Niranjan Vinay Kulkarni

Curriculum Vitae

nvk7@cornell.edu | +1 - (607)-339-7762 | Ithaca, NY, USA | linkedin.com/in/niranjan-kulkarni-95b5a4198

RESEARCH INTERESTS

Biomedical optics and photonics with a focus on Optical Coherence Tomography (OCT), light scattering in biological tissue, and quantitative interpretation of imaging signals to understand structure and function relationships in the brain.

RESEARCH EXPERIENCE

Research Technician, *Adie Lab, Cornell University* July 2025 – Present
- Analyzing depth-dependent OCT signal (A-line profiles) to investigate how scattering-driven contrast varies across brain regions and what structural features it represents.
- Established and led the lab's small-animal neuroimaging model by rewriting and executing IACUC protocols and developing workflows for 5xFAD Alzheimer's and GL261 glioblastoma models.
- Performed and optimized cranial window implantation surgeries (n>20 mice), enabling longitudinal in vivo brain imaging studies.
- Initiated and conducted ex vivo brain imaging experiments using 1300 nm OCT, focusing on region-wise structural differences (white vs gray matter) and signal variability.
- Implemented dispersion compensation and Fourier-domain reconstruction to improve depth-resolved OCT signal consistency across datasets.
- Established histology workflows including cryosectioning, Nissl staining, and H&E staining to enable OCT–histology comparison.
- Mentoring five undergraduate researchers, guiding experimental design, imaging workflows, and data interpretation across multiple projects.
- Contributing to ultra-deep OCT development efforts through biological validation and experimental pipeline design.
- Developing an interest in quantitative interpretation of OCT signals, particularly in relating scattering behavior to underlying tissue structure.

Design Engineer, *Touchdown MedTech, Cornell University* August 2024 – May 2025
- Collaborated with Cornell Engineering and Weill Cornell to design a novel biopsy device for columnar brain sampling.
- Created 50+ design prototypes using Autodesk Fusion 360 and implemented AGILE workflows for iterative testing.
- Maintained documentation aligned with FDA CFR 820 standards and explored FDA 510(k) submission strategies.

Undergraduate Researcher, *SMART Lab, Department of Physics, IIT - Indore* June 2023 – June 2024
- Investigated green-synthesized zinc oxide nanoparticles as biocompatible agents for imaging and therapy.
- Characterized optical properties of ZnO nanoparticles (scattering and absorption) to evaluate structure–function relationships relevant to imaging contrast.
- Conducted germination and oxidative stress studies on soybean seed.
- Co-authored senior thesis summarizing experimental outcomes and analytical methods.

Research Trainee, *Rapture Biotech, Mumbai* August 2022 – September 2022
- Learned experimental techniques, such as MIC and ELISA drug concentration detection.
- Learned lab safety protocols and Good Lab Practices [GLPs]
- Obtained first-hand exposure to upstream and downstream processes in cell cultures

EDUCATION

Cornell University, *M.Eng. Biomedical Engineering* August 2024 – May 2025
GPA: 3.63
Relevant Coursework: Biomedical Optics, Neurotechnology, and Neurophysiology.

Vellore Institute of Technology, *Bachelors in Technology, Bioengineering* August 2020 – May 2024
GPA: 3.69
Relevant coursework: Computational biology and analytics, Biosignals and Image processing, Cancer Biology, Python programming, Immune Engineering.

SKILLS

Optical Imaging — Optical Coherence Tomography (OCT), Optical Coherence Microscopy (OCM), Confocal Microscopy

Data Analysis — MATLAB, Python, ImageJ

Signal Processing — Fourier-domain reconstruction (introductory), dispersion compensation, phase stability, depth-dependent signal analysis

Instrumentation — Interferometric alignment, optical assembly, 3D CAD (Fusion 360, SolidWorks)

Characterization — XRD, SEM, UV-Vis, DLS (optical property analysis)

Software — LabVIEW, Autodesk Fusion 360, OriginPro

Biological — Cranial window implantation, ex vivo brain extraction, tissue fixation, cryosectioning, Nissl and H&E staining, tumor implantation (GL261), in vitro neuronal culture

PUBLICATIONS AND PRESENTATIONS

Smart Feedback-Controlled Nebulizers in Respiratory Care: A Systematic Review of Clinical Effectiveness and Technological Advances, *Alhuthaifi, F. K., Joshi, V., Kulkarni, N. V., Almeida, A. K., Faria, R. M., Nunes, G., Costa, L., & Rosa, S. S. R. F. (2025).* 2025
Under peer review

Algae-Derived Ecologically Sustainable Nanoparticles, *Ratnaparkhe, S., Tamhane, A., Nagar, A., Kulkarni, N., Mukherjea, N., & Ratnaparkhe, M. (2025).* 2025
International Journal for Innovative Research in Multidisciplinary Field (IJIRMF), DOIs:10.2015/IJIRMF/202510019

Effect on Soybean (Glycine max) Germination of Green Synthesized Zinc Oxide Nanoparticles using Garlic (Allium sativum) Extract, 2024
N. Mukherjea, N., & Kulkarni, N. (2024)
Undergraduate Thesis, VIT Bhopal University, School of Biosciences, Engineering & Technology.

PROJECTS

Bio - inspired Global Positioning Systems based Joint Precision Air Drop System, *VIT, Bhopal* October 2022 – April 2023

- Conducted statistical survey of over 20+ healthcare institutions and collaborated with stakeholders to obtain an understanding of problems with Medicare in rural India, adding value to innovation
- Designed and modeled 8+ medical kits as payloads based on survey findings
- Collaborated with an interdisciplinary team of 4 different majors for this project

AWARDS AND HONORS

Cornell M.Eng. Design Award for Engineering Excellence May 2025
Received recognition from a panel of 10+ industry professionals and experts on the novelty and design of the device

EXHIBITIONS

A Novel Device for Conducting Columnar Brain Biopsies 2025 | Cornell Engineering Design Expo

TEACHING AND MENTORSHIP

Laboratory Teaching Assistant (TA), *Tissue Engineering Lab, VIT Bhopal* September 2022 – December 2022

Project mentor, *SMART Lab, IIT Indore* March 2024 – May 2024

EXTRA - CURRICULARS

The Bioengineering Club, *Co - Founder and Secretary* 2021 – 2022

- Exhibited leadership through establishing a student body of over 100+ students as a platform for communication between students and professionals in biomedical fields.
- Fostered scientific engagement by organizing coffee table forums and the flagship symposium of bioengineering at VIT - the RABVIT '23 to address contemporary issues with healthcare in India.

Unnat Bharat Abhiyaan, *Student Member* 2022

- Volunteered in rural areas around central India for the survey project of Unnat Bharat Abhiyan.

Mauli Foundation, *Volunteer* 2021 – 2023

- Led outreach to educate farmers on scientifically validated agricultural practices and soil treatment methods; conducted workshops on nano-formulations for improved seed germination.

MIT Grandhack '25, *Participant and finalist, Heart Health track* 2025