

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 20 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 human-subject experiments with 30+ participants to study CAD feature use by novice and expert designers.
- 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. Quantitative CAD Archetype Framework Evaluation with Professional User Data. *Accepted to ASME International Design Engineering Technical Conference*. 2024.

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 PROGRESS

Cheng, K., Zhou, S., Olechowski, A. It Depends: A Dependency Management Tool for Computer-Aided Design Collaboration. *In preparation 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. *In preparation for Computers in Industry*. 2025.

Awards, Fellowships, & Grants

2024	Canada Graduate Scholarship – Doctoral , NSERC	\$ 120,000
	Ontario Graduate Scholarship , Ontario Student Assistance Program, <i>Declined</i>	\$ 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

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.
- Cuvín, 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.
- Cuvín, 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; BeautifulSoup; SciPy; NumPy; NetworkX

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

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