

COLIN SULLENDER

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EDUCATION

Continuing Education

Coursera: AI For Everyone (August 2021), Machine Learning (July 2021)

University of Texas at Austin (Austin, TX)

Doctor of Philosophy in Biomedical Engineering (December 2018)

Dissertation: *Quantitative Optical Imaging Platform for Studying Neurovascular Hemodynamics During Ischemic Stroke* (Advisor: Andrew K. Dunn, Ph.D.)

Certification in Graduate Portfolio Program in Imaging Science and Informatics

Master of Science in Engineering in Biomedical Engineering (May 2016)

Temple Foundation Graduate Fellow (2016 – 2017)

A.J. and Pat Welch Graduate Fellow (2015 – 2016)

NIH Ruth L. Kirschstein Graduate Fellow in Imaging Science and Informatics (2011 – 2013)

Cullen M. Crain Endowed Cockrell School of Engineering Graduate Fellow (2011 – 2012)

Relevant Coursework: *Biomedical Engineering Imaging Modalities, Fundamentals of Biomedical Optical Imaging, Optical Design, Digital Image and Video Processing, Functional Imaging Laboratory, Data Mining, Medical Device Design and Manufacturing, Biostatistics, Neurobiology of Disease, Cell and Tissue Engineering*

University of Washington (Seattle, WA)

Bachelor of Science in Bioengineering with College Honors in Bioengineering (June 2011)

Relevant Coursework: *Bioengineering Systems Analysis, Biomedical Instrumentation, Bioengineering Signal Processing, Medical Imaging, Bioengineering Analysis of Physiology, Introduction to Molecular Bioengineering, Introduction to Synthetic Biology, Bioengineering and Nanotechnology, Biochemistry*

EXPERIENCE

Postdoctoral Research Fellow, Department of Biomedical Engineering, University of Texas, Austin, TX (August 2018 – September 2022)

- Development of high-performance computing numerical Monte Carlo model of dynamic light scattering for computational speckle contrast optical tomography in the brain.
- Rapid iterative development of clinical laser speckle contrast imaging (LSCI) system for intraoperative blood flow monitoring during neurosurgery.
- Development of custom software for real-time LSCI visualization in clinical environment
- Testing and evaluation of LSCI flow measurement performance
- Primary Investigator: Andrew K. Dunn, Ph.D.

Graduate Research Assistant, Department of Biomedical Engineering, University of Texas, Austin, TX (August 2011 – August 2018)

- Development of a multimodal optical imaging system using laser speckle contrast imaging (LSCI) and oxygen-dependent phosphorescence lifetime imaging for studying the neurovascular hemodynamics during ischemic stroke.
- Design considerations included spatial light modulation with a Texas Instruments digital micromirror device (DMD), low-signal/high-speed data acquisition, and the processing of large-scale datasets.
- Development of custom software (C++) for real-time LSCI acquisition, processing, and visualization deployed to 10+ research groups worldwide.
- Primary Investigator: Andrew K. Dunn, Ph.D.

Associate, Jon Brumley Texas Venture Labs, Austin, TX (August 2016 – December 2016)

- Consulted for two internet startups, Cingo and SandBox Commerce, with the goal of providing foundational market research and market validation
- Deliverables included end-user survey results, competitive landscape analysis, and lists of potential clients and investors.

Summer Research Assistant, University of Texas Health Science Center, San Antonio, TX (June 2012 – September 2012)

- Development of optical imaging system combining laser speckle contrast imaging (LSCI) and multispectral reflectance imaging (MSRI) for visualizing retinal hemodynamics through a fiber-optic endoscope.
- Primary Investigator: Timothy Q. Duong, Ph.D.

Undergraduate Research Assistant, Department of Bioengineering, University of Washington, Seattle, WA (December 2009 – June 2011)

- Development of novel fluorogen-activating protein force sensor for detecting and quantifying tensile mechanical forces related to cellular adhesion.
- Designed *in vitro* microfluidic testing system to characterize mechanical dynamics of the chimeric protein during epifluorescent microscopy.
- Primary Investigator: Wendy Thomas, Ph.D.

Summer Research Assistant, Center for Biophysical Sciences and Engineering, University of Alabama at Birmingham, Birmingham, AL (June 2009 – Sept. 2009)

- Expression, purification, and crystallization of the *Ebolavirus* nucleocapsid protein for characterization via electron microscopy and x-ray crystallography
- Primary Investigator: Ming Luo, Ph.D.

SKILLS

Laboratory

Optical system design and optimization, high-speed data acquisition, MEMS integration, laser speckle contrast imaging, multi-photon microscopy, fluorescent and phosphorescent lifetime imaging, confocal microscopy, spectroscopy, TCSPC, Zemax, CAD, Monte Carlo modeling, rodent surgery and anesthesia, bacterial and mammalian cell culture, transfection, plasmid design, protein purification, western blot, gel electrophoresis, PCR, flow cytometry, FACS, size-exclusion and affinity chromatography, atomic force microscopy

Programming

Python, C++, MATLAB, LabVIEW, PHP, JavaScript, HTML, CSS, Java, MySQL, CMS

Media

Adobe Photoshop, Illustrator, and InDesign, Microsoft Office, Google Apps, Final Cut Pro

