Majeed Kazemitabaar

PhD Candidate, Computer Science, University of Toronto

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RESEARCH INTERESTS

Human-Computer Interaction, Human-AI Interaction, Programming Support Tools, Computer Science Education

My research focuses on the design, implementation, and evaluation of methods that make programming more accessible, intuitive, and engaging for beginners. Particularly, I have been addressing fundamental questions surrounding **interaction** and **cognition** in integrating AI into programming tools to enhance learnability and productivity.

EDUCATION

Sep 2020 – May 2025 **University of Toronto**
PhD Candidate in *Computer Science*
Advisor: **Tovi Grossman**
Thesis: *Balancing Productivity and Cognitive Engagement in AI-Assisted Programming*

Aug 2014 – Aug 2017 **University of Maryland, College Park**
MSc in Computer Science
Advisor: **Jon Froehlich**
Thesis: *MakerWear: A Tangible Construction Kit for Young Children to Create Interactive Wearables*

Jun 2014 **Sharif University of Technology**
BSc in Computer Engineering

EMPLOYMENT

Sep 2020 – Present **University of Toronto**, *Graduate Researcher and Teaching Assistant*

June 2023 – Aug 2023 **Microsoft Research**, Cambridge, UK, *Research Intern*
Research with Jack Williams, Advait Sarkar, and Ian Drosos.
Developed *Interactive Task Decomposition* to improve AI-assisted data analysis through progressively disclosed, editable chain-of-thought reasoning. Led to **[C.9]**, UIST 2024 research paper.

Sep 2017 – Sep 2020 **Metrix,** *Lead Software Engineer*
Developed big-data analysis and storage pipelines for analytics data aggregation, extracting insights, running custom queries, user segmentation, and real-time reporting.

May 2017 – Aug 2017 **Microsoft Research**, Redmond, US, *Research Intern*
Research with Rob DeLine and Tom Ball.
Extended MS MakeCode with a programming by demonstration pipeline for gesture recognition for to incorporate machine learning into their programs. Led to **[EA.3]**, ICER 2017 workshop paper.

Jan 2017 - April 2017 **University of California,** Berkeley, *Visiting Student Researcher*
Research with Björn Hartmann.
Researched on an embedded system development environment aimed at enhancing debugging experiences by visualizing the boundary between embedded code and circuits.

Aug 2014 – May 2017 **University of Maryland**, College Park, *Graduate Researcher and Teaching Assistant*
Researched on the design, development, and evaluation of MakerWear, an interactive wearable construction kit that enables young children to create personally meaningful computational designs.

FULL CONFERENCE PAPERS

[C.10] **Kazemitabaar, M.**, Huang, O., Suh, S., Henley, A., Grossman, T. (2025) *"Exploring the Design Space of Cognitive Engagement Techniques with AI-Generated Code that Enhance Learning"*
IUI 2025 – In Proceedings of the 30th International Conference on Intelligent User Interfaces.

[C.9] **Kazemitabaar, M.**, Williams, J., Drosos, I., Grossman, T., Henley, A., Negreanu, C., Sarkar, A. (2024) *"Improving Steering and Verification in AI-Assisted Data Analysis with Interactive Task Decomposition"*
UIST 2024 – In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology.

[C.8] **Kazemitabaar, M.**, Ye, R., Wang, X., Henley, A., Denny, P., Craig, M., Grossman, T. (2024) *"CodeAid: Evaluating a Classroom Deployment of an LLM-based Programming Assistant that Balances Student and Educator Needs"*
CHI 2024 - In Proceedings of the ACM 2024 Conference of Human Factors in Computing Systems.

[C.7] **Kazemitabaar, M.**, Hou, X., Henley, A., Ericson, B., Weintrop, D., Grossman, T. (2023) *"How Novices Use LLM-Based Code Generators to Solve CS1 Coding Tasks in a Self-Paced Learning Environment"*
Koli Calling 2023 - In Proceedings of the ACM 2023 Koli Calling International Conference on Computing Education Research.

[C.6] **Kazemitabaar, M.**, Chow, J., Ma, C., Ericson, B., Weintrop, D., Grossman, T. (2023) *"Studying the effect of AI Code Generators on Supporting Learners in Introductory Programming"*
CHI 2023 - In Proceedings of the ACM 2023 Conference of Human Factors in Computing Systems.

