# NATHAN LAZARUS

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## EDUCATION

**Carnegie Mellon University** Pittsburgh, PA

Ph.D. in Electrical and Computer Engineering — May 2012

- Thesis: "CMOS-MEMS Chemiresistive and Chemicapacitive Chemical Sensor System"

M. S. in Electrical and Computer Engineering — August 2010

**University of Pennsylvania** Philadelphia, PA

B.S.E. in Electrical Engineering — May 2007

- Senior Project: "Motion Tracking Camera with Object Recognition Capabilities

## RESEARCH EXPERIENCE

**University of Delaware,** Electrical and Computer Engineering Department, Newark DE

*Associate Professor* — Aug. 2022 – Present

- Leader of the Soft Electronics and Robotics Laboratory at the University of Delaware
- Developed squid-inspired soft underwater robot vehicle based on liquid metal electromagnetic devices
- Demonstrated fabrication of high performance stretchable traces in fused filament fabrication based 3D printing and electroless plating.

**US Army Research Laboratory (ARL),** Power Components Branch, Adelphi, MD

*Staff Researcher (Civilian Employee)* — Nov. 2014 – Aug. 2022

*Acting Team Lead, MEMS and Microsystems Team* — Oct. 2015-Sept. 2016

*Oak Ridge Associated Universities Post-Doctoral Fellow, mentored by Sarah Bedair* — May 2012-Nov. 2014

- Initiated and leading new stretchable power components focus area within research group, leading to major advances in stretchable wireless power systems
    - Currently leading group in stretchable wireless power in world for both power efficiency and transmission distance
- Developed selective copper electro- and electroless plating processes for metallization of 3D printed structural electronics made using fused filament fabrication (FFF)
- Demonstrated integration of liquid metals and magnetic fluids into channels printed using stereolithography for 3D printed inductors and electromagnets
- Proposed and demonstrated stretchable electromagnetic pump technology for soft robotics based on liquid metal electromagnet driving a ferrofluid coated piston
- Invented laser forming origami process for rapid folding of complex 3D electrical shapes such as inductors and antennas

**Carnegie Mellon University,** MEMS Laboratory, Pittsburgh, PA

*Research Assistant, advised by Gary Fedder* — June 2007 – May 2012

- Developed an integrated chemical sensor system intended to be embedded within a respirator cartridge to notify user that the cartridge is full of hazardous chemical and should be changed
- Designed 1 GHz Colpitts LC oscillator for measuring small changes in capacitance in a chemicapacitive sensor
- Developed fabrication process for incorporating high sensitivity chemicapacitive and chemiresistive sensors on a single CMOS die

**University of Pennsylvania,** Center for Sensor Technologies, Philadelphia, PA

*Senior Design Project, advised by Jan Van der Spiegel and Viktor Gruev* — September 2006 – May 2007

- Designed and fabricated a digital video camera combining optical flow and polarization imaging
- 1st prize, Electrical Engineering Department Demo Day

*Summer Undergraduate Fellowship in Sensor Technologies (SUNFEST) Fellow* — May 2006 – August 2006

- Developed a post-CMOS process to fabricate a thin film polarization filter on a CMOS image sensor

# NATHAN LAZARUS

## TEACHING EXPERIENCE

**University of Delaware**

CPEG 202 – Introduction to Digital Systems — Spring 2023, Spring 2024, Spring 2025
CPEG 460/660 – Introduction to VLSI Systems — Fall 2022, Fall 2023, Fall 2024, Fall 2025
ELEG 661 – Materials and Devices Seminar — Spring 2023, Fall 2023, Spring 2024, Fall 2024, Spring 2025

**Purdue University**

Guest Lecturer, Intro. Engineering: Defense and Security — Spring 2021

**George Washington University**

Lecturer, Introduction to MEMS and NEMS, graduate level — Spring 2014, Spring 2015

**Carnegie Mellon University**

Teaching Assistant, Microelectromechanical Systems, graduate level — Fall 2009, Fall 2010

**University of Pennsylvania**

Teaching Assistant and Grader, Digital ICs and Fund. of VLSI, graduate level — Spring 2007
Teaching Assistant, Electrical Circuits and Systems II-Lab — Spring 2006
Lab Consultant and Grader, Principles of Digital Design Lab — Fall 2005, Fall 2006
Teaching Assistant, Introduction to Engineering — Fall 2004, Spring 2005, Fall 2005, Fall 2006

## SKILLS

- **Manufacturing Technologies**: Lithography, material deposition (electroplating, sputtering and inkjet), MEMS micromachining, wirebonding (head user of CMU system), 3D printing (fused filament fabrication, stereolithography, multi-jet printing, two photon polymerization), laser cutter
- **Software**: Labview, Cadence Design Tools, Matlab, COMSOL, Solidworks, Autocad
- **Characterization**: Chemical sensor flow system, scanning electron microscope, IR (infrared) microscope, atomic force microscopy, optical profilometer, tensile tester, laser confocal microscope, electrical testing equipment

## RESEARCH FUNDING/GRANTS

- "Combining sound and magnetic fields to transfer power through seawater and metals (CoSoMaSaM)," Navy SBIR Phase 1, awarded Winter 2024 (lead PI Shengming Shan, SWR Technologies) (N. Lazarus component $40k for 6 months)
- "Advanced materials and additive manufacturing of printed electronics for harsh environment," FlexTech proposal awarded June 2025 (co-PI, S. Ren (UMD) lead) (N. Lazarus component $105k for 18 months)
- "Stretchable electromagnetic devices for on-body energy harvesting," University of Delaware Research Foundation grant, Summer 2024 ($45k total)
- "Pyroelectric material-based millimeter wave imaging system," Chem Bio Defense SBIR Phase 2, awarded Spring 2024 (lead PI Brendan DeLacy, Ballydel Inc.) (N. Lazarus component: $75k a year for 2 years (150k total))
- "Enter the plantoids", ARL Grass Roots Innovation Technology funding 2021 ($95k for one year, PIs: B. Hanrahan and N. Lazarus)
- "Muscle strength measurement," National Security Innovation Network (NSIN) funding, Fall 2020 ($10k for one semester, PIs: O. Jones and N. Lazarus)
- "Feeling good vibrations", ARL Director's Innovative Research Award Transformative Research Challenge Full Project, Spring 2020 ($250k for two years, PIs: B. Hanrahan, N. Lazarus, K. Alberts and J., Bhattacharyya)

- "Printing an artificial robot heart: energetic motors from liquid batteries and inductors," ARL Director's Innovative Research Award External Collaborator Initiative Winter 2019 ($150k for two years, PIs: N. Lazarus and R. Shepherd)
- ARL Early Career Award, 2019 ($150k for three years, PI: N. Lazarus)
- "3D printed energy harvesting microlattices," ARL Grass Roots Innovation Technology funding ($45k for one year, PIs: A. Leff, B. Hanrahan, N. Lazarus and G. L. Smith)
- "Stretchable power transmitter," Energy and Power Division ARL South funding 2019-2020 ($340k total over two years, PIs: N. Lazarus, N. Lu, and M. Bartlett)
- "Computational laser origami," ARL Director's Innovative Research Award External Collaborator Initiative Winter 2018 ($150k for two years, PIs: G. L. Smith and N. Lazarus)
- "Ears to the ground: How to sense vibrations the animal way," ARL Director's Innovative Research Award Transformative Research Challenge Winter 2017 ($100k for one year, PIs: B. Hanrahan, K. Alberts and N. Lazarus)
- "From wood to watts: Bioinspired materials for energy harvesting," ARL Director's Innovative Research Award Transformative Research Challenge Winter 2016 ($100k for one year, PIs: N. Lazarus and B. Hanrahan)
- "Stretchable AlGaN/GaN high electron mobility transistors," ARL Director's Research Initiative FY16 ($250k a year, two years, PIs: R. Tompkins and N. Lazarus)
- "Adaptive micropneumatic and microfluidic fibers," ARL Director's Strategic Initiative FY14 ($500k for one year, PIs: E. Wetzel, L. Holmes, C. Meyer, N. Lazarus and J. Riddick)
    - Led to follow-on $50k in internal development funding for N. Lazarus, FY15

