

Yoshiki Takashima

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RESEARCH INTEREST

I help developers build more robust software by leveraging automated, language-aware solutions for software testing and verification. My recent works focus on testing and verifying Rust programs by leveraging Large-Language Models and Program Synthesis.

EDUCATION

Carnegie Mellon University 2019– Present
PhD Student in Electrical and Computer Engineering Pittsburgh, PA

- Co-Advised by: Prof. Limin Jia and Prof. Corina Păsăreanu.
- Proposed Thesis: *Testing and Verifying Rust's Next Mile*. Expected Apr. 2024.

UC San Diego 2017 – 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.

EMPLOYMENT

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.

PUBLICATIONS

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

VERT: Verified Equivalent Rust Transpilation with Large Language Models
Aidan Yang, Yoshiki Takashima*, Brandon Paulsen, Joey Dodds, Daniel Kroening* Under Submission: FSE'24

*Equal Contribution

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 Industry Track

<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

Armiti Ardeshtiricham, *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.