# Kathy Cheng

PhD Candidate · Mechanical & Industrial Engineering · University of Toronto

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## Education

**University of Toronto** *Toronto, ON*

PhD in Mechanical & Industrial Engineering *2021 – 2025 (Expected)*

- Thesis topic: Improving CAD collaboration through HCI principles and software development insights.
- Co-advisors: Dr. Alison Olechowski (Mechanical & Industrial Engineering); Dr. Shurui Zhou (Computer Engineering).
- Relevant courses: *CSC2604:* Design Theory and HCI; *ECE1785:* Empirical Software Engineering; *MIE1402:* Statistical Methods in Human Factors Research; *APS1023:* New Product Innovation.

**University of Toronto** *Toronto, ON*

BASc in Mechanical Engineering *2021*

- Minors: Advanced Manufacturing; Environmental Engineering
- Undergraduate thesis: *An Analysis of Collaborative Computer-Aided Design Assembly.* Supervised by Dr. Alison Olechowski.

## Professional Experience

**University of Toronto** *Toronto, ON*

Doctoral Researcher *May 2021 – Present*

- Built a Python-based web-scraper to collect and analyze 16K+ product reviews of 3D CAD (computer-aided design) software.
- Designed and conducted interviews with 40+ professional designers to identify 14 pain points of CAD collaboration.
- Developed a computer vision tool using Pyrender, Blender, and GPT-4V to automate change summarization for CAD models.
- Designed user studies with 30+ participants, generating actionable insights to improve usability for different skill levels.
- Analyzed 33M+ user actions, representing 350+ designers, from CAD trace data to identify inefficient design patterns.

**Scotiabank** *Toronto, ON*

Technology Consultant *May 2019 – May 2023*

- Executed a COVID-19 technology roll-out, increasing the department's remote work capacity from 30% to 98% within 20 days.
- Developed Excel macro to optimize intern recruitment, reducing turnaround time by 30% and increasing applicants by 50%.
- Led the migration of 300+ users' primary telecommunications provider from Blackberry to Apple within 2 months.

## Publications

### Journal Article Manuscripts

**Cheng, K.**, Zhou, S., Olechowski, A. 2024. "A Lot of Moving Parts": A Case Study of Open-Source Hardware Design Collaboration in the Thingiverse Community. *ACM Conference on Computer-Supported Cooperative Work and Social Computing.* View here.

Asuzu, C., **Cheng, K.**, Olechowski, A. 2024. The Personas of Cloud CAD Collaboration: A Case Study of a Professional Design Team. *IEEE Transactions on Engineering Management.* View here.

**Cheng, K.**, Olechowski, A. 2024. Analysis of Collaborative Assembly in Multi-User Computer-Aided Design. *Journal of Mechanical Design,* 146(3): 031701. View here.

Roy, D., Calpin, N., **Cheng, K.**, Olechowski, A., Arguelles, A., Zurita, N., Menold, J. 2024. Designing Together: Exploring Collaborative Dynamics of Multi-Objective Design Problems in Virtual Environments. *Journal of Mechanical Design,* 146(3): 031702. View here.

**Cheng, K.**, Cuvin, P., Olechowski, A., Zhou, S. 2023. User Perspectives on Branching in Computer-Aided Design. *ACM Conference on Computer-Supported Cooperative Work and Social Computing.* View here.

**Cheng, K.**, Davis, M., Zhang, X., Zhou, S., Olechowski, A. 2023. In the Age of Collaboration, the Computer-Aided Design Ecosystem is Behind: An Interview Study of Distributed CAD Practice. *ACM Conference on Computer-Supported Cooperative Work and Social Computing.* View here.

Ferguson, S., **Cheng, K.**, Adolphe, L., Van de Zande, G., Wallace, D., Olechowski, A. 2022. Communication patterns in engineering enterprise social networks: an exploratory analysis using short text topic modelling. *Design Science 8*, e18. View here.