**PATENTS**

**20.** N. S. Lazarus, G. L. Smith, and A. A. Wilson, "Method and apparatus for performing contactless laser fabrication and propulsion of freely moving structures," US patent (patent no. 12,011,782, awarded 6/18/24)

**19.** N. S. Lazarus, A. L. Bachmann, and M. D. Dickey, "Laser folded 3D electronics," US patent pending (application no. 2024/0090126 A1, filed 9/14/2022)

**18.** B. M. Hanrahan and N. S. Lazarus, "Dielectric capacitor formed of a dielectric-coated electrically conductive porous scaffold filled with metal," US patent pending (application no. 2024/0079183A1, filed 8/23/2022)

**17.** J. A. Cardenas, N. S. Lazarus, and H. H. Tsang, "Photonic annealing of electrically-conductive thermoplastics," US patent (patent no. 12,265,152B2, awarded 7/22/2025)

**16.** S. M. Curtis, H. Wang, G. P. Anfinrud, A. O. Randolph, G. L. Smith and N. S. Lazarus, "Deformable array of semiconductor devices," US patent (patent no. 11,923,472B2, awarded 3/5/2024)

**15.** N. S. Lazarus, G. L. Smith, and A. A. Wilson, "Method and apparatus for performing contactless laser fabrication and propulsion of freely moving structures," US patent (patent no. 11,602,806, awarded 3/14/2023)

**14.** N. S. Lazarus and G. L. Smith, "Complex laser folding and fabrication," US patent (patent no. 11,364,566, awarded 6/21/2022)

**13.** N. S. Lazarus, C. P. Migliaccio and I. M. Kierzewski, "Phase change tunable capacitor," US patent (patent no. 10,249,440, awarded 4/2/2019)

**12.** N. S. Lazarus and C. D. Meyer, "Deformable inductor having a liquid magnetic core," US patent (patent no. 10,553,342 B2, awarded 2/4/2020)

**11.** N. S. Lazarus and C. P. Migliaccio, “Self cooling stretchable electrical circuit having a conduit forming an electrical component and containing electrically conductive liquid,” US patent (patent no. 10,104,805, awarded 10/16/2018)

**10.** N. S. Lazarus, C. D. Meyer and I. M. Kierzewski, “Deformable inductive devices having a magnetic core formed of an elastomer with magnetic particles therein along with a deformable electrode,” US patent (patent no. 10,304,604, awarded 5/28/2019)

**9.** N. S. Lazarus and S. S. Bedair, “LC pulse forming network substitution for Rayleigh networks in pulsed power applications,” US patent (patent no. 9,948,182, awarded 4/17/2018)

**8.** N. S. Lazarus and S. S. Bedair, “DC-DC power converter,” US patent (patent no. 10,038,376 B2, awarded 7/31/2018)

**7.** C. P. Migliaccio and N. S. Lazarus, “Methods and apparatus for dropwise excitation heat transfer,” US patent (patent no. 11,300,370 B2, awarded 4/12/2022)

**6.** C. D. Meyer and N. S. Lazarus, “MEMS tunable inductor,” US patent (patent no. 9,583,250, awarded 2/28/2017)

**5.** N. S. Lazarus, C. D. Meyer, and S. S. Bedair, “Electrically insulating elements and electrically conductive elements formed from elements having different oxidation behaviors,” US patent (patent no. 9,439,295, awarded 9/6/2016)

**4.** G. K. Fedder and N. S. Lazarus, “Method of fabricating a capacitive environment sensor,” US patent (patent no. 8,852,983, awarded 10/7/2014)

**3.** G. K. Fedder and N. S. Lazarus, “Methods, apparatuses, and system for micromechanical gas chemical sensing capacitor,” US patent (patent no. 8.471,304, awarded 6/25/2013)

**2.** N. S. Lazarus, G. K. Fedder, S. S. Bedair and C.-C. Lo, “Methods, apparatuses and systems for micromechanical gas chemical sensing,” US patent (patent no. 8,410,562, awarded 4/2/2013)

**1.** G. K. Fedder and N. S. Lazarus, “Differential preconcentrator-based chemical sensor stabilization,” US patent (patent no. 8,268,630, awarded 9/18/2012)

**BOOK CHAPTERS**

**3.** J. B. Tyler, G. L. Smith, A. v Cresce, and N. Lazarus, “3D printed integrated energy storage: additive manufacturing of carbon-based nanomaterials for batteries,” chapter in *3D Printing: Fundamentals to Emerging Applications* (ed: Ram Gupta), 2023, CRC Press.

**2.** N. Lazarus, “Metallization of 3D printed devices,” chapter in *Resilient Hybrid Electronics for Extreme/Harsh Environments* (ed: Amanda Schrand, Larry Richard Holmes, and Eric MacDonald), 2024, CRC Press.

**1.** N. Lazarus, R. Jin and G. K. Fedder, “The use of coated gold nanoparticles in high-performance chemical sensors,” chapter in *Nanosensors for Chemical and Biological Applications* (ed: Kevin Honeychurch), Woodhead Publishing, Feb. 2014, pp. 231-253 (invited)

**JOURNAL PUBLICATIONS**

(Bold and underlined as lead author, bold as senior/corresponding author)

**74.** Z. Wang, N. Lazarus and S. Ren, “Dynamic modulation of flexible molecular multiferroic antennas,” ACS Nano, in press.

**73.** D. C. Ames, N. Lazarus, and J. Mueller, “Liquid metal core-shell 3D printing,” Adv. Eng. Mater., 2025, 2402959.

**72.** J. D. Cortazar and **N. Lazarus**, “Creating a softer robosquid: liquid-metal-based compliant pumps for pulsed jet propulsion,” Adv. Mater. Technol., 2025, vol. 10, 2401372.

- Declared ‘Editor’s Choice’ by Adv. Mater. Technol.

**71.** S. Jahan and **N. Lazarus**, “Printing stretchable electronics with fused filament fabrication,” IEEE J. Flex. Electron., 2025, vol. 4, pp. 98-107.

**70.** J. Ahn, B. Yoo, D. Pines, N. Lazarus, D. Bowen, and S. Kim, “Single-step fabrication of a 3D stretchable inductor with multi-jet modeling printing technology,” Adv. Mater. Technol., 2025, vol. 10, 2401601.

**69.** E. J. Barron, E. T. Williams, N. Lazarus and M. D. Bartlett, “The magneto-mechanical coupling of multiphase magnetorheological elastomers,” J. Phys. Condensed Matter, 2025, vol. 37, 135101.

**68.** S. Kim, J. Wells, S. Bhattacharya, H. Nathan, J. He, I. Tubilla, H. Huh, P. Kakani, A. Farshkaran, P. Pasupathy, J. Zhou, E. Porter, N. Lazarus and N. Lu, “Unobstructive- and safe-to-wear watt-level wireless charger,” npj Flex. Electron., 2024, vol. 8, 75.

**67.** B. Hanrahan, A. Leff, A. Sesar, M. Fish, S. T. Jaszewski, J. A. Kropp, N. Strnad, J. F. Ihlefeld, and N. Lazarus, “An antiferroelectric-coated metal foam infiltrated with liquid metal as a dielectric capacitor,” Energy Technol., 2024, 2400956.

