ERIC T. CHANG

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EDUCATION

Columbia University, New York, NY **expected 2026**
Ph.D. in Mechanical Engineering (in 4th year) GPA: 4.00/4.00, advisor: Matei Ciocarlie
M.S. in Mechanical Engineering (Fall 2022)   GPA: 4.03/4.00
NASA Graduate Research Fellow (NSTGRO)

Duke University, Durham, NC **Spring 2021**
B.S.E. in Mechanical Engineering, B.A. in Computer Science   GPA: 3.97/4.00
Magna Cum Laude, Graduation With Distinction

RESEARCH INTERESTS

In my Ph.D., I work on building touch sensors to (hopefully) help robots be more dexterous! I'm most interested in developing compact, multimodal tactile fingers, studying new methods of tactile sensing, and exploring how to process rich, multimodal touch data in the context of manipulation.

AWARDS AND HONORS

Graduate Research Fellowship (NSTGRO), *NASA*	**2022 - 2026**
Best Inventions of 2023 (Khandate et al., 2023), *TIME Magazine*	**2023**
Oscar and Vera Byron Fellowship, *Columbia Engineering*	**2021**
Raymond C. Gaugler Award in Materials Science & Engineering, *Duke Engineering*	**2021**
Best Poster Award, *Materials Research Society 2021 Virtual Spring Conference*	**2021**
Symposium Award (2nd place), *Materials Research Society 2021 Virtual Spring Conference*	**2021**
Tau Beta Pi Engineering Honors Society (Treasurer), *Duke Engineering*	**2019 - 2021**
Pi Tau Sigma Mechanical Engineering Honors Society, *Duke Engineering*	**2019 - 2021**
Pratt Research Fellowship, *Duke Engineering*	**2020**
Dean's Undergraduate Research Fellowship, *Duke Undergraduate Research Support Office*	**2020**

PUBLICATIONS

Peer-Reviewed Publications [* indicates equal contribution]

[J.3] G. Khandate*, T. Saidi*, S. Shang*, **E.T. Chang**, Y. Liu, S. Dennis, J. Adams, M. Ciocarlie, "R×R: Rapid eXploration for Reinforcement Learning via Sampling-based Reset Distributions and Imitation Pre-training," *Autonomous Robots* **2024** (RSS 2023 special issue). https://arxiv.org/abs/2401.15484

[C.2] **E.T. Chang***, R. Wang*, P. Ballentine, J. Xu, T. Smith, B. Coltin, I. Kymissis, M. Ciocarlie, "An Investigation of Multi-feature Extraction and Super-resolution with Fast Microphone Arrays," *IEEE Intl. Conf. on Robotics and Automation (ICRA)* **2024**. https://arxiv.org/abs/2310.00206

[C.1] G. Khandate*, S. Shang*, **E.T. Chang**, T.L. Saidi, J. Adams, M. Ciocarlie, "Sampling-based Exploration for Reinforcement Learning of Dexterous Manipulation," *Robotics: Science and Systems (RSS)* **2023**. https://arxiv.org/abs/2303.03486

   – **Named to TIME's Best Inventions of 2023**

[J.2] **E.T. Chang**, G. Koknat, G.C. McKeown Wessler, Y. Yao, V. Blum, D.B. Mitzi, "Phase Stability, Band Gap Tuning, and Rashba Splitting in Selenium-Alloyed Bournonite: $CuPbSb(S_{1-x}Se_x)_3$," *Chemistry of Materials* **2023** *35*, 595-608. https://doi.org/10.1021/acs.chemmater.2c03109

[J.1] S. Tran, J. Chen, G. Kozel, **E.T. Chang**, et al., "Development of an optically transparent kidney model for laser lithotripsy research," *BJU International* **2023**. https://doi.org/10.1111/bju.16015

Workshop Papers, Posters, and Technical Reports

[W.2] **E.T. Chang***, P. Ballentine*, I. Kymissis, M. Ciocarlie, "Spike-a-Tac: Development Towards a PVDF-Based Tactile Finger with distributed Vibration Sensing," May 2024. Extended abstract and poster presentation. ICRA 2024 ViTac Workshop.

[W.1] **E.T. Chang**, P. Ballentine, I. Kymissis, M. Ciocarlie, "Towards Development of a Signal-Dense Multimodal Tactile Finger," June 2023. Extended abstract and poster presentation. ICRA 2023 ViTac Workshop.

