Neerja Aggarwal

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VISION

I am an interdisciplinary deep-tech engineer and aspiring entrepreneur with strengths across science, leadership, and communication. My dream is commercializing imaging technology for women's health and climate monitoring

EDUCATION

University of California at Berkeley — Exp. grad: May 2025
Ph.D Candidate in Electrical Engineering and Computer Science — Berkeley, CA

Massachusetts Institute of Technology — Jun 2018
Master of Engineering in Electrical Engineering — Cambridge, MA

Massachusetts Institute of Technology — Jun 2017
Bachelor of Science in Electrical Science and Engineering and in Music and Theater Arts — Cambridge, MA

RESEARCH

UC Berkeley EECS Computational Imaging Group — Sep 2019 - Present
Graduate Research Assistant; Advised by Prof Laura Waller — Berkeley, CA
Ph.D. Thesis: Computational Snapshot Hyperspectral Imaging for Biology

- Conducting interdisciplinary research in biology, microscopy, and machine learning with applications in bioassays, cell imaging, pathology, and diagnostic medical imaging
- Project: Spectral Array Diffuser Microscope - Redesigning hyperspectral cameras using lensless imaging techniques for fluorescence
- Project: Compact Spectroscopy for optical coherence tomography
- Serving as Industry Liason (and Former President) for the Optical Society Chapter: Photobears

MIT RLE Physical Optics and Electronics Group — Jul 2016 - Aug 2018
Graduate Research Assistant; Advised by Prof Rajeev Ram — Cambridge, MA

- Investigated optical techniques for non-invasive glucose biosensing through skin; won prestigious Siebel Scholarship
- Designed and debugged an electro-optical system to achieve a new measurement
- Communicated project status and results directly to research sponsors; wrote 190+ page comprehensive thesis to document findings

Physical Optics and Electronics Group — Sep 2014 - June 2015
MIT Research Laboratory of Electronics — Cambridge, MA
Undergraduate Research Assistant

- Designed and fabricated a new wearable laser heat sink for optical biosensing
- Presented work as one of six finalists at EECScon 2015 research conference

Mediated Matters — Feb 2014 - Dec 2014
MIT Media Lab — Cambridge, MA
Undergraduate Research Assistant

- Built test platforms using a laser cutter and studied effects of temperature and thread density on silkworm spinning
- Collaborated with group members and constructed the Silk Pavilion, a biological printer featuring 6500+ live silk worms spinning a completely tensile dome

Barron Research Group Oct 2010 - Aug 2012
Department of Chemistry at Rice University Houston, TX
High School Research Student

- Synthesized multi-walled carbon nanotubes via chemical vapor deposition; analyzed samples using Raman spectrometry and electron microscopy
- Work resulted in publication and award at international science fair level

INDUSTRY

Flagship Pioneering (Biotech Venture Firm) June 2024 - Aug 2024
Summer Exploration Fellow Cambridge, MA

- Competitively selected to participate in a science entrepreneurship intensive
- Ran 5 "Explorations" on diverse biotech topics related to AI/ML, life science tools, and human biology and presented venture ideas to the full company
- Immersed myself in the literature of brand new areas of biology, spoke with experts in the field, and vetted ideas for value and feasibility

Insitro (Biotech ML Start-up) May 2023 - Aug 2023
Advanced Imaging Microscopy Intern South San Francisco, CA

- Proposed and assembled a hyperspectral microscope at machine learning driven drug discovery start up
- Led project through inception, hardware, automation, and *in vitro* cell imaging, and dataset analysis
- Collaborated across genetic engineering, neuroscience, microscopy, and machine learning teams to evaluate hyperspectral autofluorescence as a biomarker

Perceptra Inc (Hardware Pre-seed Start-up) July 2022 - Aug 2022
Hardware and Data Engineer San Francisco, CA

- First employee at a biotech startup developing online bioreactor process monitoring using Raman spectroscopy (noninvasive spectroscopy).
- Designed & prototyped the first iteration of a turbidity probe to measure scattering in cell media solution and use info to correct metabolite concentration estimates acquired via Raman
- Designed probe in CAD and 3D printed, assembled optoelectronics, designed protocol for calibration, wrote Python notebooks for data collection

Perceptra Inc (Biotech Start-up) July 2020 - Feb 2021
Start-up Team Member San Francisco, CA

- Early team member for new photonics start-up commercializing swept-source Raman spectroscopy techniques
- Investigated product-market fit for technology by contacting prospective industry customers through NSF I-Corps
- Assisted with pitch deck development for seed fundraising round