**66.** G. L. Smith, A. S. Gesell, M. Restaino, J. B. Tyler, X. Xu, R. D. Sochol, S. Bergbreiter, and **N. Lazarus**, “3D-printed multi-scale fluidics for liquid metals,” Adv. Mater. Technol., 2024, vol. 9, 2301980.

**65.** S. Li, N. Lazarus, M. E. Galanko Klemash, S. S. Bedair, and C. M. Wu, “3D printed CRLH metamaterial-enabled electrically small antenna,” IEEE Ant. Wireless Propag. Lett., 2024, vol. 23, pp. 878-882.

**64.** E. J. Barron, E. T. Williams, N. Lazarus and M. D. Bartlett, “A unified understanding of magnetorheological elastomers for rapid and extreme stiffness tuning,” RSC Appl. Polymers, 2023, vol.1, pp. 315-324.

**63.** E. Gupta, C. Bonner, N. Lazarus, M. S. Mirotznik, and K. J. Nicholson, “Multi-axis manufacture of conformal metasurface antennas,” IEEE Ant. Wireless Propag. Lett., 2023, vol. 22, pp. 2629-2633.

**62.** D. C. Ames, G. L. Smith, N. Lazarus, L. L. Howell, and S. P. Magleby, “Laser forming of compliant mechanisms,” ASME Open J. Eng., 2023, vol. 2, 021018.

**61.** S. M. Curtis, J. L. Gugat, L. Bumke, D. Dengiz, L. Seigner, D. Schmadel, N. S. Lazarus, and E. Quandt, “Thin film superelastic alloys for stretchable electronics,” Shap. Mem. Superelasticity, 2023, vol. 9, pp. 35-49.

**60.** G. Smith, J. Tyler, N. Lazarus, H. Tsang, J. Shultz, and S. Bergbreiter, “Spider-inspired microhydraulics for small, soft robotics,” Adv. Funct. Mater., 2023, vol. 33, 2207435.

**59.** Y. Matia, G. H. Kaiser, R. F. Shepherd, A. D. Gat, N. Lazarus and K. H. Peterson, “Harnessing nonuniform pressure distributions in soft robotic actuators,” Adv. Intell. Syst., 2023, 2200330.

**58.** A. Bachmann, A. L. Ferris, S. Im, M. D. Dickey, and **N. Lazarus**, “Laser induced graphene from SU-8 photoresist: toward functional micromolding,” ACS Appl. Eng. Mater., 2023, vol. 1, pp. 222-228.

**57.** E. Bury, S. Thiagarajan, N. Lazarus and A. Koh, “Ferrofluid high internal phase emulsion polymer foams for soft, magnetic materials,” J. Magnetism Magnetic Materials, 2022, vol. 563, 169921.

**56.** Y. Matia, H. S. An, R. F. Shepherd, and **N. Lazarus**, “Magnetohydrodynamic levitation for high-performance flexible pumps,” PNAS, 2022, vol. 119, e2203116119.

**55.** V. F. Tseng, J. Radice, T.E. Drummond, S. Goodrich, D. Diamond, N. Lazarus, and S. S. Bedair, “Self-detachable through-metal acoustic wireless power transfer,” IEEE Trans. Ultrasonics, Ferroelectric Frequency Control, 2022, vol. 69, pp. 2381-2389.

**54.** B. Yoo, D. Bowen, N. Lazarus, and D. Pines, “Laser direct structured 3D circuits on silicone,” ACS Appl. Mater. Interfaces, vol. 14, 2022, pp. 18854-18865.

**53.** **N. Lazarus**, J. B. Tyler, J. A. Cardenas, B. Hanrahan, H. Tsang, and S. S. Bedair, “Direct electroless plating of conductive thermoplastics for selective metallization of 3D printed parts,” Addit. Manuf., vol. 55, 2022, 102793.

**52.** A. L. Bachmann, B. Hanrahan, M. D. Dickey, and **N. Lazarus**, “Self-folding PCB kirigami: rapid prototyping of 3D electronics via laser cutting and forming,” ACS Appl. Mater. Interfaces, vol. 14, 2022, pp. 14744-14782.

**51.** C. Aubin, B. Gorissen, E. Milana, P. Buskohl, N. Lazarus, G. Slipher, C. Keplinger, J. Bongard, F. Iida, J. Lewis, and R. Shepherd, “Towards enduring autonomous robots via embodied energy,” Nature, vol. 602, 2022, pp. 393-402.

**50.** K. A. Ohiri, N. M. Nowicki, T. J. Montalbano, M. Presley, and **N. S. Lazarus**, "Electroplating of aerosol jet printed silver inks," *Adv. Eng. Mater.*, vol. 23, 2021, 2100362.

**49.** K. Barrett-Snyder, S. Lane, N. Lazarus, W. C. K. Alberts, and B. Hanrahan, "Printing a Pacinian corpuscle: modeling and performance," *Micromachines*, 2021, vol. 12, 574.

- Declared 'Editor's Choice' by Micromachines

**48.** K. L. Dorsey and **N. Lazarus**, "Lifetime of liquid metal wires for stretchable devices," *Adv. Mater. Technol.*, 2021, 2001100.

**47.** A. L. Bachmann, M. D. Dickey and **N. Lazarus**, "Making light work of metal bending: laser forming in rapid prototyping," *Quantum Beam Sci.*, vol. 4, 2020, 44.

**46.** **N. Lazarus** and H. Tsang, "3D printing structural electronics with conductive filaments," *IEEE Trans. on Comp., Packag. Manuf. Technol.,* vol. 10, 2020, pp. 1965-1972.

**45.** **N. Lazarus** and S. S. Bedair, "Creating 3D printed sensors systems with conductive composites," *Smart Mater. Struct.*, vol. 30, 2021, 015020.

**44.** E. J. Barron, R. S. Peterson, **N. Lazarus** and M. D. Bartlett, "Mechanically cloaked multiphase magnetic elastomer soft composites for wearable wireless power transfer," *ACS Appl. Mater. Interfaces*, vol. 12, 2020, pp. 50909-50917.

**43.** J. B. Tyler, G. L. Smith, A. C. Leff, P. M. Wilson, J. Cumings, and **N. Lazarus**, "Understanding the electrical behavior of pyrolyzed 3D printed micro devices," *Adv. Eng. Mater.*, vol. 23, 2021, 2001027

**42.** J. A. Cardenas, H. Tsang, H. Tong, H. Abuzaid, K. Price, M. A. Cruz, B. J. Wiley, A. D. Franklin, and **N. Lazarus**, "Flash ablation metallization of conductive thermoplastics," *Addit. Manuf.*, vol. 36, 2020, 101409.

**41.** S. Lane, K. Barrett-Snyder, N. Lazarus, W. Alberts, and B. Hanrahan, "Vibration sensing the mammalian way: an artificial Pacinian corpuscle," *Bioinspiration Biomimetics*, vol. 15, 2020, 046001.

**40.** I. Kierzewski, S. S. Bedair, B. Hanrahan, H. Tsang, and **N. Lazarus**, "Adding an electroactive response to 3D printed materials: printing a piezoelectret," *Addit. Manuf.*, vol. 31, 2019, 100963.

**39.** V. Tseng, S. Bedair, J. Radice, T. Drummond, **N. Lazarus**, "Ultrasonic Lamb waves for wireless power transfer," *IEEE Trans. Ultrason., Ferroelectr. Freq. Control*, vol. 67, 2020, pp. 664-679.

