

Litao Yan

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Ph.D. Candidate in Computer and Information Science at the University of Pennsylvania, advised by Prof. Andrew Head.

Research Interests

Human-Computer Interaction, Large Language Models (LLMs), Programming Assistants, Multimodal Large Language Models (MLLMs), Software Engineering, Interactive Visualization

Education

Sep. 2022 – Present: **University of Pennsylvania**, Philadelphia, PA, United States

Ph.D. in Computer and Information Science, Advisor: *Andrew Head*

Sep. 2019 – May 2021: **Harvard University**, Cambridge, MA, United States

M.Eng. in Computational Science and Engineering, Advisor: *Elena L. Glassman*

Sep. 2015 – Jun. 2019: **Xiamen University**, Xiamen, Fujian, China

B.Eng. in Material Science and Engineering, Advisors: *Yixi Zhuang & Ye Luo*

Selected Publications

[C6] The Invisible Mentor: Inferring User Actions from Screen Recordings to Recommend Better Workflows

Litao Yan, Andrew Head, Ken Milne, Vu Le, Sumit Gulwani, Chris Parnin, Emerson Murphy-Hill (under review)

[PDF](#)

[C5] Answering Developer Questions with Annotated Agent-Discovered Program Traces

Litao Yan, Jeffrey Tao, Lydia B Chilton, Andrew Head

38th Annual ACM Symposium on User Interface Software and Technology (UIST 2025).

[PDF](#) [Video](#)

[C4] FreeForm: Flexibly Augmenting Formulas with Synchronized Markup and Graphical Edits

Jeffrey Tao, **Litao Yan**, Jessica Shi, Mia Ginsberg, Andrew Head

ACM Conference on Human Factors in Computing Systems (CHI 2025).

[PDF](#)

[C3] Ivie: Lightweight Anchored Explanations of Just-Generated Code

Litao Yan, Alyssa Hwang, Zhiyuan Wu, Andrew Head

2024 CHI Conference on Human Factors in Computing Systems (CHI 2024).

[PDF](#) [Video](#)

[C2] Concept-Annotated Examples for Library Comparison

Litao Yan, Miryung Kim, Björn Hartmann, Tianyi Zhang, Elena Glassman

35th Annual ACM Symposium on User Interface Software and Technology (UIST 2022).

[PDF](#) [Video](#)

[C1] (Honorable Mention) Visualizing Examples of Deep Neural Networks at Scale

Litao Yan, Elena L. Glassman, Tianyi Zhang

2021 CHI Conference on Human Factors in Computing Systems (CHI 2021).

[PDF](#) [Video](#)

Selected Honors and Awards

2022: John Grist Brainerd Doctoral Fellow, University of Pennsylvania

2021: Honorable Mention at CHI'21 (top 5% of submitted papers)

2019: Outstanding Graduates, Xiamen University (top 3%)

2016 - 2018: Outstanding Scholarship for Undergraduates (top 5%), Xiamen University

2016 & 2017: Triple-A Student, Xiamen University (top 3%)

2016 & 2017: "An An" Scholarship First Prize (top 3%), College of Materials, Xiamen University

Research Experience

University of Pennsylvania

Sep. 2022 – Jun. 2026 (expected)

Ph.D. Student, PA, United States

Advisor: Prof. Andrew Head

TrailBlazer: Built an AI-powered IDE tool that traces program dependencies to answer reachability questions. Combined static analysis and LLM agents to generate interactive program traces. A 20-participant study showed 34% faster task completion and 75% single-attempt success compared to baseline AI tools.

Ivie: Created Ivie, a programming assistant providing real-time, in-situ explanations for code generated by GitHub Copilot. Built as a VSCode extension using TypeScript and OpenAI APIs, Ivie improved code comprehension accuracy by 25% and reduced task completion time compared to GPT-based chatbots, as demonstrated in a user study with 32 participants.

Harvard University

Sep. 2019 – Aug. 2022

Master's Student & Research Assistant, MA, United States

Advisor: Prof. Elena Glassman

ParaLib: Developed ParaLib to show 150 concept-annotated code examples in parallel, facilitating library comparison and offering insights into library selections. I conducted a user study with 20 participants to evaluate ParaLib spanning Visualization and NLP domains. ParaLib improved developer confidence in library selection by 35% and reduced cognitive load.