[C.5] **Kazemitabaar, M.**, Chyhir, V., Weintrop, D., Grossman, T. (2023) *"Scaffolding Progress: How Structured Editors Shape Novice Errors When Transitioning from Blocks to Text"*
SIGCSE 2023 - In Proceedings of the ACM Technical Symposium on Computer Science Education.

[C.4] **Kazemitabaar, M.**, Chyhir, V., Weintrop, D., Grossman, T. (2022) *"CodeStruct: Design and Evaluation of an Intermediary Programming Environment for Novices to Transition from Scratch to Python"*
IDC 2022 - In Proceedings of the Conference on Interaction Design and Children.

[C.3] McGrath, W., Warner, J., Drew, D., **Kazemitabaar, M.**, Karchemsky, M., Mellis, D., and Hartmann, B. (2017) *"Bifröst: Visualizing and Checking Behavior of Embedded Systems across Hardware and Software"*
UIST 2017 - In Proceedings of 30th Annual ACM Symposium on User Interface Software and Technology.

[C.2] **Kazemitabaar, M.**, McPeak, J., Jiao, A., He, L., Outing, T., and Froehlich, J. (2017) *"MakerWear: A Tangible, Approach to Wearable Creation for Children"*
CHI 2017 - In Proceedings of the 2017 Conference on Human Factors in Computing Systems.
🏆 **Best Paper Award** (top 1%)

[C.1] Boghrati, R., Heydarnoori, A. and **Kazemitabaar, M.** (2014) *"Activities performed by programmers while using framework examples as a guide"*
SAC 2014 - In Proceedings of the 2014 Symposium on Applied Computing.

IN SUBMISSION FULL PAPERS

[C.11] Hosseini, S., **Kazemitabaar, M.**, Lyons, K., Zhou, S. (2025) *"TreeView: A Semantic Mini-Map for Enhancing Navigation in Computational Notebooks"*

EXTENDED ABSTRACTS & WORKSHOPS

[EA.4] Tankelevitch, L., Glassman, E., He, J., **Kazemitabaar, M.**, Kittur, A., Lee, M., Palani, S., Sarkar, A., Ramos, G., Rogers, Y., Subrammonyam, H. (2025) *"Tools for Thought: Research and Design for Understanding, Protecting, and Augmenting Human Cognition with Generative AI"*
CHI 2025 Workshop Co-Organizer – In Proceedings of the Extended Abstracts of the 2025 CHI Conference on Human Factors in Computing Systems

[EA.3] **Kazemitabaar, M.**, and DeLine, R. (2017) *"GestureBlocks: A Gesture Recognition Toolkit for Children"* Presented at the 2017 Conference on International Computing Education Research: Workshop on Research on Learning about Machine Learning.
ICER 2017 Workshop Participant (Research on Learning about Machine Learning Workshop)

[EA.2] **Kazemitabaar, M.**, He, L., Wang, K., Aloimonous, C., Cheng T. and Froehlich, J., (2016) *"ReWear: Early Explorations of a Modular Wearable Construction Kit for Young Children"*
CHI 2016 Late-Breaking Work – In Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems.
🏆 **Best Late-Breaking Work Paper** (top 1%)

[EA.1] **Kazemitabaar, M.**, Norooz, L., Guha, ML., and Froehlich, J. (2015) *"MakerShoe: Towards an E-Textile Construction Kit to Support Creativity, Playful Making, and Self-Expression"*

IDC 2015 Demo – In Proceedings of the 14th International Conference on Interaction Design and Children.