**38.** **N. Lazarus**, G. L. Smith, and M. D. Dickey, "Self-folding metal origami," *Adv. Intell. Syst.*, 2019, 1900059

**37.** **N. Lazarus**, S. S. Bedair, S. H. Hawalsi, M. J. Kim, B. J. Wiley, and G. L. Smith, "Selective electroplating for 3D printed electronics," *Adv. Mater. Technol.*, 2019, 1900126

**36.** S. M. Curtis, R. P. Tompkins, B. M. Nichols, M. B. Graziano, I. Kierzewski, G. L. Smith, M. S. Leite, and **N. Lazarus**, "Structural anisotropy in stretchable silicon," *Adv. Electron. Mater.*, 2019, 1900003

**35.** M. J. Kim, M. A. Cruz, S. Ye, A. L. Gray, G. L. Smith, N. Lazarus, C. J. Walker, H. H. Sigmarsson, and B. J. Wiley, "One-step electrodeposition of Cu on conductive 3D printed objects," *Addit. Manuf.*, vol. 27 (2019) pp. 318-326

**34.** **N. Lazarus**, S. S. Bedair, and G. L. Smith, "Creating 3D printed magnetic devices with ferrofluid and liquid metals," *Addit. Manuf.*, vol. 26 (2019) pp. 15-21

**33.** E. Siman-Tov, V. F. Tseng, S. S. Bedair, and **N. Lazarus**, "Increasing the range of wireless power transmission to stretchable electronics," *IEEE Trans. Microw. Theory Tech.*, vol. 66 (2018) pp. 5021-5030

**32.** K. L. Dorsey, M. Cao, G. A. Slipher, and **N. Lazarus**, "Mechanical isolation and temperature compensation in soft elastomers components," *IEEE Sensors J.*, vol. 18 (2018) pp. 7505-7512

**31.** **N. Lazarus** and G. L. Smith, "Laser folding in a roll-to-roll manufacturing process," *Lasers Manuf. Mater. Process.*, vol. 5 (2018) pp. 237-247

**30.** I. Mahaboob, J. Marini, K. Hogan, E. Rocco, R. P. Tompkins, N. Lazarus, and F. Shahedipour-Sandvik, "Selective area epitaxial growth of stretchable geometry AlGaN-GaN heterostructures," *J. Electronic Mater.* vol. 47 (2018) pp. 6625-6634

**29.** **N. Lazarus**, S. S. Bedair, and G. L. Smith, "Origami inductors: rapid folding of 3D coils on a laser cutter," *IEEE Electron Dev. Lett.*, vol. 39 (2018) pp. 1046-1049

**28.** V. Tseng, S. S. Bedair and **N. Lazarus**, "Acoustic power transfer and communication with a wireless sensor embedded within metal," *IEEE Sensors J.*, vol. 18 (2018) pp. 5550-5558

**27.** I. Mahaboob, K. Hogan, S. W. Novak, F. Shahedipour-Sandvik, R. P. Tompkins, and N. Lazarus, "Influence of mask material on the electrical properties of selective area epitaxy GaN microstructures," *J. Vac. Sci. Technol. B*, vol. 36 (2018) 031203

**26.** K. Angel, H. H. Tsang, S. S. Bedair, G. L. Smith, and **N. Lazarus**, "Selective electroplating of 3D printed parts," *Addit. Manuf.*, vol. 20 (2018) pp. 164-172

**25.** **N. Lazarus**, A. A. Wilson, and G. L. Smith, "Contactless laser fabrication and propulsion of freely moving structures," *Extreme Mech. Lett.*, vol. 20 (2018) pp. 46-50

**24.** V. Tseng, S. S. Bedair and **N. Lazarus**, "Phased array focusing for acoustic wireless power transfer," *IEEE Trans. Ultrason., Ferroelectr. Freq. Control,,* vol. 65 (2018), pp. 39-49

**23.** **N. Lazarus** and S. S. Bedair, "Bubble inductors: pneumatic tuning of a stretchable inductor," *AIP Advances*, vol. 8 (2018) 056601

**22.** R. P. Tompkins, I. Mahaboob, F. Shahedipour-Sandvik, and **N. Lazarus**, "Electrical properties of AlGaN/GaN HEMTs in stretchable geometries," *Solid State Electronics*, vol. 136 (2017) pp. 36-42.

**21.** **N. Lazarus** and G. L. Smith, "Laser forming for complex 3D folding," *Adv. Mater. Technolog.*, vol. 2, (2017), 1700109

**20.** J. J. Radice, P. J. Ellsworth, M. A. Romano, N. Lazarus and S. S. Bedair, "On the use of discontinuous nonlinear bistable dynamics to increase the responsiveness of energy harvesting devices," *Mech. Research Comm.*, Vol. 84 (2017) pp. 49-54

**19.** **N. Lazarus**, S. S. Bedair and I. M. Kierzewski, "Ultrafine pitch stencil printing of liquid metal alloys," *ACS Appl. Mater. Interfaces*, Vol. 9 (2017) pp. 1178-1182

**18.** V. F. Tseng, S. S. Bedair and **N. Lazarus**, "3D electroplated inductors with thickness variation for improved broadband performance," *J. Micromech. Microeng.*, Vol. 27 (2017), 015006

**17.** **N. Lazarus** and B. Hanrahan, "Thermotherapy platform based on a highly stretchable wireless heater," *Adv. Mater. Technol.*, Vol. 1 (2016), 1600130

**16.** C. Soule and **N. Lazarus**, "Reconfigurable Braille display with phase change locking, *Smart Mater. Struct.*, Vol. 25 (2016), 075040

**15.** **N. Lazarus** and S. S. Bedair, "Improved power transfer to wearable systems through stretchable magnetic composites," *Appl. Phys. A*, Vol. 122 (2016), 543

**14.** **N. Lazarus** and C. D. Meyer, "Stretchable inductor with liquid magnetic core," *Mat. Res. Express*, Vol. 3 (2016), 036103

**13.** **N. Lazarus**, C. D. Meyer, and W. J. Turner, "A microfluidic wireless power system," *RSC Advances*, Vol. 5 (2015), pp. 78695-78700

**12.** I. M. Kierzewski, L. Boteler, S. S. Bedair, C. D. Meyer, B. M. Hanrahan, and **N. Lazarus**, "Electroplated copper for heterogeneous die integration," *IEEE Trans. on Comp., Packag. Manuf. Technol.*, Vol. 5, Issue 7 (2015), pp. 895-901

**11.** C. P. Migliaccio and **N. Lazarus**, "Fabrication of hierarchically structured superhydrophobic PDMS surfaces by Cu and CuO casting," *Appl. Surf. Sci.*, Vol. 353 (2015), pp. 269-274

**10.** **N. Lazarus**, C. D. Meyer and S. S. Bedair, "Stretchable inductor design," *IEEE Trans. on Electron Devices*, Vol. 62, Issue 7 (2015), pp. 2270-2277

**9.** **N. Lazarus**, C. D. Meyer, S. S. Bedair, G. A. Slipher, and I. M. Kierzewski, "Magnetic elastomers for stretchable inductors," *ACS Appl. Mater. Interfaces*, Vol. 7, Issue 19 (2015), pp. 10080-10084

**8.** **N. Lazarus**, C. D. Meyer, S. S. Bedair, H. Nochetto and I. M. Kierzewski, "Multilayer liquid metal stretchable inductors," *Smart Mater. Struct*., Vol. 23 (2014), 085036

**7.** **N. Lazarus**, C. D. Meyer, and S. S. Bedair, "Fractal inductors," *IEEE Trans. on Magnetics*, Vol. 50, Issue 4 (2014) 8400708