ExampleNet: I created ExampleNet, an interface that visualizes 100 neural network architectures, extracted from 203 highly-starred GitHub projects using call graph analysis in Python AST, identifying 27 layer types and 9 key hyperparameters. The tool helped participants inspect three times more examples and make more diverse design choices in neural network design, as shown in a study with 16 participants.

Massachusetts Institute of Technology

Jun. 2020 – Apr. 2021

Research Assistant, MA, United States *Advisors: Prof. Michael Cafarella & Prof. Tim Kraska*

VisMeet: Developed VisMeet, an interactive video conferencing system designed to enhance meeting

participation and content comprehension through dynamic, real-time visualizations. VisMeet integrates transcript-based topic hierarchies, speaker contributions, and interactive summaries to provide users with better contextual understanding during meetings. I conducted a study with 39 MTurk participants, showing a 140% improvement in users' ability to recall meeting content.

Xiamen University

Undergrad Student, Fujian, China

Sep. 2015 – Jun. 2019

Advisors: Prof. Yixi Zhuang & Prof. Ye Luo

Thesis: I worked on predicting the thermodynamic stability of Co-V-Ti-Ta quaternary superalloys using machine learning models. By combining first-principles calculations and density functional theory (DFT), I automated the extraction of 6,219 possible atomic structures. These were used to train machine learning models to predict stability with high accuracy for previously uncalculated configurations. My research reduced the need for extensive first-principles computations while maintaining prediction accuracy, offering a more efficient approach to alloy design in high-temperature applications like aerospace engines and turbines.

Chip-Firing: I simulated the Abelian Sandpile Model, visualizing patterns of 10 million grains on an infinite graph grid. Innovatively, I integrated this model into a new stream cipher by replacing the LFSR and further applied it to study social networks and simulate dynamic systems.

Professional Experience

Research Intern

Apr. 2025 – Jul. 2025

Microsoft Research (PROSE Team), Redmond, WA (Remote) *Mentors: Emerson Murphy-Hill*
Designed and implemented **InvisibleMentor**, a novel VLM+LLM pipeline that observes spreadsheet screen recordings to infer user actions and recommend better workflows. Achieved 90.5% accuracy on 25 Excel sessions (14 action types), and led a 20-participant user study showing that InvisibleMentor's suggestions were significantly more actionable and tailored than Excel Copilot.

Intern for Sports Data and Interface Design

Oct. 2016 – Dec. 2018

GenGee Sport Co., Ltd., Fujian, China

Advisor: Yelei Zhang (CTO)

I developed a real-time soccer performance analysis interface for the INSAIT K1 system, visualizing 16 performance metrics, including player fitness and tactical movements. The system reduced post-game analysis time by 27% for over 4,000 coaches and athletes, improving decision-making through data visualization.

Academic Service

2024: Reviewer, The ACM Symposium on User Interface Software and Technology (UIST)

2023: Reviewer, ACM Conference on Designing Interactive Systems (DIS)

2023, 2024, 2025: Reviewer, ACM Conference on Human Factors in Computing Systems (CHI)

Fall 2025: Teaching Assistant, CIS 4120/5120: Introduction to Human-Computer Interaction

Fall 2022: Teaching Assistant, CIS 3990: Introduction to Human-Computer Interaction

Invited Talks

Microsoft PROSE Team

Jun. 11, 2025

Answering Developer Questions with Annotated Agent-Discovered Program Traces

Microsoft Research Lab - Cambridge, HCI community talks

Oct. 2, 2024

Ivie: Lightweight Anchored Explanations of Just-Generated Code

CHI 2024	May 14, 2024
<i>Ivie: Lightweight Anchored Explanations of Just-Generated Code</i>	
GitHub Copilot teams	Jan. 12, 2024
<i>Ivie: Lightweight Anchored Explanations of Just-Generated Code</i>	
PhD Special Topics: Large Language Models & Programming Languages	Nov. 10, 2023
<i>Ivie: Lightweight Anchored Explanations of Just-Generated Code</i>	
UIST 2022	Nov. 1, 2022
<i>Concept-Labeled Examples for Library Comparison</i>	
CHI 2021	May 11, 2021
<i>Visualizing Examples of Deep Neural Networks at Scale</i>	