### Peer-Reviewed Conference Proceedings

Zhang, K., **Cheng, K.**, Olechowski, A. 2024. Quantitative CAD Archetype Framework Evaluation with Professional User Data. *ASME International Design Engineering Technical Conference.* View here.

Zhang, K., **Cheng, K.**, Olechowski, A. 2024. Developing a CAD Personality Framework Based on User Data. *Computer-Aided Design Conference and Exhibition.* View here.

**Cheng, K.**, Olechowski, A. 2021. Some (Team) Assembly Required: An Analysis of Collaborative Computer-Aided Design Assembly. *ASME International Design Engineering Technical Conference.* View here.

### In Review

**Cheng, K.**, Olechowski, A., Zhou, S. It's a Complete Haystack: Understanding Dependency Management Needs in Computer-Aided Design. *Under review for ACM Conference on Computer-Supported Cooperative Work and Social Computing. 2025.*

Deng, Y., Zhang, S., **Cheng, K.**, Olechowski, A., Zhou, S. Untangling the Timeline: Challenges and Opportunities in Supporting Version Control in Modern Computer-Aided Design. *Under review for ACM Conference on Computer-Supported Cooperative Work and Social Computing. 2025.*

Velikonja, V., **Cheng, K.**, Olechowski, A. Exploring the Prevalence and Cause of Manufacturing Fixation in Design in Novice Engineering Designs via Computer-Aided Design. *Under review for Computers in Industry. 2025*.

## Awards, Fellowships, & Grants

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| 2024 | **Canada Graduate Scholarship – Doctoral**, NSERC | *$ 120,000* |
| | **Ontario Graduate Scholarhip**, Ontario Student Assistance Program, *Declined* | *$ 15,000* |
| 2023 | **Ontario Graduate Scholarship**, Ontario Student Assistance Program | *$ 15,000* |
| | **MIE Conference Travel Grant**, University of Toronto | *$ 500* |
| | **BPart Fellowship**, American Society of Mechanical Engineers (ASME) | *$ 1,250* |
| | **1st Place Poster Presentation – MIE Graduate Research Symposium**, University of Toronto | *$ 500* |
| 2022 | **Ontario Graduate Scholarship**, Ontario Student Assistance Program | *$ 15,000* |
| | **Best Poster Design – Onshape Research Symposium**, PTC Inc. | *$ 350* |
| 2021 | **Best Poster Award – Undergraduate Engineering Research Day**, University of Toronto | *$ 100* |
| | **PEY Co-op Student of the Year Award**, University of Toronto | – |
| 2016 | **Dean's Merit Entrance Scholarship**, University of Toronto | *$ 7,500* |
| | **President's Entrance Scholarship**, University of Toronto | *$ 2,000* |

## Presentations

** presenting author; + mentored undergraduate*

### Invited Talks

Nov 2024. *Open-Source Hardware Design Collaboration*. Invited talk: Human-Centered AI Reading Group, McGill University, Online.

Aug 2024. *The Trove of CAD Informatics: Acquiring and Analyzing CAD Data for Design Process Insights and AI Applications*. Workshop talk: ASME International Design Engineering Technical Conference, Washington D.C., USA.

July 2024. *Open-Source Hardware Design Collaboration in the Thingiverse Community*. Invited talk: Machine Agency Reading Group, University of Washington, Online.

May 2021. *Reflections on leadership skills and organizational considerations for the workplace of tomorrow*. Invited talk: 11th Conference on the Leader Engineer, Toronto, ON.

### Conference Presentations Without Proceedings

**Cheng, K.***, Zhou, S., Olechowski, A. 2024. A Case Study of Open-Source Hardware Design Collaboration. Poster: University of Toronto MIE Graduate Research Symposium, Toronto, ON.

**Cheng, K.***, Zhou, S., Olechowski, A. 2023. Analysis of Collaborative Software Development Insights to Physical Product Design via Computer-Aided Design. Poster: ASME (American Society of Mechanical Engineers) IDETC (International Design Engineering Technical Conference), Boston, MA.