**6.** **N. Lazarus**, C. D. Meyer, S. S. Bedair, X. Song, L. M. Boteler, and I. M. Kierzewski, "Thick film oxidation of copper in an electroplated MEMS process," *J. Micromech. Microeng*., Vol. 23 (2013) 065017 (9 pp)

**5.** **N. Lazarus** and G. K. Fedder, "Designing a robust high-speed CMOS-MEMS capacitive humidity sensor," *J. Micromech. Microeng.*, Vol. 22, Issue 8 (2012), 085021 (7pp)

**4.** **N. Lazarus** and G. K. Fedder, "Integrated vertical parallel-plate capacitive humidity sensor," *J. Micromech. Microeng*., Vol. 21, Issue 6 (2011), 065028 (9pp)

**3.** N. Garg, A. Mohanty, N. Lazarus, L. Schultz, T. Rozzi, S. Santhanam, L. Weiss, J. Snyder, G. K. Fedder and R. Jin, "Robust gold nanoparticles stabilized by trithiol for applications in chemiresistive sensors," *Nanotechnology*, Vol. 21, Issue 40 (2010) 405501 (6pp)

**2.** **N. Lazarus**, S. S. Bedair, C.-C. Lo, and G. K. Fedder, "CMOS-MEMS capacitive humidity sensor," *J. Microelectromechanical Systems*, Vol. 19, Issue 1 (2010), pp. 183-191

**1.** V. Gruev, A. Ortu, N. Lazarus, J. Van der Spiegel, and N. Engheta, "Fabrication of a dual-tier thin film micropolarization array," *Optics Express*, Vol. 15, Issue 8 (2007), pp. 4994-5007

**COLLOQUIA**

**17.** N. Lazarus, "Creating soft and stretchable electromagnetic devices for soft robotics," University of North Texas Soft Robotics Seminar Series, Fall 2024 (Invited)

**16.** N. Lazarus, "Stretchable electromagnetics for wearable sensors," University of Delaware Biomechanics and Movement Science Seminar, Spring 2024 (Invited)

**15.** N. Lazarus, "Creating soft and stretchable electromagnetic devices for soft robotics," Maryland Robotics Center Research Symposium, Spring 2024 (Keynote)

**14.** N. Lazarus, "Stretchable electronics for managing power on the body," Texas A&M University Electrical and Computer Engineering Colloquium Series, Fall 2023 (Distinguished Lecture with Honorarium)

**13.** N. Lazarus, "Stretchable electronics for wearable biomedical sensors," Nemours Junior Investigators Network seminar series, Winter 2023 (Invited).

**12.** N. Lazarus, "3D printing a power system," Rutgers Electrical and Computer Engineering Colloquium Series, Fall 2022 (Invited).

**11.** N. Lazarus, "Creating a soft and stretchable wireless power system," US Government STEP Smart Materials and Intelligent Systems Seminar, Fall 2021 (Invited).

**10.** N. Lazarus, "3D printing a power system," UMBC Mechanical Engineering Seminar Series, Fall 2021 (Invited).

**9.** N. Lazarus, "Creating a soft and stretchable wireless power system," Case Western Electrical Engineering Seminar Series, Winter 2020 (Invited).

**8.** N. Lazarus, "Creating a soft and stretchable wireless power system," U. Maryland Chemical Engineering Seminar Series, Winter 2020 (Invited).

**7.** N. Lazarus, "Creating a soft and stretchable wireless power system," Cornell Mechanical Engineering Colloquium, Winter 2020 (Invited).

**6.** N. Lazarus, "3D printing a power system," Laboratory of Physical Sciences (LPS) Colloquium, Fall 2019 (Invited)

**5.** N. Lazarus, "An origami microfactory: folding 3D parts with a low cost marking laser," North Carolina State University Chemical Engineering Seminar, Spring 2019 (Invited)

**4.** N. Lazarus, "Creating a soft and stretchable wireless power system," UT Austin Wireless Networking and Communications Group (WNCG) Seminar Fall 2018 (Invited)

**3.** N. Lazarus, “Towards 4D printing: self-folding 3D parts with a low cost marking laser,” ARL Colloquium and Science Café lecture series, Summer 2017 (Invited).

**2.** R. P. Tompkins and N. Lazarus, “Stretchable gallium nitride transitors,” SUNY Polytechnic Institute Seminar, 2017 (Invited)

**1.** S. S. Bedair and N. Lazarus, “Stretchable power conversion,” Physics Colloquium, U. Delaware, 2015 (Invited)

**CONFERENCE PRESENTATIONS/PAPERS**

**47.** S. Jahan and N. Lazarus, “FFF 3D printing for advanced electronics packaging,” EMC 2025, 2025 (Lecture)

**46.** N. Lazarus, “Stretchable magnetic materials and devices for soft robotics,” MRS Spring Meeting 2025, 2025 (Invited Lecture).

**45.** N. Lazarus, “Soft materials and fabrication for stretchable electromagnetics,” SAMPE B-W Feb. 2025 (Invited Lecture)

**44.** N. Lazarus, “Creating power components through metallized 3D printed polymers,” Inter-Agency Power Group Electronic Materials Panel, Aug. 2024 (Invited Lecture)

**43.** N. Lazarus, “3D printing of magnetic materials and devices,” EMA 2024, 2024 (Invited Lecture)

**42.** C. Kuo, J. Ahn, B. Yoo, N. Lazarus and S. Kim, “3D printed flexible coil for wireless power transfer application,” EMC 2024, 2024 (Lecture)

**41.** C. Bonner, E. Gupta, M. Richards, N. Lazarus, K. Nicholson and M. Mirotznik, “Computational design of metalenses for passive millimeter wave imaging,” Proc. URSI EMTS 2023, 2023 (Lecture).

**40.** E. Bury, S. Thiagarajan, N. Lazarus and A. Koh, “Ferrofluid high internal phase emulsion polymer foams for soft, deformable magnetic elastomer composites,” AIChE Annual Meeting 2023, 2023 (Lecture).

**39.** N. Lazarus, “Selective metallization of 3D printed polymers,” NextFlex Winter Symposium 2023, Fall 2023 (Poster)

**38.** N. Lazarus, “Printing an artificial robot heart,” Mid Atlantic Robotics Symposium 2023, Summer 2023 (Invited Lecture)

**37.** N. Lazarus, “Integration and power: microsystems research at U. Delaware,” NSF NanoSI Workshop, Fall 2022 (Invited Lecture)

**36.** V. F. Tseng, T. Kiebala, D. Bruno, B. Novick, N. Lazarus and S. S. Bedair, “Wireless power transmission using acoustic-to-inductive relayed transfer,” Proc. PowerMEMS 2022, 2022 (Lecture).

