Sharon Ferguson

PhD Student
Mechanical & Industrial Engineering
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EDUCATION

PhD. **Mechanical and Industrial Engineering**, University of Toronto, Toronto, ON
2020-2025.
Advisor: Dr. Alison Olechowski
Relevant Courses: *CSC2515*: Introduction to Machine Learning, *MIE1517*: Deep Learning, *ETH1000*: Ethics of AI in Context, *CSC2552*: Topics in Computational Social Science

BASc. **Industrial Engineering**, *Honours, 3.84/4.0*, University of Toronto, Toronto, ON, 2020
Minor in Engineering Business
Relevant Courses in Machine Learning and Human Factors
Undergraduate Thesis: *Experiential User-Experience Sessions for Healthy Aging Technology.*
Supervised by Dr. Mark Chignell

PUBLICATIONS

Journal Article Manuscripts

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

2022 **Ferguson, S.**, Lai, K., Chen, J., Faidi, S., Leonardo, K., and Olechowski, A. "Why couldn't we do this more often?": exploring the feasibility of virtual and distributed work in product design engineering. *Research in Engineering Design* (2022) . View here.

Peer-Reviewed Conference Proceedings

2022 **Ferguson, S.**, Mao, K., Magarian, J., Olechowski, A. Advancing a Model of Students' Intentional Persistence in Machine Learning and Artificial Intelligence*. *American Society of Engineering Education annual conference*, 2022. View here.

Accepted **S. Ferguson**, A. Olechowski, "Measuring Gendered Communication Patterns on Enterprise Communication Platforms" ACM Conference on Supporting Group Work, Poster, 2023.

Submitted **Ferguson, S.**, Akemi, P., Alexander, R., Kuzminykh, A. Can You Explain?: A Four-Layer Framework of Human and AI Decision Explanation Strategies *Submitted to ACM CHI Conference on Human Factors in Computing Systems*, 2022.

Works in Progress

Progress Ferguson, S., Hu, Y., Chignell, M. Choosing Effective Videos for Exergaming Applications. *In preparation for International Journal of Human-Computer Studies*, 2022.

* represents proceedings accompanied by an oral presentation at the conference

Progress Ferguson, S., Ozecylan, M., Chiu, K., Alexander, R., Kuzminykh, A. Open for interpretation: Comparing Human and AI explanations of sexism assessment. *In preparation for ACM Transactions on Interactive Intelligent Systems*, 2022.

TALKS

Invited Talks

2022 Institute for Leadership Education in Engineering (ILead) Community of Practice Conference on the Future of Work. "Engineering Communication in Hybrid Teams" presenter, scheduled November 2022.

2022 Massachusetts Institute of Technology 2.009 Product Design Processes: Slack Tutorial. "Using Slack in Design Teams: Evidence from Three Research Projects" presenter, September 2022.

2022 University of Toronto Centre For Ethics: Ethics of AI Emerging Scholars Series: "Advancing a Model of Students' Intentional Persistence in Machine Learning and Artificial Intelligence" presenter, March 2022.

Conference Presentations Without Proceedings

Accepted J. Chen, S. Ferguson, A. Olechowski "Understanding Design Team Conflict on Virtual Communication Platforms" Canadian Design Workshop 2, 2022.

Accepted S. Ferguson, A. Olechowski "Measuring Gendered Patterns in a Capstone Design Course's Online Communication" Canadian Design Workshop 2, 2022.

Accepted S. Ferguson, M. Flus, A. Olechowski "A Machine Learning Tool to Classify Design Phases" Canadian Design Workshop 2, 2022.

Accepted S. Ferguson, P. Aoyagui, A. Kuzminykh "A Thematic Comparison of Human and AI Explanations of Sexism Assessment" NeurIPS Workshop on Human Centered AI, 2022.

2021 S. Ferguson, A. Olechowski, ""Why couldn't we do this more often?": exploring the feasibility of virtual and distributed work in product design engineering" ASME IDETC Conference, Lightning Talk, 2021.