LivaNova (Medical Devices) Sep 2018 - Jul 2019
Full-time Electrical Engineer II Houston, TX

- Led the design of the power circuitry for next generation implantable neuro-modulation device for epilepsy
- Collaborated across functional teams of software, mechanical, clinical engineers
- Started new team seminar initiative to encourage continuous learning and pitched a new young professionals development program

Formlabs (Consumer Electronics) Jun 2015 - Aug 2015
Print Process Engineer Intern Somerville, MA

- Designed the heater control and temperature sensor calibration for the Form 2, advanced stereolithography 3-D printer for product launch in Sep 2015
- Collaborated across electrical, mechanical, software, materials, and process teams to solve print failures and system integration issues

Halliburton (Oil & Gas) Jun 2014 - Aug 2014
Electro-optics Engineer Intern, Wireline and Perforating Houston, TX

- Evaluated effect of temperature and vibrations on fiber optic components to obtain faster down-hole telemetry data rates
- Exceeded expectations and presented results as a finalist out of 100+ interns (including Ph.Ds) to the Vice Presidents of Technology, Wireline, Cementing, and Landmark Product Service Lines

MD Anderson Cancer Center (Hospital) Oct 2010 - Jun 2012
Intern, Dept of Neuro-oncology, Dept of Head and Neck Houston, TX

- Analyzed MRIs and executed physical examinations while shadowing a physician; observed surgeries, procedures, and follow-ups for 100+ hours

PATENTS

N. Aggarwal, L. Waller, Y. Raniwala, E. Markley, K. Monakhova. Hyperspectral Microscopy Uisng a Phase Mask and Spectral Filter Array. US Patent App No. 2024/0337824

D. Stark, D. Barfoot, W. Zhang, **N. Aggarwal**. Multiple Polarization Fiber Optic Telemetry. US Patent No. 10218435B2. 2019

N. Aggarwal, M. Cavuto, M. Li, N. Rodman. Compact Proton Beam Energy Modulator - US Patent No. 11141608B2. 2021

PUBLICATIONS

N. Aggarwal*, E. Markley*, L. Waller, et al., "Spectral DiffuserScope: a compact hyperspectral imager attachment for fluorescence microscopy," Manuscript in preparation for submission to *Optica*

Y. Raniwala, **N. Aggarwal**, and L. Waller, "Improved fabrication and calibration for snapshot computational hyperspectral imaging, *SPIE Proceedings*, vol 12363, 2023
`https://doi.org/10.1117/12.2648579`

J. Malone, **N. Aggarwal**, L. Waller, A. Bowden, "DiffuserSpec: spectroscopy with Scotch tape," *Optics Letters* 48, 2, 2023
`https://doi.org/10.1364/OL.476472`

K. Monakhova, K. Yanny, **N. Aggarwal**, L. Waller, "Spectral DiffuserCam: lensless snapshot hyperspectral imaging with a spectral filter array," *Optica* 7, 2020
`https://doi.org/10.1364/OPTICA.397214`

N. Aggarwal, M. Cavuto, M. Li, et al, "Design of a compact proton beam energy modulator for imaging," *Nuclear Instruments and Methods in Physics Research A* 955. 2020
https://doi.org/10.1016/j.nima.2019.163269

M.Eng Thesis: **N. Aggarwal**, "Raman and Fluorescence Spectroscopy of In Vitro Skin Tissue for Diagnostics and Monitoring," *Dspace@MIT*. 2018
https://dspace.mit.edu/handle/1721.1/121617

A. Orbaek, **N. Aggarwal**, A. Barron. "The development of a process map for the growth of carbon nanomaterials from ferrocene by injection CVD," *Journal of Materials Chemistry A*. 2013
https://doi.org/10.1039/C3TA13543H

CONFERENCE TALKS

Scheduled: N. Aggarwal, L. Waller. "Adaptable multispectral imaging system using Fourier ptychography and spectral filter" Photonics West Opto. Jan 2025

N. Aggarwal, E. Markley, et al. "Improvements to computational snapshot hyperspectral microscope enable low-light imaging" Focus on Microscopy. Genova, Italy. Mar 2024

E. Markley, N. Aggarwal et al. "Spectral DiffuserScope: compact hyperspectral imager for fluorescence microscopy" Computational Optics Sensing and Imaging Conference, Boston, MA USA. Aug 2023

N. Aggarwal, E. Markley, et al. "Spectral DiffuserScope: compact hyperspectral imager for fluorescence microscopy" Focus on Microscopy. Porto, Portugal. Apr 2023