**35.** N. Lazarus and J. Tyler, “Metallization of polymers for additive manufacturing,” OSD Basic Research Conf., 2022 (Lecture)

**34.** V. F. Tseng, D. Diamond, S. Goodrich, J. J. Radice, N. Lazarus, and S. S. Bedair, “Selective receiver charging using acoustic wireless power transfer,” Proc. IEEE WPTC 2021, 2021 (Lecture)

- Winner of Best Conference Paper Award

**33.** S. Bedair, M. E. Galenko Klemash, R. Rudy, V. Tseng, B. Hanrahan, I. Kierzewski, N. Lazarus, J. Pulskamp, and J. Radice, “Piezoelectric and ferroelectric devices for energy efficiency and power,” ISAF 2021 (Invited Lecture)

**32.** J. Tyler, G. Smith, J. Cumings and N. Lazarus, “3D printing metals at the microscale,” MEMS 2022 (Poster)

**31.** J. A. Cardenas, H. Tsang, H. Tong, H. Abuzaid, K. Price, M. A. Cruz, B. J. Wiley, A. D. Franklin, and N. Lazarus, “Flash ablation metallization of conductive thermoplastics,” Flex 2020 (Poster)

- 2$^{nd}$ place, student poster competition

**30.** S. Hawalsi, H. Tsang, N. Lazarus, G. Smith, and E. Forsythe, “Improving conductivity of 3D printed conductive paste for RF and high performance electronics,” IMWS-AMP 2018 (Lecture)

**29.** R. P. Tompkins, S. M. Curtis, I. Mahaboob, F. Shahedipour-Sandvik, N. Lazarus, “Fabrication of stretchable AlGaN/GaN high electron mobility transistors (HEMTs),” EMC 2018 (Lecture)

**28.** I. Mahaboob, K. Hogan, E. Rocco, R. P. Tompkins, N. Lazarus, F. Shahedipour-Sandvik, "Influence of mask material in controlling the electrical properties of selective area epitaxially grown AlGaN-GaN microstructures," EMC 2018 (Lecture).

**27.** G. L. Smith, N. Lazarus, S. McCormick, "Laser folded antenna," IMWS-AMP 2018 (Lecture).

**26.** K. L. Dorsey, M. Cao and N. Lazarus, "Mechanical isolation structures for soft elastomer components," IEEE Sensors 2017 (Poster)

**25.** I. M. Kierzewski, C. Jia, B. Hanrahan, S. Bedair, J. Ho, L. Hu and N. Lazarus, "Ferroelectret behavior in de-lignified wood," ISE 2017 (Poster)

**24.** N. Lazarus and S. S. Bedair, "Bubble inductors: pneumatic tuning of a stretchable inductor," MMM 2017 (Lecture)

**23.** N. Lazarus, "Magnetic composites for stretchable wireless power systems," MS&T 2017 (Invited)

**22.** N. Lazarus, "Creating a stretchable power system," IEEE EDS Baltimore Colloquium on Flexible and Wearable Electronics, Oct. 2017 (Invited)

**21.** I. Mahaboob, J. Marini, K. Hogan, E. Rocco, R. P. Tompkins, N. Lazarus, and F. Shahediopour-Sandvik, "Design and bottom-up development of stretchable geometry AlGaN/GaN high electron mobility transistors," Proc. EMC 2017 (Lecture)

**20.** S. M. Curtis, H. Wang, R. P. Tompkins, and N. Lazarus, "Effect of mechanical anisotropy of GaN and Si for stretchable electronics," MAMNA 2017 (Poster)

- 2nd place, student poster competition

**19.** D. J. Sharar, J. Radici, A. Smith, B. Hanrahan, N. Jankowski, and N. Lazarus, "Bending-mode elastocaloric cooling," MRS Spring Meeting, 2017 (Poster)

**18.** V. F. Tseng, S. Bedair and N. Lazarus, "Acoustic wireless power transfer with receiver array for enhanced performance," IEEE Wireless Power Transfer Conference (WPTC) 2017, Taipai, Taiwan, May 2017 (Lecture).

**17.** R. Tompkins, I. Mahaboob, F. S. Shahedipour-Sandvik and N. Lazarus, "Mechanical modeling and electrical characterization of AlGaN/GaN HEMTs in stretchable geometries," International Semiconductor Device Research Symposium (ISDRS) 2016, Bethesda, MD, Dec. 2016 (Poster)

**16.** F. Shahedipour-Sandvik, I. Mahaboob, J. Marini, K. Hogan, R. Tompkins and N. Lazarus, "A bottom-up approach to AlGaN/GaN HEMT development for stretchable electronics," International Semiconductor Device Research Symposium (ISDRS) 2016, Bethesda, MD, Dec. 2016 (Invited)

**15.** N. Lazarus and R. Tompkins, "High performance stretchable power electronics," International Semiconductor Device Research Symposium (ISDRS) 2016, Bethesda, MD, Dec. 2016 (Invited)

**14.** I. Mahaboob, J. Marini, K. Hogan, R. P. Tompkins, N. Lazarus and S. Shahedipour-Sandvik, "Development of stretchable geometry AlGaN/GaN HEMTs with selective area epitaxial growth technique," International Workshop on Nitride Semiconductors (IWN) 2016, Orlando, FL, Oct. 2016 (Lecture)

**13.** R. P. Tompkins, I. Mahaboob, S. Shahedipour-Sandvik, and N. Lazarus, Electrical properties of AlGaN/GaN HEMTs in stretchable geometries," Electronic Materials Conference, Newark, DE June 2016 (Poster)

**12.** R. P. Tompkins, I. Mahaboob, S. Shahedipour-Sandvik, and N. Lazarus, "Mechanical analysis of stretchable AlGaN/GaN high electron mobility transistors," *ECS Trans.*, Vol. 72, Issue 5 (2016) pp. 89-95 (Poster)

**11.** N. Lazarus and C. D. Meyer, "Ferrofluid-based stretchable magnetic core inductors," Proc. PowerMEMS 2015, Boston, MA, Dec. 2015 (Lecture)

**10.** N. Lazarus, "From fractals to ferrofluids: creating a soft and squishy power system," Mid-Atlantic Micro/Nano Alliance Spring Workshop 2016, Laurel, MD, March 2016 (Invited)

**9.** N. Lazarus, S. Bedair and C. Meyer, "Remoldable inductors based on self-heating fusible alloys," IEEE Sensors 2014, Valencia, Spain Nov. 2014 pp. 1551-1554 (Lecture)

**8.** C. Migliaccio and N. Lazarus, “Fabrication of hierarchically structured superhydrophobic PDMS surfaces by CuO casting, IEEE Sensors 2014, Valencia, Spain Nov. 2014 pp. 1695-1698 (Lecture)

**7.** N. Lazarus, “3D printing in a research environment,” 3D Maryland Innovative User Group, Columbia, MD, Oct. 2014 (Invited)

**6.** N. Lazarus, C. D. Meyer and S. S. Bedair, “Multilayer liquid metal stretchable power inductors,” Darnell Energy Summit 2014, Richmond, VA Sept. 2014 (Invited)

**5.** S. S. Bedair, C. D. Meyer, N. Lazarus, C. Dougherty, J. S. Pulskamp, B. Morgan, R. Polcawich, X. Lin, R. Bashirullah, I. Kierzewski, J. Martin, and B. Power, “MEMS-based and switched-capacitor approaches for miniature power supply applications,” Micro- and Nano-technology Sensors, Systems and Applications VI, Baltimore, MD, May 2014, 90831T (Invited)

**4.** C. D. Meyer, S. S. Bedair, B. C. Morgan, X. Lin, R. Bashirullah, D. P. Arnold, I. M. Kierzewski, and N. S. Lazarus, “Power management for small scale systems,” Micro- and Nanotechnology Sensors, Systems and Applications VI, Baltimore, MD, May 2014 (Invited)

**3.** C. D. Meyer, S. S. Bedair, B. C. Morgan, J. S. Pulskamp, R. G. Polcawich, N. Lazarus, X. Lin, C. M. Dougherty, R. Bashirullah, and G. P. Arnold, “Chip-scale power management for autonomous microsystems,” PowerSOC 2012, San Francisco, CA Nov. 2012 (Poster)

**2.** N. Lazarus and G. K. Fedder, “Integrated vertical parallel-plate capacitive humidity sensor,” Solid State Sensors, Actuators and Microsystems Workshop (Hilton Head) 2010, Hilton Head, SC, June 2010, pp. 242-245 (Poster)