2021 S. Ferguson, A. Olechowski, "Exploring Short Text Topic Models in the Context of Product Design Enterprise Social Network Messaging" University of Toronto Engineering Research Conference, Oral Presentation, 2021. **Awarded First Place in Data Analytics, AI, and Robotics section**

2020 S. Ferguson, A. Olechowski, "Towards the Future of Work from Home via Interviews with Engineering Designers" McMaster Engineering Technology Research and Innovation Conference, 2020.

2020 S. Ferguson, S. Dusciuc, M. Vella, Y. Sivaparamanantha, M-C. Tsai, T. Chan, "Jump Detection and Metric Extraction using Machine Learning: A Case Study in Snowboarding" SPort INnovation (SPIN) Summit, 2020.

AFFILIATIONS

Fellow **Schwartz Reisman Institute for Technology and Society** University of Toronto, 2022-2023
Project: *Understanding and Mitigating Inequality in Enterprise Social Networks*

RA **COoKIE Research Group** Led by Anastasia Kuzminykh, Faculty of Information, University of Toronto, 2021-2022
Project: *Examining Explanation Strategies of Humans and AI*

Fellow **Ethics of AI Graduate Research Fellowship** University of Toronto, 2021-2022
Graduate Research Fellowship at the University of Toronto, Centre for Ethics
Project: *Examining Diversity and Intentional Persistence in Machine Learning and Artificial Intelligence*
Responsibilities: Moderated presentations for the Ethics of AI in Context speaker series

Fellow **Toronto Human-AI Interaction Research School**, University of Toronto, 2021
Research school held by the University of Toronto Faculty of Information.
Project: *Detecting Sexism in Text: Humans vs. Machines*
Advisors: Dr. Anastasia Kuzminykh and Dr. Rohan Alexander

GRANTS AND AWARDS

Grants and Scholarships

2022 University of Toronto Mechanical and Industrial Engineering Conference Grant ($650)

2022 NSERC Canada Graduate Scholarship - Doctoral ($105,000)

2022 Schwartz Reisman Institute for Technology and Society Graduate Fellowship ($7,500)

2021 Queen Elizabeth II Graduate Scholarship in Science and Technology ($15,000)

2021 Ontario Graduate Scholarship ($15,000) *Declined*

2021 Ethics of AI Graduate Research Fellowship ($2,500)

2021 Toronto Human-AI Interaction Research School Fellow ($500)

2020 University of Toronto Global COVID-19 Student Engagement Grant ($3,000)

2020 NSERC Undergraduate Research Award ($4,800)

2015 University of Toronto Admissions Scholarship ($3,000)

2015 University of Toronto Scholar ($6,000)

Awards and Honors

2021 Selected as University of Toronto nominee for Vanier Canada Graduate Scholarship

2021 Best Oral Presentation in Data Analytics, AI, and Robotics Stream at the University of Toronto Engineering Research Conference ($500)

2020 2^{nd} Place Capstone Award - Industrial Engineering class of 2020 ($600)

2018 1^{st} Place - Healthy Aging Technology Hackathon

TEACHING AND MENTORING

Teaching - University of Toronto

2022 **Head Teaching Assistant** MIE459: Organization Design
Designed assignments and rubrics, led tutorials, and assisted in the creation of exam materials.
Nominated for Teaching Assistant Award.

2021 **Guest Lecturer** TEP1502: Leadership in Product Design

2021 **Lab Instructor** MIE262: Operations Research 1
Taught synchronous lab sessions using Excel, AMPL, Gurobi and Java to solve linear programs. Advised students throughout the completion of the course project.
Nominated for Teaching Assistant Award.

2020-22 **Teaching Assistant** MIE242: Psychology for Engineers
Prepared lectures to transition course to an online format. Created and led a workshop for 130 students about effectively reading academic papers, in collaboration with the Engineering Communication Program.
Nominated for Teaching Assistant Award.

