

Jingmei Hu

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EDUCATION

Ph.D. in Computer Science HARVARD UNIVERSITY Co-Advisors: Margo Seltzer (University of British Columbia), Stephen Chong (Harvard)	Aug 2016 - May 2022 Cambridge, MA
M.Sc. in Computer Science HARVARD UNIVERSITY Advisor: Margo Seltzer (University of British Columbia)	Aug 2016 - May 2018 Cambridge, MA
B.Sc in Computer Science SHANGHAI JIAO TONG UNIVERSITY (SJTU)	Sep 2012 - Jun 2016 Shanghai, China

PROFESSIONAL EXPERIENCE

Applied Scientist AMAZON, STORES SECURITY, AUTOMATED REASONING GROUP	Jul 2022 — Present Santa Clara, CA
<ul style="list-style-type: none">Design and build formal verification systems that continuously assess safety and security.Develop new formal verification methods and automated reasoning tools at scale.	
Applied Scientist Intern AWS AUTOMATED REASONING GROUP, AMAZON	May 2021 — Aug 2021 (Remote) Boston, MA
<ul style="list-style-type: none">Utilized the mutation testing information to analyze the behaviors of test cases with JUnit framework.Developed a toolchain to automatically generate test assertions to increase mutation coverage and improve test suite quality.	
Applied Scientist Intern AWS AUTOMATED REASONING GROUP, AMAZON	Sep 2020 — Dec 2020 (Remote) Boston, MA
<ul style="list-style-type: none">Proposed an SMT-native lookahead-based approach for parallel SMT solving on program verification with string theories.Deployed the divide-and-conquer methodology, built a distributed solver with AWS cloud services and achieved orders-of-magnitude performance improvement on string-theory verification.	
Research Intern SYSTEMS RESEARCH GROUP, MICROSOFT RESEARCH	Jun 2020 — Aug 2020 (Remote) Redmond, WA
<ul style="list-style-type: none">Explored and compared different approaches to integer reasoning for SMT-based verification.	

PUBLICATIONS

Parallel Assembly Synthesis INTERNATIONAL SYMPOSIUM ON LOGIC-BASED PROGRAM SYNTHESIS AND TRANSFORMATION (2024) Hu, J., Chong, S. and Seltzer, M.I.	LOPSTR
Towards Porting Operating Systems with Program Synthesis ACM TRANSACTIONS ON PROGRAMMING LANGUAGES AND SYSTEMS (2022) Hu, J., Lu, E., Holland, D.A., Kawaguchi, M., Chong, S. and Seltzer, M.I.	TOPLAS
Assuage: Assembly Synthesis Using A Guided Exploration ACM SYMPOSIUM ON USER INTERFACE SOFTWARE AND TECHNOLOGY Hu, J., Vaithilingam, P., Chong, S., Seltzer, M.I., Glassman, E.L.	UIST'21
Improving Data Scientist Efficiency with Provenance ACM/IEEE INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING Hu, J., Joung, J., Jacobs, M., Seltzer, M.I., Gajos, K.	ICSE'20
ProvBuild: Improving Data Scientist Efficiency with Provenance (An Extended Abstract) ACM/IEEE INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING: COMPANION PROCEEDINGS Hu, J., Joung, J., Jacobs, M., Seltzer, M.I., Gajos, K.	ICSE'20

Trials and Tribulations in Synthesizing Operating Systems

PLOS'19

WORKSHOP ON PROGRAMMING LANGUAGES AND OPERATING SYSTEMS

Hu, J., Lu, E., Holland, D.A., Kawaguchi, M., Chong, S. and Seltzer, M.I.

Shakein: Secure user authentication of smartphones with single-handed shakes

TMC

IEEE TRANSACTIONS ON MOBILE COMPUTING (2017)

Zhu, H., Hu, J., Chang, S. and Lu, L.

Aquarium: Cassiopea and Alewife Languages

TECHNICAL REPORT (2019)

Holland, D.A., Hu, J., Kawaguchi, M., Lu, E., Chong, S. and Seltzer, M.I.

PATENTS

US Patent - No. 11861409

Jan.2, 2024

DISTRIBUTED DECOMPOSITION OF STRING - AUTOMATED REASONING USING PREDICATES

Noetzli, A., Hu, J., Cook, J., Rungta, N.

RESEARCH EXPERIENCE

Assembly Synthesis with Parallelism

2021 - 2022

GRADUATE RESEARCH ASSISTANT

Harvard University

Advised by Prof. Stephen Chong, Prof. Margo Seltzer

- Designed a framework for automated parallel synthesis via search space reductions.
- Designed a parallel assembly synthesis system and evaluated with various general assembly programming problems, showing its scalability improvement on assembly synthesis.

Assembly Synthesis Using A Guided Exploration

2020 - 2021

GRADUATE RESEARCH ASSISTANT

Harvard University

Advised by Prof. Stephen Chong, Prof. Margo Seltzer and Prof. Elena Glassman

- Developed an interactive assembly synthesizer, *Assuage*, that allows the user and the synthesizer to collaboratively search a large space of assembly programs and generate the correct specification-satisfying program.
- Conducted a controlled laboratory study with 21 participants with a wide range of expertise to evaluate the usefulness and usability of *Assuage*.

Porting Operating Systems with Code Synthesis

2018 - 2020

GRADUATE RESEARCH ASSISTANT

Harvard University

Advised by Prof. Stephen Chong and Prof. Margo Seltzer, cooperated with Eric Lu, David Holland and Ming Kawaguchi

- Designed two domain specific languages: *Alewife*, a language for specification of Operating Systems functionality, and *Cassiopea*, a register transfer language style machine description language.
- Implemented a compiler in OCaml and a synthesis engine that takes a machine description and a specification instance, and produces an assembly program using satisfiability-modulo-theories (SMT) solvers.
- Developed usecases from preexisting operating systems to demonstrate the expressivity and usability.

Improving Data Scientist Efficiency with Provenance

2017 - 2018

GRADUATE RESEARCH ASSISTANT

Harvard University

Advised by Prof. Margo Seltzer and Prof. Krzysztof Gajos

- Developed a data analysis environment called *ProvBuild* that leverages language-level provenance to track dependencies in a script and uses change impact analysis to reduce the iterative editing process time in script-based workflow pipelines.
- Conducted a quantitative experiment, a controlled laboratory study and a real-world deployment study to evaluate *ProvBuild*'s performance, effectiveness, and usability.

Smartphone User Authentication Scheme Based on Customized Shakes

2014 - 2015

UNDERGRADUATE RESEARCH ASSISTANT

Shanghai Jiao Tong University

Advised by Prof. Hongzi Zhu

- Characterized single-handed shaking behavior based on sensory data with biometrical features and devised a training-authentication machine learning methodology for Android-based smartphones.
- Reduced equal error rate to 1.2% and achieved resilience under shoulder-surfing attacks in various working conditions.

SKILLS

Programming Languages (advanced) Python, Objective Caml (OCaml), Java, HTML/CSS/JavaScript, C/C++
(intermediate) Assembly Languages, SQL, MATLAB

Research skills familiar with cloud services (AWS) and common testing techniques
familiar with human interaction related research

HONORS, AWARDS, AND SERVICES

ACM-W Scholarship	2020
National Scholarship (China) (Top 1% in SJTU)	2013
Secretary, Harvard Chinese Student and Scholar Association	Jun. 2019 - Apr. 2020
Teaching Fellow, COMPSCI 61 Systems Programming and Machine Organization	Fall 2017