**1.** N. Lazarus, S. S. Bedair, C.-C. Lo and G. K. Fedder, “CMOS-MEMS capacitive humidity sensor,” MEMS 2009, Sorrento, Italy, Jan. 2009, pp. 268-271 (Poster)

**SELECTED HONORS AND FELLOWSHIPS**

- Presidential Early Career Award for Scientists and Engineers (PECASE), 2019
    - Highest honor bestowed by US government on researchers beginning their independent research careers
- ARL Early Career Award, 2019
    - Awarded to a single researcher per year at ARL, among all candidates with less than five years experience beyond the conclusion of their final post-doctoral fellowship.
- ARL Honorary Award for Engineering, US Army Research Laboratory 2016
- 2016 Rookie Employee of the Year Excellence in Federal Career Award (Gold), Technical, Scientific and Program Support Category, Baltimore Federal Executive Board
    - Gold award given to top individual in category from the pool of 125 federal agencies and 7 military installations represented by the Baltimore FEB
- ARL Nominee for Office of the Secretary of Defense (OSD) Laboratory Scientist of the Quarter, 2nd Quarter 2015

**PROFESSIONAL ACTIVITIES**

- Technical Reviewer: Advanced Materials, Advanced Functional Materials, Advanced Materials Technologies, Advanced Materials Interfaces, Advanced Healthcare Materials, ACS Applied Materials and Interfaces, J. Micromech. Microeng., Adv. Intell. Syst., Applied Physics Letters, J. Appl. Phys., J. of Physics D: Applied Physics, Applied Physics A, Materials and Design, Applied Surface Science, Scientific Reports, AIP Advances, Advanced Engineering Materials, IEEE Sensors Conference 2016, IEEE Trans. on Magnetics, IEEE Trans. Industrial Electronics, Metals, Materials, Micromachines, Measurement, Sensors, Electronics, Measurement Science and Technology, IEEE J. Flexible Electronics, Sensors Letters
    - Winner of Outstanding Reviewer Award, J. Micromech. Microeng., 2017
    - Winner of Outstanding Reviewer Award, Micromachines, 2020
- Editing: Materials (Topic Editor), 2021

- Reviewer Board: Micromachines, Polymers, J. Manuf. Mater. Processing, Advances in Engineering, J. Compos. Sci.
- Review Panels: NSF Panel Reviewer (2015, 2016, 2018, 2019) National Defense Science and Engineering Graduate (NDSEG) Fellowship Panelist (2017, 2018), ARO Institute for Collaborative Biotechnologies Subject Matter Expert Evaluator (2017, 2021), Marsden Fund (New Zealand) Proposal Evaluator (2025)
- Advisory workshops:
    - AFOSR/NSF Additive Manufacturing Workshop, Summer 2018 (served as Army representative helping lead the workshop)
    - AFOSR Workshop on Reconfigurable Electronics, Spring 2016 (invited expert/presenter)
- Session Chair: MAMNA 2017, MMM 2017, EMC 2024, Transducers 2025, PowerMEMS 2025 Focused Session
- Steering Committee Member: Mid-Atlantic Micro/Nano Alliance (Secretary of steering committee Aug. 2016-Nov. 2020)
- Technical Program Committee: Transducers 2025, Hilton Head 2026, PowerMEMS 2025
- Invited Conference Organizer: Electronics Materials Conference (EMC) 2023-present

**POPULAR PRESS**

My work was selected to be highlighted in the following articles:

- "Soft robots harness viscous fluids for complex motions," Cornell Chronicle, Jan. 2023.
- "Future robots might come with a fake heart that pumps blood," Daily Beast, July 2022
- "Engineers give soft robots a heart," Unite.AI, July 2022
- "Deformable Pump Gives Soft Robots a Heart," Science Daily, July 2022
- "Stretching the Limits of Soldier Performance," Army Magazine, Nov. 2019
- "Laser Origami Makes Inductors," IEEE Spectrum, June 2018
- "Laser Forming Lets 3D Metal Parts Build Themselves," MachineDesign.com, Dec. 2017
- "Laser Forming Origami: Hands-Free Folding in a Laser Cutter," ScienceTrends, Nov. 2017
- "Multi-layer Liquid Metals, GaN and Advanced Power Converters," PowerPulse, Sept. 2014

**MENTORING/SUPERVISING**

- Kirin Stevens, undergraduate researcher, U. Delaware (Summer 2025)
- Bethany Hinshaw, NSF REU researcher, Bridgewater College (Summer 2025)
- Jorge Zarate, Bolivian summer scholar, U. Delaware (Summer 2025)
- Kyle Heckman, M.S. student, U. Delaware (Spring 2025-present)
- Juan Sanchez, undergraduate researcher, U. Delaware (Winter 2025-present)
- Mekhai Waples, undergraduate researcher, U. Delaware (Winter 2025-present)
- Cristhian Castro, Peruvian student scholar, U. Delaware (Summer 2024 to Oct. 2024)
- Kyle McKee, U. Delaware NSF REU researcher, Notre Dame University (Summer 2024)
- Ryan Weiss, undergraduate researcher, U. Delaware (Summer 2024)
- Gabriel Dolce, M.S. student, U. Delaware (Summer 2024 to Winter 2025)
- Charise Jeudy, NSF REU researcher, U. Delaware (Summer 2024)
- Ranyah Khan, undergraduate researcher, U. Delaware (Winter 2023)
- David Adejoro, undergraduate researcher, U. Delaware (Winter 2023 to Summer 2024)
- Brandon Garcia, undergraduate researcher, U. Delaware (Fall 2023 to present)
- Sharmin Jahan, Ph.D. student, U. Delaware (Fall 2023 to present)

- Minhazur Rahman, Ph.D. student, U. Delaware (Fall 2023 to present)
- Juan Cortazar, Ph.D. student, U. Delaware (visiting scholar Summer 2023 to Dec. 2023, Ph.D student Spring 2025 to present)
- Joshua Hyman, undergraduate researcher, U. Delaware (Summer 2023)
- Colby Dolbow, undergraduate researcher, U. Delaware (Summer 2023)
- Noah Durbin, undergraduate researcher, U. Delaware (Summer 2023 to Summer 2024)
- Claudia McCormick, undergraduate researcher, U. Delaware (Fall 2022 to Spring 2024)
- Michael Earley, undergraduate researcher, U. Delaware (Fall 2022 to Spring 2024)
- Lillian Olkolla, NSIN X-Force fellow, Texas A&M University, Summer 2021 (with C. Quigley)
- Vanessa Townsend, NSIN X-Force fellow, Florida Polytechnic, Summer 2021 (with C. Quigley)
- Golda Nguyen, NDSEG fellow, MIT, Winter 2020 to Summer 2022
- Jayla Wade, junior student intern, Howard University, Spring 2021 to Winter 2021 (with B. Hanrahan)
- Madyson Quest, senior student intern, Baylor University, Winter 2021 to Winter 2021 (with B. Hanrahan)
- Edward Barron, Ph.D. student, Virginia Tech, Fall 2019 to Summer 2023 (with M. Bartlett)
- Yoav Matia, ORAU postdoctoral fellow, Winter 2020 to Summer 2022 (with R. Shepherd)
- Jorge Cardenas, Ph.D. student intern, Duke University, Summer 2019 (with H. Tsang)
- Josh Tyler, Ph.D. student, U. Maryland, Jan. 2019 to March 2023
    - Co-advised Ph.D. thesis, Spring 2023 (with J. Cummings)
- Sabrina Curtis, BS/MS intern, U. Maryland Fall 2016 to Spring 2018
    - Co-advised MS thesis, Spring 2018, (with R. Tompkins)
- Iain Kierzewski, Ph.D. student, U. Maryland, Jan. 2016 to Summer 2024
    - Co-advised Ph.D. thesis, U. Maryland, Summer 2024 (with L. Hu)
- Adam Bachmann, Ph.D. student, North Carolina State University, Jan. 2019 to Summer 2022 (with M. Dickey)
    - Co-advised Ph.D. thesis, North Carolina State University, Summer 2022 (with M. Dickey)
- Sangjun Kim, Ph.D. student, UT Austin, 2020 to summer 2022 (with N. Lu)
- Jonathan Wells, Ph.D. student, UT Austin, Jan. 2019 to summer 2022 (with N. Lu)
- Yifu Huang, Ph.D. student, UT Austin, Jan. 2019 to 2020 (with N. Lu)
- Kieran Barrett-Snyder, RIT, Summer/Fall 2018 (with B. Hanrahan)
- Susan Lane, sophomore student intern, RIT, Summer 2018/Fall 2018 (with B. Hanrahan)
- Elad Siman-Tov, GTS contractor, Jan. 2017 to Jan. 2018 (with S. Bedair)
- Victor Tseng, ORAU postdoctoral fellow, Fall 2015-Spring 2019 (with S. Bedair)
- Kristin Angel, junior undergraduate intern, RIT, Summer-Fall 2017
- Cody Soule, sophomore undergraduate intern, RIT, Summer-Fall 2015
- Edgar Garay, Ph.D. student intern, U. Florida, Winter-Summer 2015 (with C. Meyer)
- Walker Turner, Ph.D. student intern, U. Florida, Fall/Winter 2014 (with C. Meyer)
- Ben Miller, senior undergraduate intern, George Washington University, Summer 2014