Mentoring - University of Toronto

2022 **Jiacheng (Jason) Chen**, Engineering Science undergraduate summer student. Now third year Engineering Science student. Advising on a project using text processing and qualitative analysis to detect conflict in Slack messages.

2021/22 **Paula Akemi**, Master of Information student. Now UX Research Lead at Versett. Led a project where she was a research assistant using qualitative analysis to develop a framework for human and AI explanation strategies.

2021/22 **Katherine Mao**, Engineering Science thesis student. Now Software Development Engineer at Amazon Robotics. Co-advised her undergraduate thesis investigating social belonging confidence and identity of Machine Learning/Artificial Intelligence students.

2021 **Prachi Sukhnani**, Engineering Science undergraduate work study student. Now fourth year Engineering Science student. Led a project that she assisted in, advancing a survey to study the persistence of Machine Learning/Artificial Intelligence students.

PROFESSIONAL EXPERIENCE

2018/19 **Power System Data Analyst** *Independent Electricity System Operator*.
Published the 20-year electricity demand forecast to 50+ stakeholder groups, informing 3000 MW of investments. Implemented an automated pipeline to gather generator data from 10+ sources into a relational database used by 8 teams. Designed data-visualization queries in Tableau to automatically update charts used in quarterly publications.

SERVICE

Outreach Activities

2022/23 **President** *Graduate Society of Women Engineers, University of Toronto*. Leading a team of 8 executive members in securing funding for the club, organizing social and professional development events, and coordinating with other University of Toronto groups and the global Society of Women Engineers organization.

2022 **Presenter** *University of Toronto Centre for Analytics and Artificial Intelligence*. Presented at the engineering student orientation and networking event. Discussed my experience working on analytics projects at the University of Toronto and explained the fellowship opportunities available for students.

2021/22 **Vice President Finance** *Graduate Society of Women Engineers, University of Toronto*. Responsible for managing and budgeting club funds, applying for external funding opportunities, and organizing

events. Tripled club funding from previous year, acquired funding from the global Society of Women Engineers organization, and led the switch to a more efficient banking platform.

2021 **Workshop Co-Lead** *Camp Ooch Teen Conference Skill Building Workshops*. Led a coding workshop to introduce Python to 14-18 year olds.

2020 **Panel Moderator** *'Female Leaders and the Changing Landscape of Engineering' with the Ontario Society of Professional Engineers*. Moderated a panel of four women engineers, guiding a discussion on the challenges and barriers to participation, as well as what allies can do to improve this.

2018 **High School Mentor** *Women in Science and Engineering club at the University of Toronto*. Mentored three high school students interested in engineering through the university application process.

Science Communication

Medium Building an online audience (2.5k views) to share accessible summaries of my research and other cutting edge research in the field of product design, AI, and management science.

Peer-Reviewing

2022 Reviewer for ACM Conference on Computer-Supported Cooperative Work and Social Computing

2022 Reviewer for ACM CHI Conference on Human Factors in Computing Systems

SKILLS

Computing Languages: Python, R, Java, SQL, MATLAB

Python Packages: scikit-learn, Matplotlib, NumPy, SciPy, NLTK, SpaCy, Gensim, Jupyter

Other Computing: Git, LaTeX, Twitter API

Academic Professional Development Courses: Becoming a Better Editor of Your Work, Writing NSERC Proposals, Oral Presentation Skills, University of Toronto Unconscious Bias Education Modules, Canada Research Chair Unconscious Bias Training Module, Department for Women and Gender Equality's Introduction to Gender-Based Analysis+, Workshop for Qualitative Analysis in Human-Computer Interaction, Workshop on using the Twitter API for academic research

RESEARCH INTERESTS

Computational Social Science, Human-Computer Interaction, Natural Language Processing, Gender and Diversity, Machine Learning, Explainable Artificial Intelligence, Engineering Design

Updated December 2022