Elyse D. Z. Chase

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Education

Stanford University, Ph.D. in Mechanical Engineering — Summer 2023
Dissertation: In Touch with Causation:
The Role of Haptics in Multisensory Phenomenal Causality

Stanford University, M.S. in Mechanical Engineering — Spring 2020
Depth in Mechatronics

University of Pennsylvania, B.S.E. in Mechanical Engineering and Applied Mechanics — Spring 2017
Minors in Fine Arts and Anthropology | Summa Cum Laude

Appointments

MAHI Lab, Rice University — 2023 – Current
Advisor: Dr. Marcia O'Malley | *Postdoctoral Fellow*

SHAPE Lab, Stanford University — 2017 – 2023
Advisor: Dr. Sean Follmer | *Graduate Research Assistant*
Research focusing on haptics and human perception for understanding causality through experimental results and computational models. Additional work explored human's affective interpretation of robot motion, haptic guidance for blind and visually impaired individuals, and reach redirection in virtual reality.

Haptics Group, Facebook Reality Labs Research — Sept 2020 - Jan 2021
Advisor: Dr. Ali Israr | *Research Intern, Haptics Group*
Worked to understand the information transfer rate of the human wrist via vibrotactile actuation by training users with a wristband device.

CHARM Lab, Stanford University — Winter 2018
Advisor: Dr. Allison Okamura | *Graduate Research Assistant*
Developed the system and conducted studies to test haptic perception on the forearm using a Phantom device

Haptic Intelligence, Max Planck Institute for Intelligent Systems in Stuttgart, Germany — Summer 2017
Advisor: Dr. Katherine J. Kuchenbecker | *Visiting Researcher*
Completed the mechanical design for a haptic feedback pen as well as curated documentation for a Baxter robot used for exercise with older humans

Haptics Group, University of Pennsylvania — Spring 2015 - 2017
Advisor: Dr. Katherine J. Kuchenbecker | *Undergraduate Research Assistant*
The research focused on cutaneous haptic devices for use with the daVinci surgical robot; I built several different devices for use in palpation with the robot

Drones and Autonomous Systems Lab, University of Nevada, Las Vegas — Summer 2016
Advisor: Dr. Paul Oh | *Undergraduate Research Assistant*
Aided on a project to document and create open source resources for making soft, pneumatic robots

ModLab, University of Pennsylvania — Fall 2014
Advisor: Dr. Mark Yim | *Undergraduate Research Assistant*
Aided graduate students through design & manufacturing of components for lightweight flying robots

REU, University of Central Florida — Summer 2014
Advisor: Dr. Sudipta Seal | *Hard and Soft Materials in Nanoscience Technology Driven Energy Applications*
Worked with graduate students on the detection of proteins through the use of magnetic nanoparticles and optics

Caracol Archaeological Project, Belize — Annually - 2014
Advisor: Drs. Arlen & Diane Chase | *Lab Assistant*
For 2 months annually, worked in the field to document remains and catalog them (www.caracol.org)

Academic Honors and Achievements

Intelligence Community Postdoctoral Fellowship Oct 2023 - Current

Rice Academy of Fellows Aug 2023 - Current

Best Work in Progress Paper at World Haptics Conference July 2021

NSF Graduate Research Fellowship Program (GRFP) 3 years Awarded 2017

Stanford Graduate Fellowship (SGF) 3 years, *Stanford University* Awarded 2017

Ralph Teetor Award, *University of Pennsylvania* 2017
Awarded annually to the senior who in the opinion of the department's faculty, has demonstrated the qualities of ingenuity, creativity, scholarship, and service

1st Prize SEAS Senior Design, (School of Engineering and Applied Science) *University of Pennsylvania* 2017
For Backster: an accurate, affordable, and portable torso mapping system

Francis G. Tatnall Prize, *University of Pennsylvania* 2017
Awarded to the senior design project judged to be the most outstanding and which reflects the qualities of ingenuity, technical proficiency, and usefulness

Goldwater Scholar 2016

Victor W. K. Ku Memorial Award, *University of Pennsylvania* 2016
Awarded annually to a student in who, at the end of their junior year, best exemplify the ideals of high scholarship, personal discipline, and service to others

Abraham Research Award, *University of Pennsylvania* 2015
Awarded annually to support an undergraduate student conducting summer research

MEAM Summer Showcase Presenter (**3rd Place Award 2014**) 2014, 2015
A panel of Mechanical Engineering Faculty selected presenters, and winners were chosen by a panel of faculty and industry professionals.

National Merit Finalist Scholarship 2013
Sponsored by the National Distiller's Distributors Foundation

National Honor Society Scholarship 2013

Publications (peer-reviewed)

Conference Articles

(*under review*) **Chase E.D.Z.**, O'Malley M.K. (2024) Revisiting Virtual Environments: The Impact of Vision and Referred Haptics on Stiffness Perception in Virtual Reality.

