

Research Summary

I work in computational imaging, where we combine illumination, cameras and computation in innovative ways to sense the environment in a way that traditional cameras can't. I [build optical imaging systems](#) to realize these capabilities. My current work applies the principles of computational imaging to improve visual feedback in neurosurgery.

My previous work involved using wave nature of light to achieve exciting capabilities like [seeing through scattering media](#) and [micron-scale shape acquisition](#), with applications in biomedical imaging and fabrication. Some of these were possible only [in the lab](#) now: We brought them [out in the open](#)!

Education

Carnegie Mellon University Aug 2017 - Dec 2022

PhD in Robotics

Advisor: Prof. Ioannis Gkioulekas

Indian Institute of Technology Bombay

Jul 2016 - Jun 2017

Master of Technology in Electrical Engineering

Thesis advisor: Prof. Ajit Rajwade

Indian Institute of Technology Bombay

Jul 2012 - Jun 2016

Bachelor of Technology in Electrical Engineering

Research advisors: Prof. Ajit Rajwade and Prof. Suyash Awate

Professional Positions

Research Scientist

June 2024 - present

Department of Neurosurgery, University of Texas Medical Branch

Advisor: Dr. Pablo Valdes

Postdoctoral Researcher

May 2023 - May 2024

Department of Neurosurgery, University of Texas Medical Branch

Advisor: Dr. Pablo Valdes

Visiting Researcher

June 2023 - present

Department of Electrical and Computer Engineering, Rice University

Advisor: Prof. Ashok Veeraraghavan

Postdoctoral Researcher

Feb 2023 - Apr 2023

Robotics Institute, Carnegie Mellon University

Advisor: Prof. Ioannis Gkioulekas

Graduate Research Assistant

Aug 2017 - Jan 2023

Robotics Institute, Carnegie Mellon University

Advisor: Prof. Ioannis Gkioulekas

Visiting PhD Student in Radiology

May 2019 - Aug 2019

Neuroradiology, Massachusetts General Hospital

Advisor: Dr. Rajiv Gupta

Research Assistant

Aug 2016 - Aug 2017

Department of Electrical Engineering, Indian Institute of Technology Bombay

Advisor: Prof. Ajit Rajwade

Publications

Passive micron-scale time-of-flight with sunlight interferometry

Computer Vision and Pattern Recognition (2023), highlight paper [\[paper\]](#)

A. Kotwal, A. Levin and I. Gkioulekas

Swept-angle synthetic wavelength interferometry

Computer Vision and Pattern Recognition, 2023 [\[paper\]](#)

Computational Cameras and Displays Spotlight, 2023

A. Kotwal, A. Levin and I. Gkioulekas

Interferometric transmission probing with coded mutual intensity

ACM Transactions on Graphics, 2020 [\[paper\]](#), [video](#)

A. Kotwal, A. Levin and I. Gkioulekas

Joint desmoking, specular removal, and denoising of laparoscopy images via graphical models and Bayesian inference

International Symposium on Biomedical Imaging, 2017 [\[paper\]](#)

A. Baid, **A. Kotwal**, R. Bhalodia, S. Merchant and S. Awate

Joint desmoking and denoising of laparoscopy images

International Symposium on Biomedical Imaging, 2016 [\[paper\]](#)

A. Kotwal, R. Bhalodia and S. Awate

Designing constrained projections for compressed sensing: mean errors and anomalies with coherence

GlobalSIP, 2018 [\[paper\]](#)

D. Shah, **A. Kotwal** and A. V. Rajwade

Signal sensing and reconstruction for a novel multi-source static computed tomography system

ICASSP, 2020 [\[paper\]](#)

A. Kotwal, A. Cramer, D. Wu, K. Yang, W. Krull, I. Gkioulekas and R. Gupta

Invited Talks and Courses

“**Computational Interferometric Imaging**” | ACM SIGGRAPH [course](#) | Jul 2023

“**Swept-Angle Synthetic Wavelength Interferometry**” | Computational Cameras and Displays Workshop at the IEEE/CVF Conference on Computer Vision and Pattern Recognition | Jun 2023

“**Computational Interferometric Imaging**” | University of California at San Diego – Pixel Cafe | May 2023

“**Computational Interferometric Imaging**” | Camera Culture | Massachusetts Institute of Technology Media Lab | Jan 2023

“**Computational Interferometric Imaging**” | Wellman Center for Photomedicine, Massachusetts General Hospital | Jan 2023

“**Computational Interferometric Imaging**” | Photonics Center, Boston University | Jan 2023

“**Computational Interferometric Imaging**” | Robotics Institute seminar, Carnegie Mellon University | Dec 2022

“**Computational Interferometry**” | Samsung AI Center in Toronto | Oct 2022

“**Computational Interferometry**” | University of California at Los Angeles Grundfest Lectures in Computational Imaging | Jul 2022

“**Interferometric Transmission Probing with Coded Mutual Intensity**” | ACM SIGGRAPH | Aug 2020

“**Interferometric Transmission Probing with Coded Mutual Intensity**” | CVPR CCD | Jun 2020

Theses	Computational interferometric imaging Doctoral Dissertation, Robotics Institute, Carnegie Mellon University, 2023 [link]
	Optimizing sensing matrices for compressed sensing recovery Master's Thesis, Electrical Engineering, Indian Institute of Technology Bombay, 2017 [link]
Academic Service	Reviewer , Conference on Neural Information Processing Systems (NeurIPS), 2024
	Reviewer , IEEE/CVF European Conference on Computer Vision (ECCV), 2024
	Reviewer , IEEE Transactions on Computational Imaging (TCI), 2024
	Reviewer , ACM SIGGRAPH Asia, 2023
	Reviewer , IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023
	Reviewer , IEEE/CVF International Conference on Computer Vision (ICCV), 2023
	Reviewer , International Conference on Computational Photography (ICCP), 2022-2023
	Reviewer , International Journal of Computer Assisted Radiology and Surgery (IJCARS), 2018
Awards	Undergraduate Research Award for Master's thesis, Indian Institute of Technology Bombay, 2017
	Gold medal at the 6 th International Olympiad on Astronomy and Astrophysics, representing India
	Bronze medal at the 5 th International Earth Sciences Olympiad, representing India
	KVPY Scholarship 2011 by the Government of India for students interested in basic sciences
Other information	Citizenship: Indian
	Languages: English (fluent), Marathi (native), Hindi (fluent)