

# Leah M. Chong

Postdoctoral Associate | Massachusetts Institute of Technology

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🇺🇸 U.S.A.

## Education

### Ph.D. in Mechanical Engineering

August 2017 – May 2022

Carnegie Mellon University, Pittsburgh, PA

Dissertation: Role of Human Self-Confidence and Their Confidence in Artificial Intelligence in AI-Assisted Decision-Making in Engineering Design

Committee: Jonathan Cagan (Advisor), Kenneth Kotovsky (Advisor), Kosa Goucher-Lambert, Levent Burak Kara

### M.S. in Mechanical Engineering

August 2017 – May 2020

Carnegie Mellon University, Pittsburgh, PA

### B.S. in Mechanical Engineering

August 2013 – May 2017

Rice University, Houston, TX

## Research Interests

Human-AI collaboration; human-centered engineering design; computational design methods; design cognition and decision-making; creativity; design theory and methodology; ethical design

## Research Experience

### Ideation Lab (PI: Maria Yang)

September 2022 – Present

Postdoctoral Associate

Massachusetts Institute of Technology, Cambridge, MA

- Investigating novel human-centered methods for designers to better identify and empathize with user needs by leveraging various machine learning-based computer vision techniques.
- Studying pressing topics in human-AI collaboration in engineering design specifically regarding designers and consumers' trust and acceptance of AI teammates, as well as AI-generated designs.
- Conducting timely research on the influence of generative design tools on the design process and designer behavior and decisions, especially when designing for qualitative design goals, such as aesthetics.

### Design Computation and Digital Engineering (DeCoDE) Lab (PI: Faez Ahmed)

September 2022 – Present

Research Collaborator

Massachusetts Institute of Technology, Cambridge, MA

- Investigating new methods to enhance the usability of text-to-image generation models in engineering design contexts, such as improving the feasibility of generated images by text-to-image models.
- Studying design exploration strategies in using text-to-image generation AI that successfully yield designs that meet specific goals like feasibility, novelty, and aesthetics.

### Integrated Design Innovation Group (IDIG) (PI: Jonathan Cagan)

August 2017 – July 2022

Postdoctoral Researcher, Ph.D. Candidate

Carnegie Mellon University, Pittsburgh, PA

- Conducted pressing human-centered research on human-AI collaboration in engineering design, particularly on how designers' confidence in AI and self-confidence are influenced by the number of AI teammates, AI performance, and AI feedback and consequently affect their decisions.
- Explored a novel voting approach to human-AI joint decision-making and its influence on designers' confidence and decision-making.
- Investigated the potential of constraints to enhance designer creativity by studying the relationship between item constraints and designers' ideation effectiveness.

- Modeled and designed physics-based micro-robotic systems such as a submersible in-line pump for an underwater inspection robot and a micro-robot locator.
- Conducted literature review and initial video analyses of the gait of foot drop patients for a project that developed robots that assist human gait training.

## Publications

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### Journal Articles

**Chong, L.**, Lo, I., Rayan, J., Dow, S., Ahmed, F., and Lykourantzou, I., “Guiding Imperfect Tools: Investigating Design Exploration Strategies When Using Image Generation Artificial Intelligence,” *Design Science*. (Under Review)

**Chong, L.**, Kotovsky, K., and Cagan, J., “Human Designers’ Dynamic Confidence and Decision-Making When Outnumbered by Artificial Intelligence Teammates,” *ASME Journal of Mechanical Design*. (Under Review)

Hu, M., Zhang, G., **Chong, L.**, Cagan, J., and Goucher-Lambert, K., “Human-AI Team Decision-Making Via Voting: How Being Outvoted by AI Teammates Affects Human-AI Collaboration,” *International Journal of Human-Computer Interaction*. (Under Review)

**Chong, L.**, Raina, A., Goucher-Lambert, K., Kotovsky, K., and Cagan, J., 2023, “The Evolution and Impact of Human Confidence in Artificial Intelligence and in Themselves on AI-Assisted Decision-Making in Design,” *ASME Journal of Mechanical Design*, 145(3), pp. 031401. <https://doi.org/10.1115/1.4055123>.