[P.1] **E.T. Chang**, G. Koknat, V. Blum, D.B. Mitzi, "Synthesis and Characterization of Selenium-Alloyed Bournonite $CuPbSb(S_{1-x}Se_x)_3$: a Prospective Semiconductor for Optoelectronic Applications," March 2021. Poster presentation. Materials Research Society 2021 Virtual Spring Conference.

  – **Won best poster award and placed 2nd in symposium award.**

[TR.1] Duke RoboSub Team, "CTHULHU: The Design and Implementation of the Duke Robotics Club's 2019/2020/2021 RoboSub Competition Entry," RoboSub: San Diego, USA, 2019/2020/2021.
https://robonation.org/app/uploads/sites/4/2019/10/Duke_RS19_TDR.pdf
https://robonation.org/app/uploads/sites/4/2020/08/RS20_TDR_Duke.pdf
https://robonation.org/app/uploads/sites/4/2021/07/RoboSub_2021_Duke_TDR.pdf
Placed 1st of 54 (2021) and 4th of 33 (2020) in technical design report portion of competition

RESEARCH EXPERIENCE

R.O.A.M. Lab, Columbia University **Fall 2021 - Present**
Ph.D. Candidate, advisor: Matei Ciocarlie

- Designing multimodal tactile fingers for dexterous manipulation
- Took courses in robotics, control, dynamics, mechatronics, machine learning, robot learning
- Research interests: tactile sensing (multimodal tactile finger design, tactile vibration sensing), touch processing, dexterous manipulation

Intelligent Robotics Group, NASA Ames Research Center **Fall 2023, Summer 2024**
NSTGRO Fellowship Program Intern, advisors: Trey Smith, Brian Coltin

- Improved design of 3-fingered underactuated hand for Astrobee (ISS' free-flyer robot)
- Work towards integrating tactile sensor work into NASA applications, e.g. for intravehicular space robots

Mitzi Research Group, Duke University **Spring 2018 - Spring 2021**
Research Assistant, advisor: David B. Mitzi

- First authored paper on bournonite band gap engineering, working to develop solar materials and devices that are cost effective and sustainable

Duke Robotics Club, Duke University **Spring 2018 - Spring 2021**
Task Planning Lead, Mechanical Engineer
Project: Design autonomous underwater vehicle for and compete in International RoboSub Competition

- Designed and implemented task planning architecture (Python); designed, prototyped, and tested servo-controlled torpedo launcher (iterative design, Solidworks)

INDUSTRY EXPERIENCE

Nauticus Robotics (formerly Houston Mechatronics), Houston, TX **Summer 2021**
Robotics R&D Intern, manager: John Yamokoski, Adam Konneker
Project: Refine point cloud compression algorithms for underwater untethered data transmission

- Investigated optimizations for compressing point cloud data from TOF, structured light, and lidar sensors with compression ratio > 300 (C++, Python, ROS, Docker)

Realtime Robotics, Boston, MA   **Summer 2020**
Mechanical and Applications Engineering Intern, manager: Nathan Koontz, Ty Tremblay
Project: Develop test cell for application of company's motion planning technology to spot welding cells

- Designed and prototyped scaled spot-welding gun and work cell for testing for a major customer (OnShape)
- Wrote software to control robots and weld guns for bimanual motion planning demo (Python, Arduino)

Coherix, Ann Arbor, MI   **Summer 2019**
Product Development Intern
Project: Improve robot programming methods in automotive manufacturing

- Improved potential plant efficiency by 25 minutes per part through development of machine vision software to self-correct manually programmed nozzle position of an adhesive-dispensing robot (Python, FANUC arm)

TECHNICAL SKILLS

Proficient	Python, ROS, ROS2, Arduino, MATLAB, LaTeX, 3D CAD (Solidworks, Onshape), 3D printing (FDM, SLA)
Some Experience	C, C++, micro-ROS, PCB design (Altium Designer/Circuitmaker), laser cutting, CNC mill, lathe

SERVICE

- Reviewer for Nature Communications (2024), T-RO (2024), ICRA (2024, 2025), and BioRob (2024)
- Created and led an arduino activity for Columbia's Girls' Science Day event (Nov 2021, Spring 2022)

OTHER INTERESTS

- Percussion, hiking, board games, tennis, crosswords, running