Schroeder, J. B., Telian, G. I., Zhang, Z., **Sunil, S.**, & Ritt, J. T. (2016). OptoZIF Drive: a 3D printed implant and assembly tool package for neural recording and optical stimulation in freely moving mice. Journal of Neural Engineering, 13(6), 066013.
- Ravikumar, M., **Sunil, S.**, Black, J., Barkauskas, D. S., Haung, A. Y., Miller, R. H., Selkirk, S. M., & Capadona, J. R. (2014). The roles of blood-derived macrophages and resident microglia in the neuroinflammatory response to implanted Intracortical microelectrodes. Biomaterials, 35(28).
- Potter-Baker, K. A., Ravikumar, M., Burke, A. A., Meador, W. D., Householder, K. T., Buck, A. C., **Sunil, S.**, Stewart, W. G., Anna, J. P., Tomaszewski, W. H., & Capadona, J. R. (2014). A comparison of neuroinflammation to implanted microelectrodes in rat and mouse models. Biomaterials, 35(22).
- Potter, K. A., Buck, A. C., Self, W. K., Callanan, M. E., **Sunil, S.**, & Capadona, J. R. (2013). The effect of resveratrol on neurodegeneration and blood brain barrier stability surrounding intracortical microelectrodes. Biomaterials, 34(29).

Talks

- Allen Institute Showcase Symposium. *Towards a multiplexed understanding of neuromodulators.* December 2022.
- Optical Society of America, Biophotonics Congress. *Wide-field optical imaging of neurovascular coupling during stroke recovery.* April 2021.
- SPIE Photonics West Conference. *Longitudinal evolution of neurovascular coupling during stroke recovery.* March 2021
- Optical Society of America, Biophotonics Congress. *The evolution of hemodynamics during stroke recovery: from early hours to subsequent weeks.* April 2020.

Poster Presentations

- SPIE Photonics West Conference. *Focal pial vessel occlusion via photothrombosis with simultaneous monitoring of blood flow in awake mice.* February 2019.
- Society for Neuroscience Annual Conference. *Phase dependent differences in excitatory and inhibitory modulation of somatosensory cortex during active touch.* November 2017.
- Society for Neuroscience Annual Conference. *Active touch modulates cortical excitation and inhibition evoked by closed-loop optogenetic stimulation.* November 2016.
- Biomedical Engineering Society Annual Conference. *The Roles of Blood-derived Macrophages and Resident Microglia in the Neuroinflammatory Response to Implanted Intracortical Microelectrodes.* October 2014.
- Biomedical Engineering Society Annual Conference. *Characterization of Blood Brain Barrier Disruption at the Tissue-Electrode Interface.* September 2013.
- Biomedical Engineering Society Annual Conference. *Comparison of a rat and mouse model for evaluation of acute and chronic Neuroinflammation following device implantation in the brain.* October 2012.
- PiNO. *Grape-Derived Antioxidants Prevent Neurodegeneration in the Brain after Medical Device Implantation: Application for the Development of Neuroprotective Biomimetic Polymers.* June 2012.

Teaching Experience

Boston University Teaching Fellow

- BE 402 - Control Systems in Biomedical Engineering, Spring 2018, with Mary Dunlop
- BE 402 - Control Systems in Biomedical Engineering, Spring 2017, with Ahmad Khalil

Case Western Reserve University Teaching Fellow

- EBME 360 - Biomedical Instrumentation Laboratory, Spring 2015, with Dustin Tyler
- EBME 201 - Physiology-Biophysics I, Fall 2013, with Efstathios Karathanasis