PUBLICATIONS

1. **C. T. Sullender**, *et al.*, Using pressure-driven flow systems to evaluate laser speckle contrast imaging, *Journal of Biomedical Optics*, 28(3), 036003 (2023).
2. A. Santorelli, **C. T. Sullender**, and A. K. Dunn, Multi-exposure Speckle Imaging for Quantitative Evaluation of Cortical Blood Flow, in *Neural Repair: Methods and Protocols*, 2616, 97-111 (2023).
3. D. R. Miller, *et al.* [including **C. T. Sullender**], Continuous blood flow visualization with laser speckle contrast imaging during neurovascular surgery. *Neurophotonics*, 9(2), 021908 (2022).
4. **C. T. Sullender**, *et al.*, Dynamics of isoflurane-induced vasodilation and blood flow of cerebral vasculature revealed by multi-exposure speckle imaging. *Journal of Neuroscience Methods*, 366, 109434 (2022).
5. C. Z. Jafari, *et al.* [including **C. T. Sullender**], Effect of vascular structure on laser speckle contrast imaging, *Biomedical Optics Express*, 11(10), 5826-5841 (2020).
6. M.-C. Ding, *et al.* [including **C. T. Sullender**], Peripheral electrical stimulation augments cerebral collateral circulation if performed within a critical time window. *bioRxiv* (2020).
7. F. He, *et al.* [including **C. T. Sullender**], Multimodal mapping of neural activity and cerebral blood flow reveals long-lasting neurovascular dissociations after small-scale strokes, *Science Advances*, 6(21), eaba1933 (2020).
8. T. A. Clark, *et al.* [including **C. T. Sullender**], Rehabilitative training interacts with ischemia-instigated spine dynamics to promote a lasting population of new synapses in peri-infarct motor cortex, *Journal of Neuroscience*, 39(43), 8471-8483 (2019).
9. T. A. Clark, *et al.* [including **C. T. Sullender**], Artery targeted photothrombosis widens the vascular penumbra, instigates peri-infarct neovascularization and models forelimb impairments, *Scientific Reports*, 9, 2323 (2019).
10. **C. T. Sullender**, *et al.*, Imaging of cortical oxygen tension and blood flow following targeted photothrombotic stroke, *Neurophotonics*, 5(3), 035003 (2018).
11. L. Luan, *et al.* [including **C. T. Sullender**], Nanoelectronics enabled chronic multimodal neural platform in a mouse ischemic model, *Journal of Neuroscience Methods*, 295, 68–76 (2018).
12. D. R. Miller, *et al.* [including **C. T. Sullender**], *In vivo* multiphoton imaging of a diverse array of fluorophores to investigate deep neurovascular structure, *Biomedical Optics Express*, 8(7), 3470–3481 (2017).

POSTERS AND PRESENTATIONS

1. Continuous Blood Flow Visualization with Laser Speckle Contrast Imaging During Cerebrovascular Surgery (*AANS 2022*)

2. Laser Speckle Contrast Imaging for Intraoperative Blood Flow Visualization During Neurosurgery (*Biophotonics Congress: Biomedical Optics 2022*)
3. Statistical Anatomy of Microvascular Networks in Living Mouse Cortex (*Biophotonics Congress: Biomedical Optics 2022*)
4. Intraoperative real-time and continuous cerebral blood flow visualization with laser speckle contrast imaging (*Clinical and Translational Neurophotonics 2022*)
5. Longitudinal multimodal mapping of neural activity and blood flow reveals neurovascular dissociations in an awake mouse model of microinfarcts (*Neural Imaging and Sensing 2020*)
6. Longitudinal multimodal mapping of neural activity and blood flow reveals neurovascular dissociations in an awake mouse model of microinfarcts (*Neuroscience 2019*)
7. A bi-directional optical-genetic toolkit for reading and writing topographic neural population codes in behaving macaque cortex (*Neuroscience 2019*)
8. Computational speckle contrast optical tomography (*SPIE BiOS 2019*)
9. A fast three-dimensional dynamic light scattering computational model for imaging through turbid media (*Advances in Optics for Biotechnology, Medicine and Surgery XVI 2019*)
10. Concurrent optical imaging and extracellular recording for longitudinal studies of behaving brain (*Neuroscience 2017*)
11. Targeted photothrombotic stroke to mouse motor cortex instigates sustained increases in dendritic spine turnover that continue after impairments improve (*Neuroscience 2017*)
12. Targeted photothrombotic stroke: a method for producing upper extremity impairments in mice (*Neuroscience 2016*)
13. Enlarging the penumbra with a slight variation of the standard photothrombotic technique: targeted artery occlusion (*Neuroscience 2016*)
14. Development of a 3D-printed Laser Speckle Contrast Imaging System (*BMES 2016*)
15. Simultaneous imaging of oxygen tension and blood flow during stroke using a digital micromirror device (*Austin Translational Neuroscience Symposium 2014*)
16. Simultaneous imaging of oxygen tension and blood flow during stroke using a digital micromirror device (*BMES 2014*)
17. Delivery of oxygen-sensitive two-photon contrast agent to the mouse brain via blood brain barrier disruption using ultrasound and microbubbles (*BMES 2013*)
18. Demonstrating functionality of fluorogen-activating protein force sensor (*University of Washington Undergraduate Research Symposium 2011*)

AWARDS AND ACTIVITIES

Lead Moderator, Reddit r/science (May 2015 – Present)

President, Biomedical Optics Graduate Organization (SPIE and OSA) (2015 – 2018)

Volunteer Coordinator, BME Graduate Student Recruitment Committee (2014 – 2017)

Treasurer, Biomedical Optics Graduate Organization (SPIE and OSA) (2013 – 2015)

Organizing Committee, Graduate Undergraduate Research Union (2013 – 2014)
Industry Committee, Biomedical Engineering Society (BMES) (2010 – 2011)
University of Washington Quarterly Dean's List (2007 – 2011)
Eagle Scout Award, Boy Scouts of America, Greater Alabama Council (2006)