**Cheng, K.***, Zhou, S., Olechowski, A. 2023. Is Cloud the Future of Computer-Aided Design? An Industry Case Study of CAD Collaboration. Poster: Onshape Research Symposium, Virtual, Online.

Roy, D.*, **Cheng, K.**, Olechowski, A., Menold, J. 2023. Exploring Collaborative Dynamics for Multi-Objective Design Problem Solving. Poster: Onshape Research Symposium, Virtual, Online.
*Received Best Poster Award in the Informatics category.*

Velikonja, V.*+, **Cheng, K.**, Olechowski, A. 2023. Exploring the Prevalence and Cause of Manufacturing Fixation in Design (MFD) in Novice Engineering Designers via Computer-Aided Design (CAD). Poster: Onshape Research Symposium, Virtual, Online.

**Cheng, K.***, Olechowski, A., Zhou, S. 2023. User Perspectives on Branching in Computer-Aided Design. Poster: University of Toronto MIE Graduate Research Symposium, Toronto, ON.
*Received 1st place in the Applied Mechanics & Design category.*

**Cheng, K.***, Olechowski, A., Zhou, S. 2022. Time to branch out: An analysis of online user forum posts to inform Computer-Aided Design (CAD) branching. Poster: Onshape Research Symposium, Virtual, Online.
*Received Best Poster Design Award.*

Cuvin, P.*+, **Cheng, K.**, Zhou, S., Olechowski, A. 2022. Where to Grow from Here? An Empirical Study of Branching Use in Computer-Aided Design. Poster: Onshape Research Symposium, Virtual, Online.

Cuvin, P.*+, **Cheng, K.**, Zhou, S., Olechowski, A. 2022. Where to Grow from Here? An Empirical Study of Branching Use in Computer-Aided Design. Poster: University of Toronto Undergraduate Engineering Research Day, Toronto, ON.

**Cheng, K.***, Olechowski, A. 2021. An Analysis of Collaborative Computer-Aided Design Assembly. Poster: PTC Digital Transformation in Education Summit, Virtual, Online.

**Cheng, K.***, Olechowski, A. 2021. A Study of Collaborative Computer-Aided Design Assembly. Poster: University of Toronto Undergraduate Engineering Research Day, Toronto, ON.
*Received Best Poster Award in the Advanced Manufacturing category.*

Davis, M.*+, Zhang, X.+, **Cheng, K.**, Zhou, S., Olechowski, A. 2021. What's Wrong with CAD?: Identifying and Classifying Challenges in Collaborative Work with Computer-Aided Design. Poster: University of Toronto Undergraduate Engineering Research Day, Toronto, ON.
*Received Best Poster Award in the Transdisciplinary Engineering Education & Practices category.*

Zhang, X.*+, Davis, M.+, **Cheng, K.**, Zhou, S., Olechowski, A. 2021. Challenges of Collaboration with Computer-Aided Design (CAD). Oral presentation: University of Toronto Undergraduate Engineering Research Day, Toronto, ON.

## Teaching Experience

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| 2024-2025 | **MIE221: Manufacturing Engineering**, Head Teaching Assistant |
| 2024-2025 | **MIE221: Manufacturing Engineering**, Lab Manager |
| 2024-2025 | **MIE221: Manufacturing Engineering**, Marking Teaching Assistant |
| 2022-2023 | **MIE221: Manufacturing Engineering**, Lab Teaching Assistant |
| 2022-2024 | **MIE301: Kinematics & Dynamics of Machines**, Lead Project Teaching Assistant |
| 2021 | **MIE301: Kinematics & Dynamics of Machines**, Project Teaching Assistant |

## Skills

**Programming:** Python; R; VBA; MATLAB

**Python Packages:** Matplotlib; Selenium; Beautiful Soup; SciPy; NumPy; NetworkX

**Other Software:** Overleaf; Qualtrics; SurveyMonkey; Figma; NVivo; Miro; Jupyter; Google Colab

**Languages:** English (fluent); Mandarin (advanced); French (intermediate)