Zhang, G., **Chong, L.**, Kotovsky, K., and Cagan, J., 2023, “Trust in an AI versus a Human teammate: The effects of teammate identity and performance on Human-AI cooperation,” *Computers in Human Behavior*, 139, pp. 107536. <https://doi.org/10.1016/j.chb.2022.107536>.

**Chong, L.**, Zhang, G., Goucher-Lambert, K., Kotovsky, K., and Cagan, J., 2023, “Data on Human Decision, Feedback, and Confidence During an Artificial Intelligence-Assisted Decision-Making Task,” *Data in Brief*, 46, pp. 108884. <https://doi.org/10.1016/j.dib.2023.108884>.

**Chong, L.**, Zhang, G., Goucher-Lambert, K., Kotovsky, K., and Cagan, J., 2022, “Human Confidence in Artificial Intelligence and in Themselves: The Evolution and Impact of Confidence on Adoption of AI Advice,” *Computers in Human Behavior*, 127, pp. 107018. <https://doi.org/10.1016/j.chb.2021.107018>.

### Peer-Reviewed Conference Papers

Saadi, J., Yang, M., and **Chong, L.**, “Form Attributes to Measure and Understand Aesthetic Preferences,” ASME International Design Engineering Technical Conferences – Design Theory and Methodology Conference, Boston, MA, August 20-23, 2023.

**Chong, L.** and Yang, M., 2023, “AI vs. Human: The Public’s Perceptions of the Design Abilities of Artificial Intelligence,” Proceedings of the Design Society: International Conference on Engineering Design, Bordeaux, France, July 24-28, 2023, 3, pp. 495-504. <https://doi.org/10.1017/pds.2023.50>.

**Chong, L.**, Raina, A., Goucher-Lambert, K., Kotovsky, K., and Cagan, J., 2022, “Collaborative Design Decision-Making with Artificial Intelligence: Exploring the Evolution and Impact of Human Confidence in AI and in Themselves,” ASME International Design Engineering Technical Conferences - Design Theory and Methodology Conference, St. Louis, MO, August 14-17, 2022, 6, V006T06A021. <https://doi.org/10.1115/DETC2022-88574>. **Best Paper Award Finalist**

**Chong, L.**, Kotovsky, K., and Cagan, J., 2022, “Are Confidence Designers Good Teammates to Artificial Intelligence?: A Study of Self-Confidence, Competence, and Collaborative Performance,” Proceedings of the Design Society: DESIGN Conference, Virtual, May 23-26, 2022, pp. 1531-1540. <https://doi.org/10.1017/pds.2022.155>.

**Chong, L.**, Goucher-Lambert, K., Kotovsky, K., and Cagan, J., 2022, “Empirically Understanding the Impact of Item Constraints on Designer Ideation,” 2020 Design Computing and Cognition Conference, Virtual, December 14-16, 2020, pp. 3-19. [https://doi.org/10.1007/978-3-030-90625-2\\_1](https://doi.org/10.1007/978-3-030-90625-2_1).

Jin, Y. G., **Chong, L.**, and Cho, H. K., 2012, "Designing a Robotics-Enhanced Learning Content for STEM Education," 2012 9th International Conference on Ubiquitous Robots and Ambient Intelligence, Daejeon, Korea, November 26-28, 2012, pp. 433-436. <https://doi.org/10.1109/URAI.2012.6463032>.

## Works in Progress

**Chong, L.**, and Yang, M., "Do We Trust Artificial Intelligence to Design?: Designers and Consumers' Perceptions of the Design Abilities of Artificial Intelligence."

**Chong, L.**, Rayan, J., Lykourantzou, I., Dow, S., and Ahmed, F., "CAD-Guided Text-to-Image AI for Design Concept Generation."