AWARDS AND HONORS

2025 **Special Recognition for Outstanding Reviews (x4)**
ACM Conference on Human Factors in Computing Systems (CHI 2025)

2024 **Special Recognition for Outstanding Reviews (x2)**
ACM Conference on Human Factors in Computing Systems (CHI 2024)

2023 **Special Recognition for Outstanding Reviews**
ACM Conference on Human Factors in Computing Systems (CHI 2023)

2022 **Special Recognition for Outstanding Reviews**
ACM Symposium on User Interface Software and Technology (UIST 2022)

2020 **University of Toronto 4-Year Scholarship**

2017 **CHI2017 Best Paper Award** 🏆 [C.2]

2016 Selected as one of the four **Inventors in our Midst** at the 2016 Silver Spring Maker Faire

2016 **CHI2016 Best Late-Breaking Work Award** 🏆 [EA.2]

2015 **Top Maker Award** at the *Tangible Interactive Computing Course* - CMSC838

PRESS COVERAGE

2024 **Raspberry PI Foundation**
Using an AI code generator with school-age beginner programmers
https://www.raspberrypi.org/blog/using-an-ai-code-generator-with-school-age-beginner-programmers/

2023 **University of Toronto Computer Science News**
AI code generators could make learning to code easier for young students, new research shows
https://web.cs.toronto.edu/news-events/news/ai-code-generators-for-programming-education

2023 **University of Toronto Arts and Science News**
Making coding more accessible: PhD student Majeed Kazemitabaar finds AI code generators can play key role in helping young learners
https://www.artsci.utoronto.ca/news/ai-code-generators-could-make-learning-code-easier-young-students

GRANTS AND RESEARCH AWARDS

2024 **LEAF Impact Grant University of Toronto**
$300,000 (over three years)
Development and Large-Scale Deployment of a Platform for Building Course-Specific Pedagogical AI Tutors and AI-Powered Exercises for Computer Programming Classes
PI: Tovi Grossman
Co-PIs: Prof. Michelle Craig, Prof. David Liu, Prof. Scott Schwartz
Lead Graduate Student: **Majeed Kazemitabaar**

2023 **LEAF+ Generative AI**
$10,000
Deployment of LLM-based Personal Coding Assistants that Balance Helpfulness and Directness
PI: Tovi Grossman
Lead Graduate Student: **Majeed Kazemitabaar**

2017 **NSF Career Award**
$541,016
"A Tangible-Graphical Approach to Engage Young Children in Wearable Design"
NSF Career Award #1834629
PI: Jon Froehlich
Lead Graduate Student: **Majeed Kazemitabaar**

PROFESSIONAL SERVICES

EXTERNAL REVIEWER

2025 1x Full Paper, ACM Intelligent User Interfaces (IUI)
2025 6x Full Papers, ACM Human Factors in Computing (CHI)
2024 3x Full Papers, ACM Human Factors in Computing (CHI)
2024 1x Short Paper, ACM Interaction Design for Children (IDC)
2023 2x Full Papers, 1x Late-Breaking Work Paper, ACM Human Factors in Computing (CHI)
2022 1x Demo Paper, ACM Interaction Design for Children (IDC)
2022 1x ACM User Interface and Software Technology (UIST)
2019 1x Full Paper, ACM Designing Interactive Systems (DIS)
2018 1x ACM Tangible and Embodied Interactions (TEI)
2018 2x Full Paper, ACM Interaction Design and Children (IDC)
2017 1x Late-Breaking Work Paper, ACM Human Factors in Computing Systems (CHI)

STUDENT VOLUNTEER

2016 ACM Human Factors in Computing Systems (CHI), 2016
2015 ACM Interaction Design and Children (IDC), 2015

OPEN-SOURCE RESEARCH PROTOTYPES

2017 **MakerWear [C.2]**
Github Repository: https://github.com/MajeedKazemi/MakerWear

Open-source designs for MakerWear's 32 electronic modules, including hardware schematics, microcontroller code, and 3D-printable components.

2021 **CodeStruct [C.4]**
Web Application (Try Live): https://code-struct.vercel.app/
Github Repository: https://github.com/MajeedKazemi/code-struct

CodeStruct is an open-source editor that provides a context-aware structured editor and toolbox, live variable hints, visual aids, and in-browser code execution using Pyodide.

2022 **Coding Steps [C.6]**
Github Repository: https://github.com/MajeedKazemi/coding-steps

Coding Steps is a self-paced programming environment with 45 increasingly complex Python coding tasks. The system includes an AI code generator powered by OpenAI GPT, an online grading environment for TAs, a Python code execution server, and comprehensive user data collection. It enables online, large-scale user studies in CS-Ed.