N. Aggarwal, J. Malone, et al. "DiffuserSpec: spectroscopy with scotch tape" Photonics West Bios. San Francisco, CA USA. Jan 2023

Y. Raniwala, N. Aggarwal, L. Waller. "Improved fabrication and calibration for snapshot computational hyperspectral imaging" Photonics West Bios, San Francisco, CA, USA. Jan 2023

N. Aggarwal, E. Markley, et al. "Compact snapshot hyperspectral imager for fluorescence microscopy" Focus on Microscopy. Online. Apr 2022

AWARDS

UC Berkeley EECS Evergreen Award 2024
For successfully mentoring undergraduate researchers in the department

Siebel Scholarship 2017
For excellence in engineering research and community leadership

MIT Music and Theater Arts John Everingham Award 2017
For single creative accomplishment: directing *Einstein's Dreams*

MIT EECS Paul L. Penfield Student Service Award 2015
For outstanding student service to the department: founding Voltage

QuestBridge College Match Finalist 2012
National scholarship presented to high-achieving low-income students

Girl Scouts National Gold Award 2012
Highest award in scouting, presented for engaging youth into science

Intel International Science Fair - 3rd Place Chemistry 2012
For novel high school research in carbon nanotubes

SERVICE LEADERSHIP

UC Berkeley Bias Busters, President May 2024 - Present

- Revamping student organization focused on combating implicit bias in the workplace to build a more inclusive environment
- Lead team of officers to hold events, raise funds, and attract membership.

MIT Club of Nor Cal, Vice President of Core Events May 2024 - Present

- Appointed as chair of committee to hold marquee events (200+ attendees) for the club membership (6000+)
- Lead event planning, logistics, task delegation for the Annual Membership Meeting and Spotlight Gala

MIT Alumni Association, Class of 2016 President Jun 2018 - Present

- Re-elected in 2021 to serve another term as alumni class council president representing 1000+ alumni across the world
- Lead council committees of 20+ volunteers to organize regional and national reunions

Photobears - UC Berkeley Optical Society Chapter, May 2022 - May 2024
President, Industry Liason

- Served as club President from 2022-2023. Revamped club activities after COVID. Helped organize seminars, industry talks, socials.
- As Industry Liason, organized industry speaker visits to campus and field trips at local companies.

Big Brother Big Sister of Bay Area, Mentor Mar 2021 - Sep 2024

- Matched with local youth after vetting process to offer 1:1 mentoring
- Meet twice a month for enrichment activities in science, art and nature

TEACHING

UC Berkeley EECS Teaching Assistant Aug 2021 - Dec 2023

- Signals and Systems: Led discussion sections including interactive music filtering demo, held office hours and exam reviews
- Medical Imaging: Led discussion sections including hands on activity for building your own pinhole camera, held office hours and exam reviews

MIT EECS Teaching Assistant Sep 2013 - 2017

- Undergraduate Advanced Research Seminar (2 semester): Head TA; advised 40 chemical, biological, and electrical engineering students on independent research projects; reviewed and edited student proposals and posters
- Intro to EECS (3 semesters): Worked one-on-one with undergraduate students through circuits, signals, and probabilistic models

THEATER

Einstein's Dreams, Writer, Director, MIT Theater Arts 2017
MIT Theater Arts 2017 Spring Production; Thesis Project
A new multi-media adaptation of the novel by Alan Lightman exploring Einstein's

journey to special relativity
Featuring original music, choreography, and script; led cast and crew of 30+ people

Now Then Again, Director, MIT Experimental Theater Company 2015
A time-bending romantic comedy about the transactional interpretation of quantum mechanics; led cast and crew of 10+ Awarded the Council of Arts at MIT Director's Grant to fund production

The Importance of Being Earnest, Director, MIT Theater Arts 2014
One-act version of the classic Oscar Wilde play; led cast and crew of 10+

PRESS

M. Rosenburg, *Practicum: Directing Einsteins' Dreams*, MIT News, Jun 2017
http://news.mit.edu/2017/featured-video-bringing-einsteins-dreams-to-life-0620

M. Tenenbaum, *Learning to Think Like an Engineer*, MIT News, Mar 2016
http://news.mit.edu/2016/learning-think-engineer-neerja-aggarwal-0309

P. Sampson.*Voltage: A new community of electrical engineers*, MIT News, May 2015
http://news.mit.edu/2015/voltage-new-community-electrical-engineers-0520

C. Ziervogel, *Passion Impels Her, Fort Bend Lifestyles and Homes*, Jul 2011
http://barron.rice.edu/aggarwal_2011.pdf