

# Curriculum Vitae

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## 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 Efsthios Karathanasis