

## Elyse D. Z. Chase

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### Education

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- 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

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- MAHI Lab**, Rice University 2023 – Current  
*Postdoctoral Fellow*, Advisor: Dr. Marcia K. O'Malley  
Studied how referred haptic feedback, such as vibration and squeeze at the wrist, can provide the user information about what is occurring at their fingertips. Explored multisensory integration with referred haptic feedback and sensory illusions in virtual reality. Additionally, I aided projects on haptic feedback for surgical training, robotic rehabilitation, and haptic perception.
- SHAPE Lab**, Stanford University 2017 – 2023  
*Graduate Research Assistant*, Advisor: Dr. Sean Follmer  
Research focused on haptics and human perception to understand 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  
*Research Intern*, Advisor: Dr. Ali Israr  
Studied how the human wrist can transfer information via vibrotactile actuation with a wristband device.
- Haptics Group**, University of Pennsylvania Spring 2015 - 2017  
*Undergraduate Research Assistant*, Advisor: Dr. Katherine J. Kuchenbecker  
Studied cutaneous haptic devices with the daVinci surgical robot; built multiple devices for robotic palpation.
- Caracol Archaeological Project**, Belize Annually - 2014  
Advisor: Drs. Arlen & Diane Chase | *Lab Assistant*  
For two months annually, I worked in the field to document remains and catalog them ([www.caracol.org](http://www.caracol.org)).

### Short-Term Research Experiences

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- CHARM Lab**, Stanford University Winter 2018  
*Graduate Research Assistant*, Advisor: Dr. Allison Okamura  
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  
*Visiting Researcher*, Advisor: Dr. Katherine J. Kuchenbecker  
Designed a haptic feedback pen and created documentation for a Baxter robot for exercise with older adults.
- Drones and Autonomous Systems Lab**, University of Nevada, Las Vegas Summer 2016  
*Undergraduate Research Assistant*, Advisor: Dr. Paul Oh  
Aided on a project to document and create open-source resources for making soft, pneumatic robots.
- ModLab**, University of Pennsylvania Fall 2014  
*Undergraduate Research Assistant*, Advisor: Dr. Mark Yim  
Aided graduate students through the design & manufacturing of components for lightweight flying robots.
- REU**, University of Central Florida Summer 2014  
*Hard and Soft Materials in Nanoscience Technology Driven Energy Applications*, Advisor: Dr. Sudipta Seal  
Worked with graduate students to detect proteins using magnetic nanoparticles and optics.

## **Academic Honors and Achievements**

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<b>Intelligence Community Postdoctoral Fellowship</b>	Oct 2023 - Current
<b>Rice Academy of Fellows</b> Postdoctoral Fellowship	Aug 2023 - Current
<b>NSF Graduate Research Fellowship</b> Program (GRFP) 3 years	Awarded 2017
<b>Stanford Graduate Fellowship</b> (SGF) 3 years, <i>Stanford University</i>	Awarded 2017
<b>Ralph Teeter Award</b> , <i>University of Pennsylvania</i>	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	
<b>Goldwater Scholar</b>	2016
<b>Victor W. K. Ku Memorial Award</b> , <i>University of Pennsylvania</i>	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	
<b>National Merit Finalist Scholarship</b>	2013
Sponsored by the National Distiller's Distributors Foundation	

## **Research and Design Prizes**

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<b>Best Work in Progress Paper</b> at World Haptics Conference	July 2021
<b>1<sup>st</sup> Prize SEAS Senior Design</b> , (School of Engineering and Applied Science) <i>University of Pennsylvania</i>	2017
For Backster: an accurate, affordable, and portable torso mapping system	
<b>Francis G. Tatnall Prize</b> , <i>University of Pennsylvania</i>	2017
Awarded to the senior design project judged to be the most outstanding and which reflects the qualities of ingenuity, technical proficiency, and usefulness	
<b>Abraham Research Award</b> , <i>University of Pennsylvania</i>	2015
Awarded annually to support an undergraduate student conducting summer research	
MEAM Summer Showcase Presenter ( <b>3<sup>rd</sup> Place Award 2014</b> )	2014, 2015
A panel of Mechanical Engineering Faculty selected presenters, and winners were chosen by a panel of faculty and industry professionals.	