Chase E.D.Z., Gerstenberg T., Follmer S. (2023) Realism of Visual, Auditory, and Haptic Cues in Phenomenal Causality. In *IEEE World Haptics Conference*, July 2023. (Oral presentation by **Chase E.D.Z.**)

Gonzalez E.J., **Chase E.D.Z.**, Kotipalli P., Follmer S. (2022) A Model Predictive Control Approach for Reach Redirection in Virtual Reality. In *ACM CHI*, April 2022. (Oral Presentation by Gonzalez E.J.)

Chase E.D.Z., Israr A., Preechayasomboon P., Sykes S., Gupta A., Hartcher-O'Brien J. (2021) Learning Vibes: Communication Bandwidth of a Single Wrist-Worn Vibrotactile Actuator. In *IEEE World Haptics Conference*, pages 421-426, July 2021. (Oral Presentation by **Chase E.D.Z.**)

Chase E.D.Z., Follmer S. (2019) Differences in Haptic and Visual Perception of Expressive 1DoF Motion. In *ACM Symposium on Applied Perception*, pages 1-9, Barcelona, Spain, September 2019. (Oral presentation by **Chase E.D.Z.**)

Brown J.D., Ibrahim M., **Chase E.D.Z.**, Pacchierotti C., Kuchenbecker K.J. (2016) Data-Driven Comparison of Four Cutaneous Displays for Pinching Palpation in Robotic Surgery. In *Proc. IEEE Haptics Symposium*, pages 147-154, Philadelphia, PA, USA, April 2016. (Oral presentation by Brown J.D.)

Journal Publications

(*in progress*) **Chase E.D.Z.**, Follmer S., Gerstenberg T. (2024) Multisensory Integration for Causal Events: An Inference Model for Causal Judgments Across Visual, Auditory, Kinesthetic, and Vibrotactile Feedback.

Sullivan D.H., **Chase E.D.Z.**, O'Malley M.K. (2024) Comparing the Perceived Intensity of Vibrotactile Cues Scaled Based on Inherent Dynamic Range. *IEEE Transactions on Haptics*.

Murdock R.J., Putnam S.A., Das S., Gupta A., **Chase E.D.Z.**, Seal S. (2017) High-Throughput, Protein-Targeted Biomolecular Detection Using Frequency-Domain Faraday Rotation Spectroscopy. *Small*, 13(12):1613-682, 2017.

Demonstrations, Posters, & Extended Abstracts

Johnson L.R., **Chase E.D.Z.**, Byrne M.D., O'Malley M.K. (2024) Real-Time Vibrotactile Haptic Feedback Based on Tool Movement Smoothness for Endovascular Surgical Skill Training. In *Haptics Symposium*. Long Beach, CA, USA, April 2024.

Chase E.D.Z., Wolff P., Gerstenberg T., Follmer S. (2021) In Touch with Causation: Understanding the Impact of Kinesthetic Haptics on Causality. In *Proc. Annual Meeting of the Cognitive Science Society*, 43(43). Virtual, July 2021. (Oral Presentation by **Chase E.D.Z.**)

Chase E.D.Z., Wolff P., Gerstenberg T., Follmer S. (2021) A Causal Feeling: How Kinesthetic Haptics Affects Causal Perception. In *IEEE World Haptics Conferences*, pages 421-426, Virtual, July 2021. (Oral Presentation by **Chase E.D.Z.**) [Best Work in Progress Paper]

Chase E.D.Z., Siu A.F., Boadi-Agyemang A., Kim G.S-H., Gonzalez E., Follmer S. (2020) PantoGuide: A Haptic and Audio Guidance System To Support Tactile Graphics Exploration. In *ACM SIGACCESS*, pages 1-4, Virtual, October, 2020. (Oral Presentation by **Chase E.D.Z.**)

Ibrahim M., **Chase E.D.Z.**, Brown J.D., Pacchierotti C., Kuchenbecker K.J. (2016) One sensor, three displays: A comparison of tactile rendering from a BioTac sensor. In *IEEE Haptics Symposium*, Philadelphia, PA, USA, April 2016. (Hands-on demonstration presented by **Chase E.D.Z.** and Ibrahim M.)