**Chong, L.**, Schelhaas, B., and Yang, M., "Expediting Designers' User Research Process: Identifying Unarticulated User Needs from Observational Videos using Pose Estimation."

Saadi, J., Yang, M., and **Chong, L.**, "Investigating How Designers Design for Users' Aesthetic Preference Using a Generative Design Tool."

Wood, S., Kotecha, M., and **Chong, L.**, "The Use of Artificial Intelligence for Systems Design to Allocate Scarce Medical Resources."

## Funding

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### MIT-Google Grant

Title: Learning latent human needs for real-world generative design of physical systems

PIs: Maria Yang, Caitlin Mueller, Funding amount: \$115,000, Funding period: June 1, 2023 to May 31, 2024

- Contributed substantially to the writing of the proposal.
- Working with industry partners to conduct research with both theoretical and practical impact.

## Awards & Honors

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### ASME Design Theory and Methodology Best Paper Award Finalist

August 2022

(Top 5 papers based on reviewer nominations)

Title: Collaborative Design Decision-Making with Artificial Intelligence: Exploring the Evolution and Impact of Human Confidence in AI and in Themselves

### Carnegie Mellon University Mechanical Engineering Milton Shaw Ph.D. Research Award

March 2022

(Selected by the faculty and postdoc judges at a Ph.D. Research Symposium poster session)

### Carnegie Mellon University Presidential Fellowship

September 2017

### Rice President's Honor Roll

May 2016

### VEX Robotics Competition Judges' Choice Award

November 2015

## Teaching Experience

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### Introduction to Design (2.00)

Fall 2023

Co-Instructor

Massachusetts Institute of Technology, Cambridge, MA

- Core undergraduate class based on hands-on team projects that emphasize creativity and human-centered design.
- Teaching weekly lectures and lab sections, coordinating and designing two projects with real users, and leading and managing the teaching team (teaching assistants and team lab instructors).

Team Lab Instructor

Fall 2022

- Instructor evaluation score: 7.0/7.0
- Coached student design teams of freshmen and sophomores in mechanical engineering through two team projects and graded their performance.

## Numerical Methods in Engineering (24-703)

Fall 2019

Teaching Assistant

Carnegie Mellon University, Pittsburgh, PA

- Led weekly office hours and a C++ programming workshop and assisted the instructor with in-class exercises and project team meetings.

## Engineering Design II – Conceptualization and Realization (24-441)

Spring 2018

Teaching Assistant, Chief Technical Officer

Carnegie Mellon University, Pittsburgh, PA

- Provided technical help to students during project team meetings and machine shop sessions and held weekly office hours to answer questions about the design process and concepts, computer-aided design (CAD) methods, and engineering analysis.

## Mentoring Experience

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**Booker Schelhaas**, Master's student at Massachusetts Institute of Technology *June 2023 – Present*

**I-Ping Lo**, Master's student at Utrecht University *June 2023 – Present*

**Jana Saadi**, Ph.D. student at Massachusetts Institute of Technology *September 2022 – September 2023*

**Krystal Montgomery**, Undergraduate student at Massachusetts Institute of Technology *Spring 2023*

## Presentations

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### Conferences

“Form Attributes to Measure and Understand Aesthetic Preferences,” ASME International Design Engineering Technical Conferences – Design Theory and Methodology Conference, Boston, MA, August 20-23, 2023.

“AI vs. Human: The Public's Perceptions of the Design Abilities of Artificial Intelligence,” International Conference on Engineering Design (ICED), Bordeaux, France, July 24-28, 2023.

“Collaborative Design Decision-Making with Artificial Intelligence: Exploring the Evolution and Impact of Human Confidence in AI and in Themselves,” ASME International Design Engineering Technical Conferences (IDETC), St. Louis, MO, August 14-17, 2022.