## **Publications (peer-reviewed)**

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### **Journal Publications**

- 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. To be submitted to *Cognitive Science*. (in progress)
- Mahan E.E., Oh J., **Chase E.D.Z.**, Dunkelberger N.B., King S.T., Sayenko D., O'Malley M.K. (2024) Assessing the Effect of Cervical Transcutaneous Spinal Stimulation with an Upper Limb Robotic Exoskeleton and Surface Electromyography. In *Transactions on Neural Systems and Rehabilitation Engineering*. (under review)
- 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*, 17(1): 45-51.
- 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.

### **Conference Articles**

- Chase E.D.Z.**, O'Malley M.K. (2024) The Interplay of Vision and Referred Haptic Feedback in VR Environments. In *International Conference on Human Haptic Sensing and Touch Enabled Computer Applications*. Cham: Springer International Publishing, 2024. (Oral Presentation by **Chase E.D.Z.**)

**Chase E.D.Z.**, Gerstenberg T., Follmer S. (2023) Realism of Visual, Auditory, and Haptic Cues in Phenomenal Causality. In *IEEE World Haptics Conference*, pages 306-312, 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*, pages 1-15, 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.)

### **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. pp. 67-88.

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.

### **Demonstrations, Posters, Work In Progress Papers, & Extended Abstracts**

**Chase E.D.Z.**, O'Malley M.K. (2024) From Integration to Illusion: Advancing Multisensory Perception with Haptic Feedback. In *Interface Rice*. Houston, TX, USA, April 2024. (Presented by **Chase E.D.Z.**)

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.**)

**[Best Work in Progress Paper]** **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.**)

**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.)

### **Invited Talks**

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**Chase E.D.Z.** *Referred Haptics in Virtual Environments and Multisensory Integration*. Spotlight Speaker for Texas Regional Robotics Symposium (TEROS). College Station, TX. April 30, 2024.

### **Patents**

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**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.

## **Grant and Proposal Experience**

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**Intelligence Community Postdoctoral Fellowship** Sept 2023 - 2025  
Dr. Elyse D. Z. Chase & Dr. Marcia K. O'Malley, "Enabling Components of Human Augmentation"  
\$181,500: Postdoc Salary, Research Stipend, Travel Budget

**Rice Academy Postdoctoral Fellowship** Aug 2023 - 2025  
Dr. Elyse D. Z. Chase & Dr. Marcia K. O'Malley, "Understanding Multisensory Perception within Sensory Illusions"  
\$70,000: Postdoc Salary, Research Stipend

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

## **Teaching Experience**

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Guest Lecturer, **Translational Neuroengineering** (MECH 599) Spring 2024  
*Rice University*, Dr. Marcia O'Malley - Graduate Level  
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 - Graduate & Undergraduate Levels

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 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.

## **Activities & Service**

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### **Honor Society Memberships & Affiliations**

Tau Beta Pi, Sigma Xi, SWE, ASME, ACM, IEEE

### **Service**

*Reviewer:* WHC World Haptics (2021), EuroHaptics (2022, 2024), CHI Human Factors in Computing Systems (2023-24), TOH Transactions on Haptics (2024), HS Haptics Symposium (2024), Nature Reviews Electrical Engineering (2024), THRI Transactions on Human-Robot Interaction (2024)

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), <i>University of Pennsylvania</i>	2014 - 2016
President	2016
Corporate Sponsorship Chair	2015

## **Mentoring**

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### **Rice University**

Daziyah Sullivan, <i>PhD Student</i>	Fall 2023 - current
Erin Mahan, <i>PhD Student</i>	Fall 2023 - current
Noah Kim, <i>PhD Student</i>	Fall 2023 - current
Anas Yousaf, <i>ME Undergraduate Student</i>	Fall 2023 - current

### **Stanford University**

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

## **Skills**

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

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