2023 **CodeAid [C.8]**
Github Repository: https://github.com/MajeedKazemi/code-aid
Student Queries: https://huggingface.co/datasets/majeedkazemi/students-coding-questions-from-ai-assistant

CodeAid is an open-source coding assistant. The repository includes the GPT 3.5 prompts that guide students instead of displaying direct code responses, the architecture for storing and streaming AI responses per student, real-time rendering of interactive AI responses, and the pipeline for retrieving relevant function documentations.

2024 **Cognitive Engagement Techniques [C.10]**
Web Application (try live): https://lead-and-reveal.vercel.app/
Github Repository: https://github.com/MajeedKazemi/code-engagement-techniques

This open-source project includes the seven interventions that were designed to engage programmers with AI-generated code. It includes a self-paced environment for data collection and conducting scalable, remote studies.

INVITED TALKS

UPCOMING

Feb 2025 **University of Alberta**, Invited by *Joerg Sander*
Balancing Productivity and Cognitive Engagement in AI-Assisted Programming

PAST TALKS

Feb 2025 **Microsoft Research (AI Frontiers Group),** Invited by *Saleema Amershi*
Balancing Productivity and Cognitive Engagement in AI-Assisted Programming

Feb 2025 **Microsoft Research UK (Tools for Thought),** Invited by *Sean Rintel*
Balancing Productivity and Cognitive Engagement in AI-Assisted Programming

Jan 2025 **University of Maryland (Human-Computer Interaction Lab)**
Cognition and Interaction in AI-Assisted Programming

Jan 2025 **Allen AI Institute (Semantic Scholar Group)**, Invited by *Pao Siangliulue*
Balancing Productivity and Cognitive Engagement in AI-Assisted Programming

Jan 2025 **University of Maryland (Human-Computer Interaction Lab)**, Invited by *Joel Chan*
Cognition and Interaction in AI-Assisted Programming

Jan 2025 **Apple AIML Research (UI Understanding Group)**, Invited by *Titus Barik*
Balancing Productivity and Cognitive Engagement in AI-Assisted Programming

Jan 2025 **EPFL (Center for Learning Sciences)**, Invited by *Kim Uittenhove*
Learning to Code with AI

July 2024 **Toronto Data Workshop**, Invited by *Rohan Alexander*
AI-Assisted Data Analysis: Interactive Task Decomposition

Feb 2024 **Raspberry PI Research Seminars**, Invited by *Jane Waite*
Can large language models that generate code help K–12 students effectively learn Python programming?

Nov 2022 **Microsoft Research (PROSE)**, Invited by *Austin Henley*
Studying the effect of AI Code Generators on Supporting Novice Learners in Introductory Programming

Jul 2022 **Microsoft Research (RiSE)**, Invited by *Tom Ball*
Codestruct: An intermediary programming environment for novices to transition from scratch to python

Mar 2017 **Berkeley Institute of Design**, Design Field Notes, Invited by *Björn Hartmann*
MakerWear: A Tangible Approach to Interactive Wearable Creation for Children

Nov 2016 **Technica: Tech + Design, All-women Hackathon**
Interaction Design for a Purpose

Sep 2016 **Maker Faire Silver Spring**
MakerWear: A Tangible, Modular Approach for Children to Create Interactive Wearables

May 2016 **33rd Annual HCIL Symposium**
MakerWear: Early Explorations of Wearable Construction Kits for Children

May 2015 **32nd Annual HCIL Symposium**
MakerShoe: Towards an E-Textile Construction Kit to Support Creativity, Playful Making, and Self-Expression

ADVISING

UNDERGRADUATE THESES

Sep 2023 - Apr 2024 **Chase McDougall**, Engineering Sciences – now at Decoda Health
Thesis: *Personalized Gamification through Storifying Coding Tasks in a Self-Paced Programming Environment*

GRADUATE STUDENTS

Apr 2024 – Oct 2024 **Sepehr Hosseini**, Computer Science
Acted as Proxy Supervisor, Main Supervisor: Shurui Zhou
Thesis: *TreeView: A Semantic Mini-Map for Enhancing Navigation in Computational Notebooks* **[C.11]**

UNDERGRADUATE STUDENTS

Sep 2023 – Aug 2024 **Oliver Huang**, Computer Science – now MSc student at University of Toronto **[C.10]**

