Yoshiki Takashima

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RESEARCH INTEREST

My recent works focus on automated legal reasoning as well as enhancing correctness of Rust programs by leveraging Large-Language Models and Program Synthesis.

EMPLOYMENT

Postdoctoral Associate, Yale Law School — May 2024

· Developing automated legal reasoning for AI: https://news.yale.edu/2024/03/25/ais-legal-revolution

Applied Scientist Intern (Automated Reasoning), Amazon Web Services — Summer 2023

· Developed an LLM-based universal transpiler into Rust that guarantees correct translation by equivalence-checking the candidate translation against a Web Assembly-based trusted oracle.

Applied Scientist Intern (Automated Reasoning), Amazon Web Services — Summer 2022

· Developed PropProof, a library that automatically converts Property-Based Tests into model-checking by replacing random values with optimized symbolic models. Integrated it into GitHub CI of AWS open source project `PROST`.

EDUCATION

Carnegie Mellon University — Aug. 2019 - Mar. 2024

Ph.D. in Electrical and Computer Engineering — *Pittsburgh, PA*

· Co-Advised by: Prof. Limin Jia and Prof. Corina Păsăreanu.

· Thesis: *Testing and Verifying Rust's Next Mile.*

UC San Diego — Sept. 2017 - Jun. 2019

BS Mathematics - Comp. Sci. (MA30) — *La Jolla, CA*

· GPA 3.95/4.00. Credits transferred from Santa Monica College and West Los Angeles College.

PUBLICATIONS

Scheherazade: Evaluating Chain-of-Thought Math Reasoning in LLMs with Chain-of-Problems
Stephen Miner, **Yoshiki Takashima***, Simeng Han, Sam Kouteili, Ferhat Erata, Ruzica Piskac, Scott J. Shapiro.*

VERT: Verified Equivalent Rust Transpilation with Large Language Models
Aidan Yang*, **Yoshiki Takashima*** *, Brandon Paulsen, Joey Dodds, Daniel Kroening*

*Equal Contribution

Crabtree: Rust API Test Synthesis Guided by Coverage and Type
Yoshiki Takashima *, Chanhee Cho, Ruben Martins, Limin Jia, Corina S. Păsăreanu.* — *OOPSLA'24*

Automatically Enforcing Rust Trait Properties
Twain Byrnes, **Yoshiki Takashima** *, Limin Jia.* — *VMCAI'24*

PropProof: Free Model-Checking Harnesses from PBT
Yoshiki Takashima *.* — *ESEC/FSE'23*

https://github.com/YoshikiTakashima/propproof

Mariposa: Measuring SMT Instability in Automated Program Verification
*Yi Zhou, Jay Bosamiya, **Yoshiki Takashima**, Jessica Li, Marijn Heule, Bryan Parno.*   *FMCAD'23*

SyRust: Automatic Testing of Rust Libraries with Semantic-Aware Program Synthesis
***Yoshiki Takashima**, Ruben Martins, Limin Jia, and Corina S. Păsăreanu.*   *PLDI'21*

Paper and video available here: https://doi.org/10.1145/3453483.3454084. Discovered bugs lead to CVE-2020-15254

VeriSketch: Synthesizing Secure Hardware Designs with Timing-Sensitive Information Flow Properties
*Armaiti Ardeshiricham, **Yoshiki Takashima (presenter)**, Sicun Gao, Ryan Kastner.*   *CCS'19*

Paper and artifact: https://doi.org/10.1145/3319535.3354246

AWARDS AND FELLOWSHIPS

Amazon Research Award 2022: Enabling One-Line Rust Verification with Program Synthesis

· Written with advisors Limin Jia and Corina Păsăreanu.

CMU ECE Prabhu and Poonam Goel Graduate Fellowship $2021 - 2022$

· Internal fellowship awarded by the CMU Electrical and Computer Engineering Department.

TEACHING AND SERVICE

Teaching Assistant for CMU 18-636 (Web Security)   Fall 2023
Professor: Limin Jia

· Topics: Cross-Site Scripting, Request Forgery, browser policy.

Teaching Assistant for CMU 18-732 (Software Security)   Spring 2021
Professor: Bryan Parno

· Topics: Control-Flow Integrity, Software Fault Isolation, Fuzzing, Model-Checking, Formal Verification.

Artifact Evaluation for VMCAI 2021   October 2020

· Evaluated 4 artifacts for the VMCAI (Verification, Model Checking, and Abstract Interpretation) 2021.

Student Volunteer for CSF 2020   June 2020

· Helped manage virtual conferencing for CSF (Computer Security Foundations Symposium) 2020.

SKILLS

· Programming Language: Rust, SQL, Python, R, Java, Dafny, C, C++, Scala, OCaml.
· Operating System: Linux, Mac.
· Document Writing: LaTeX, Microsoft Word, HTML.
· Human Language: Fluent in English and Japanese.