Book Chapters

Chase A.S.Z., **Chase E.D.Z.**, Chase D.Z., & Chase A.F. (2024) Population History for Caracol, Belize: Numbers, Complexity, and Urbanism. In A.S.Z. Chase, A.F. Chase, & D.Z. Chase Eds. *Ancient Mesoamerican Population History: Demography, Social Complexity, and Change*, University of Arizona Press, Tucson. (in press)

Siu A.F., **Chase E.D.Z.**, Kim G.S-H., Boadi-Agyemang A., Gonzalez E.J., & Follmer S. (2021) Haptic Guidance to Support Design Education and Collaboration for Blind and Visually Impaired People. In C. Meinel and L. Leifer, Eds. *Design Thinking Research: Translating, Prototyping, and Measurement*, pp. 167 - 180, Springer Nature Switzerland AG

Patents

Chase E.D.Z., Fang L.N., Crossley K.A., Graham S., Pritt M.E., Singh A. (2017) Backster. United States Provisional Patent under application #62/539991, filed August 1, 2017.

Teaching Experience

Guest Lecturer, **MECH 599: Translational Neuroengineering** — Spring 2024
Rice University, Dr. Marcia O'Malley
Topic: IRB and Experimental Design

Course Assistant, **Design and Control of Haptic Systems** (ME 327) — Spring 2022
Stanford University, Dr. Allison Okamura - Graduate Level (79 students), Review 4.55/5

Course Assistant, **Advanced Dynamics & Computation** (ME 331A) — Winter 2022
Stanford University, Dr. Paul Mitiguy - Graduate Level (29 students)

Course Assistant, **Human-Computer Interaction Seminar** (CS 547) — Fall 2021
Stanford University, Dr. Sean Follmer

Teacher, **Stories in 2D: Sketching & Design Thinking** Spring 2021
Stanford University, Stanford Rainstorm
Co-designed and co-taught a 1.5-hour design thinking workshop in which we covered some design thinking elements and allowed students to draw and discuss their own new objects with peers. We hosted 20 students during an online weekend program for middle and high school students.

Teacher, **Stories in Motion: Mechanical Automata and Rapid Prototyping** 2019
Stanford University, Stanford Splash (November 2019) and SeeME (April 2019)
Co-designed and co-taught a 2-hour class that focused on prototyping techniques through the creation of automata. We prepped laser cut materials, including different cams for the automata, so that students could quickly test out motion for their devices. We hosted 20 high school and middle school students on campus each weekend.

Grants

Stanford HAI Seed Grant, "In Touch With Causation" 2021
PI Dr. Sean Follmer, Co-PIs Dr. Jeannette Bohg & Dr. Tobias Gerstenberg, *$75,000*
Helped to plan projects, provide preliminary data, and write the proposal.

Activities & Service

Honor Society Memberships & Affiliations
Tau Beta Pi, Sigma Xi, SWE, ASME, ACM

Service

Reviewer: World Haptics (2021), EuroHaptics (2022, 2024), CHI (2023-24), TOH (2024), Haptics Symposium (2024), Nature Reviews	2021 – current
Women's Community Center STEM Mentor	2021 - 2023
Shape Lab Website Admin	2019 - 2023
Shape Lab Outreach Coordinator	2018 - 2023
Creation of programming for outreach activities centered around prototyping and design for middle and high school students – both in-person hands-on projects and completely online courses, organization of lab tours	
Stanford HCI (Human Computer Interaction) Website Admin	2020 - 2021
PennApps Volunteer, Rapid Prototyping Staff	2014 - 2017
Stouffer College House Steering President	Fall 2016
SWE Mentor for Incoming Freshman	2014
AWE (Advancing Women in Engineering) Pre-Orientation Mentor	August 2014
Engineering Student Activities Council (ESAC), *University of Pennsylvania*	2014 - 2016
President	2016
Corporate Sponsorship Chair	2015

Mentoring

Yuyu Lin, CS Masters Student, Stanford University	Fall 2021
Amy Zhou, ME Undergraduate Student, Stanford University	Summer 2021, Fall 2022
Cherie Frances, ME Undergraduate Student, Stanford University	Summer 2021
Abena Boadi-Agyemang, ME Undergraduate Student, Stanford University	Summer 2019
Julea Chin, ME Undergraduate Student, Stanford University	Summer 2018

Skills

Programming Experience: MATLAB, C, C++, C# (Unity), R, Python, Javascript, Arduino, Processing, Embedded Hardware

Design and Fabrication: SolidWorks, laser cutting, 3D printing, soldering, mechatronic design, precision machining, CNC machining, silicone molding, photoshop, illustrator

Printmaking: Apprentice at Flying Horse Press, University of Central Florida, with Professor Ke Francis, worked learning how to use different printmaking techniques on my own pieces as well as printing pages for books created by Ke Francis (Summer 2013). Later learned from Professor Marc Blumthal, University of Pennsylvania, on projects based in silk-screen, etching, letterpress, woodcut, linocut, and monotype (2016 - 2017).

Fine Arts: watercolor, acrylic, oil, pencil, charcoal, pastels, mixed media, printmaking, photography