**THESIS/PROJECT ADVISING**

- Ph.D. Thesis Co-advisor –
  - Adam Bachmann, "Unconventional laser fabrication of electronic devices," Dept. of Chemical and Biomolecular Engineering, North Carolina State University (Defended Summer 2022)
  - Joshua Tyler, "Pyrolysis of 3D printed photopolymers: Characterization and process development," Dept. Materials Science and Engineering, University of Maryland (Defended Spring 2023)
  - Iain Kierzewski, "An investigation of 3D printed materials as electrets," Dept. Materials Science and Engineering, University of Maryland (Defended Summer 2024)
- M.S. Thesis Co-advisor –
  - Sabrina Curtis, "Stress characterization of stretchable semiconductors," Dept. of Materials Science, University of Maryland (Defended Spring 2018)
  - Patrick Richard, "Fabrication of an asymmetric ceramic membrane via indirect additive manufacturing," Dept. of Chemical and Biomolecular Engineering, University of Maryland (Defended Fall 2022)
- Ph.D. Committees
  - Mohamad Idris, "Integrating organic electrochemical transistors with 3D-printed objects," Electrical Engineering and Computer Science, York University (Defended Spring 2025)
  - Rachel Viger, "Synthetic aperture radar information extraction and phase characterization via complex-valued neural networks," Electrical and Computer Engineering, University of Delaware (Defended Spring 2025)
  - Drew Barrett, "The design and additive manufacture of antenna systems for space-constrained environments, Electrical and Computer Engineering, University of Delaware (Defended Spring 2025)
  - Yahui Xiao, "Integrated photonics platform: from passive low loss to active electrically tunable photonic crystals," Dept. Electrical and Computer Engineering, University of Delaware (Defended Summer 2024)
  - Mark A. Colgan, "Iterative design and additive manufacturing of volume constrained wire grid antennas," Dept. Electrical and Computer Engineering, University of Delaware (Defended Winter 2024)
  - Theodore N. Z. Fessaras, "The design and additive manufacture of gradient dielectrics for RF devices," Dept. Electrical and Computer Engineering, University of Delaware (Defended Winter 2024)
  - Ellen R. Gupta, "Hybrid manufacturing of radiofrequency and photonic devices," Dept. Electrical and Computer Engineering, University of Delaware (Defended Spring 2023)
  - Edward J. Barron III, "Multi-component elastomer composites for next generation electronics and machines," Macromolecular Science and Engineering, Virginia Tech (Defended Summer 2023)
- Senior Design Project co-advisor:
  - "Muscle strength measurement," Georgia Tech (2 teams, one Mechanical Engineering, one Biomedical Engineering), Fall 2020.
  - "Wirelessly charged wearable sensor node," University of Pennsylvania Electrical Engineering department, Fall 2019 to Spring 2020
    - Winner, "Most Innovative" and "Viewer's Choice" awards, M&T Summit 2020
    - Winner, Fred Ketterer Memorial Award for Creativity in Engineering Design, UPenn Electrical Engineering Department Senior Design Day 2020
  - "Design, fabrication, and characterization of stretchable silicon photovoltaic devices," University of Maryland College Park Materials Science department, Spring 2017
  - "RIPT wireless power transfer," University of Maryland Baltimore County Mechanical Engineering department, Spring 2016.
- Honor's Thesis Committee

- Julia Hatoum, “Modeling and analysis of patient-specific cardiovascular control,” Spring 2024 (committee member)
- Kaveri Srivastava, “Computational studies on the effect of hydrogen bonding on the ordering of block co-polymers towards thermal conductivity applications,” Spring 2024 (committee member)
- Saurav Padhye, “Modeling the impact of pediatric tonsil size on aerosol deposition and pulmonary drug delivery,” Spring 2024 (committee member)
- Miyu Mudalamane, “The design of a bacterial strain for stabilization and incorporation of aldehyde building blocks into proteins,” Spring 2024 (committee member)
- Kristina Holsapple, “Is exascale enough? An investigation into the performance of a plasma physics machine learning model on AMD MI250X GPUs,” Spring 2023 (committee member)
- Manju Sivasankar, “Design of the MR-StretchFingers device for the study of neuromechanics of stretch reflexes in the finger muscles,” Spring 2023 (committee member)
- Mathias Heider, “Machine Learning in Pediatric Acute Myeloid Leukemia,” Spring 2023 (committee member)

**OUTREACH/MENTORING**

- FedTech Project Team Mentor – co-mentored four person team on commercializing stretchable wireless power technology, Spring 2019 cohort
  - 3rd place team (out of twenty teams in cohort)
- US Patent and Trademark Office Collegiate Inventors Competition – co-mentored four person team on Stretchable Silicon Photopholtaics invention, 2017
  - Selected as finalist in national undergraduate competition (top six teams in the nation)
- ARL Sensors and Electron Devices Summer Student Symposium – mentored student Sabrina Curtis
  - Student competition winner, undergraduate category, summer 2017
- Senior Design Judging, Penn Electrical and Systems Engineering demo day, Spring 2021, Spring 2025.
- Course Project Mentor – co-mentored six person course project on stretchable solar cells, University of Maryland College Park, ENMA 466: Advanced Microfabrication, Fall 2017
- STEM National Week at the Labs – Ran stretchable electronics demo, March 2017
- ARL Gains in the Education of Mathematics and Science (GEMS) program – Ran stretchable electronics demo, Summer 2015, 2016, 2017
- Maryland chapter of Department of Energy Science Bowl – served as volunteer moderator for series of head to head rounds between teams of 4 high school students, January 2013, 2014, 2015
- Science Fair volunteering - Chesapeake Math and IT Academy Charter School 2013, 2014, Cleveland Elementary School Science Fair 2014, DC STEM Fair 2013. Real World Design Challenge (RWDC) 2013
- Maryland Science Olympiad - Organized and ran Circuits Lab component of event 2013