Summer 2023 **Runlong Ye**, Computer Science – now PhD student at University of Toronto **[C.8]**

Summer 2022 **Justin Chow**, Engineering Sciences (class of 2025) **[C.6]**

Summer 2022 **Carl Ma**, Engineering Sciences (class of 2025) **[C.6]**

May 2021 – Feb 2022 **Viktar Chyhir**, Computer Science (class of 2022) – now AMD **[C.4]** **[C.5]**

Summer 2016 **Jason McPeak**, Computer Engineering (class of 2017) **[C.2]**

Summer 2016 **Alex Jiao**, Electrical and Computer Engineering (class of 2019) **[C.2]**

Summer 2015 **Tony Cheng**, Computer Science (class of 2018) **[EA.2]**

Summer 2015 **Katie Wang**, Computer Science (class of 2018) **[EA.2]**

HIGH SCHOOL STUDENTS

Chloe Aloimonos [EA.2]

TEACHING EXPERIENCE

COURSE INSTRUCTOR

Winter 2025 CSC108: Introduction to Computer Programming
Responsible for delivering lectures and teaching the fundamental concepts of programming.

Winter 2024 CSC2524H: Topics in Interactive Computing – Intelligent User Interfaces with LLMs
Co-instructor for Tovi Grossman

TEACHING ASSISTANT

University of Toronto

Fall 2024 CSC108: Intro to Programming
Teaching Assistant for Michelle Craig

Summer 2024 CSC108: Intro to Programming
Teaching Assistant for Joonho Kim

Winter 2024 CSC108: Intro to Programming
Teaching Assistant for Tom Fairgrieve

Fall 2023 CSC309: Web Programming
Teaching Assistant for Jack Sun

Fall 2022 CSC263: Data Structures and Analysis
Teaching Assistant for David Heap

Winter 2022 CSC309: Web Programming
Teaching Assistant for Mark Kazakevich

Fall 2021 CSC309: Web Programming
Teaching Assistant for Mark Kazakevich

University of Maryland

Winter 2016 CMSC122: Intro to Web Programming
Teaching Assistant for Pedram Sadeghian

Fall 2015 CMSC216: Intro to Computer Systems
Teaching Assistant for Larry Herman

Winter 2015 CMSC122: Intro to Web Programming
Teaching Assistant for Pedram Sadeghian

Fall 2014 CMCS434: Intro to Human-Computer Interaction
Teaching Assistant for Vibha Sazawal

Sharif University

Winter 2014 Intro to Human-Computer Interaction
Teaching Assistant for Ali Nazari Shirehjini

Fall 2013 Intro to Human-Computer Interaction
Teaching Assistant for Alireza Ajdari

Fall 2013 Intro to 3D Computer Vision
Teaching Assistant for Shohreh Kasaei

Winter 2013 Intro to Electric Circuits
Teaching Assistant for Mohammad Hemmatyar

Ferdowsi University

Winter 2011 Electric Circuits I

Teaching Assistant for Hamidreza Pourreza

Fall 2010 Electric Circuits I
Teaching Assistant for Hamidreza Pourreza

WORKSHOP INSTRUCTOR

Summer 2011 Programming AVR Microcontrollers

Fall 2010 Programming AVR Microcontrollers

REFERENCES

Tovi Grossman
Associate Professor, *Computer Science, University of Toronto*
tovi@dgp.toronto.edu

Jon Froehlich
Professor, *Computer Science, University of Washington*
jonf@cs.washington.edu

Björn Hartmann
Associate Professor, *Electrical Engineering and Computer Science, University of California Berkeley*
bjoern@eecs.berkeley.edu

Barbara Ericson
Associate Professor, *Electrical Engineering and Computer Science, University of Michigan*
Associate Professor, *School of Information, University of Michigan*
barbarer@umich.edu

David Weintrop
Associate Professor, *College of Information Studies and Department of Teaching & Learning, University of Maryland*
weintrop@umd.edu

Austin Henley
Associate Teaching Professor, *School of Computer Science, Carnegie Mellon University*
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Rob DeLine
Senior Principal Researcher, *Microsoft Research Redmond*
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Jack Williams
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jack.williams@microsoft.com