“Are Confidence Designers Good Teammates to Artificial Intelligence?: A Study of Self-Confidence, Competence, and Collaborative Performance,” DESIGN Conference, Virtual, May 23-26, 2022.

“Empirically Understanding the Impact of Item Constraints on Designer Ideation,” Design Computing and Cognition (DCC) Conference, Virtual, December 14-16, 2020.

“Designing a Robotics-Enhanced Learning Content for STEM Education,” International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Daejeon, Korea, November 26-28, 2012.

### Invited Talks

Emerging Technologies and Methods for Early Stage Product Design and Development, ASME International Design Engineering Technical Conferences (IDETC) Workshop, Boston, MA, August 20, 2023.

Women's Technology Program (WTP) in Mechanical Engineering Showcase, Massachusetts Institute of Technology, Cambridge, MA, August 1, 2023.

## Professional & Service Activities

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### Professional Associations

Design Society *April 2023 – Present*

National Postdoctoral Association *September 2022 – Present*

American Society of Mechanical Engineers *June 2018 – Present*

Society of Women Engineers *August 2013 – Present*

## Reviewer Activities

*Journals:* ASME Journal of Mechanical Design

*Conferences:* ASME IDETC Design Theory and Methodology Conference, International Conference on Engineering Design (ICED), DESIGN Conference

## Professional Service Activities

PhD Forum, International Conference on Engineering Design (ICED)  
Junior Expert

July 24, 2023  
Bordeaux, France

## University Service and Involvement Activities

Mechanical Engineering Graduate Student Organization  
Secretary, Member

August 2018 – May 2022  
Carnegie Mellon University, Pittsburgh, PA

Korean Graduate Student Association  
Member

August 2017 – May 2022  
Carnegie Mellon University, Pittsburgh, PA

Korean International Student Association  
Member

August 2013 – May 2017  
Rice University, Houston, TX

Design for America  
Project Lead, Member

August 2014 – May 2017  
Rice University, Houston, TX

Robotics Club  
Head of Internal Relations, Member

August 2015– December 2015  
Rice University, Houston, TX

## Outreach Activities

Women's Technology Program (WTP) in Mechanical Engineering  
Project Mentor

Summer 2023  
Massachusetts Institute of Technology, Cambridge, MA

Camp Oakhurst Service Trip: Fostering Community and Erasing Stereotypes Surrounding Disabilities

March 2015  
Oakhurst, NJ

## Certificates & Training

Kaufman Teaching Certificate

Spring 2023  
Massachusetts Institute of Technology, Cambridge, MA

2021 Teaching and Learning Summit

October 2021  
Carnegie Mellon University, Pittsburgh, PA

Eberly Center Teaching Seminars

January 2018 – October 2021  
Carnegie Mellon University, Pittsburgh, PA

*Key Attended Seminars: Supporting Ourselves and Our Students: Navigating Mental Health in the Classroom, Teaching Inclusively: Leveraging Diversity and Promoting Equity in Your Classroom, Guiding Attention and Memory to Build Knowledge, Grading and Delivering Feedback on Quantitative/Writing Assignments*

## Skills

**Programming Languages:** Python, C/C++

**Software:** MATLAB, SolidWorks, Microsoft Office, Adobe Suite, ACT-R

**Languages:** English (Native), Korean (Native)

## References

**Jonathan Cagan** (Ph.D. Advisor)

David and Susan Coulter Head of Mechanical Engineering

George Tallman and Florence Barrett Ladd Professor, Mechanical Engineering

Carnegie Mellon University

cagan@cmu.edu

**Maria Yang** (Postdoctoral Advisor)  
Deputy Dean of Engineering  
Gail E. Kendall Professor, Mechanical Engineering  
Massachusetts Institute of Technology  
mcyang@mit.edu

**Kosa Goucher-Lambert** (Thesis Committee Member)  
Assistant Professor, Mechanical Engineering  
University of California, Berkeley  
kosa@berkeley.edu