

YUSUKE MATSUSHITA

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<https://shiatsumat.github.io>

I am a researcher of software science. I primarily study **formal verification of stateful programs**, especially those written in **Rust**.

PUBLICATIONS

ACM PLDI 2022 — **Yusuke Matsushita**, Xavier Denis, Jacques-Henri Jourdan and Derek Dreyer.

RustHornBelt: A Semantic Foundation for Functional Verification of Rust Programs with Unsafe Code.

Distinguished Paper Award. <https://dl.acm.org/doi/10.1145/3519939.3523704>

ACM TOPLAS 2021 — **Yusuke Matsushita**, Takeshi Tsukada and Naoki Kobayashi. **RustHorn: CHC-based Verification for Rust Programs.** <https://dl.acm.org/doi/10.1145/3462205>

ESOP 2020 — **Yusuke Matsushita**, Takeshi Tsukada and Naoki Kobayashi. **RustHorn: CHC-based Verification for Rust Programs. Selected for the Special Issue of ACM TOPLAS.** https://link.springer.com/chapter/10.1007/978-3-030-44914-8_18

VMCAI 2024 — Takashi Nakayama, **Yusuke Matsushita**, Ken Sakayori, Ryosuke Sato and Naoki Kobayashi. Borrowable Fractional Ownership Types for Verification. https://doi.org/10.1007/978-3-031-50521-8_11

Ph.D. Thesis, 2024 — **Yusuke Matsushita**. Non-Step-Indexed Separation Logic with Invariants and Rust-Style Borrows. University of Tokyo, 2024. <http://www.kb.is.s.u-tokyo.ac.jp/~yskm24t/papers/phd-thesis.pdf>

Master Thesis, 2021 — **Yusuke Matsushita**. Extensible Functional-Correctness Verification of Rust Programs by the Technique of Prophecy. University of Tokyo, 2021. Precursor of RustHornBelt. <http://www.kb.is.s.u-tokyo.ac.jp/~yskm24t/papers/masters-thesis.pdf>

Senior Thesis, 2019 — **Yusuke Matsushita**. CHC-based Program Verification Exploiting Ownership Types. University of Tokyo, 2019. Precursor of RustHorn. <http://www.kb.is.s.u-tokyo.ac.jp/~yskm24t/papers/senior-thesis.pdf>

HONORS & AWARDS

2022 — **Distinguished Paper Award** at ACM PLDI 2022

2020 — Selected for **ACM TOPLAS, ESOP 2020 Special Issue**

2018 — Sub-leader of Japan's special team for the **International Olympiad in Informatics 2018**

2013 & 2012 — Finalist in the **Japanese Olympiad in Informatics 2013 & 2012**

2013 — Quarter-finalist in the **National High School English Debate Tournament 2013**

GRANTS

Apr 2024 - Mar 2027 — **JSPS Research Fellowship for Young Scientists PD** “Foundation and Practice for Robust and High-Performance Systems Software”

Apr 2021 - Mar 2024 — **JSPS Research Fellowship for Young Scientists DC1** “Theory and Application for Robust and High-Performance Systems Programming Languages”

UTokyo Science News 2022 — Breaking Ground in the World of Software. News from Faculty of Science, the University of Tokyo, Vol. 54, No. 1, 2022. https://dl5s7ayfvssw3.cloudfront.net/WEB_info/pub/8311/54-1.pdf#page=7

TALKS

PPL Summer School 2024, Invited Lecture — The World of Separation Logic Iris. <http://ppl.jssst.or.jp/index.php?ss2024>

PRO-2024-1, Invited Talk — New Perspectives on Program Verification and Testing Spreading from Rust.

UTokyo Open Campus 2023 — Science of Software, Aspiring to a World Free of Bugs. Open Campus 2023, the Faculty of Science, the University of Tokyo. With Takashi Nakayama. <https://www.youtube.com/watch?v=DDdEtx05dZ4>

ACM PLDI 2022 — RustHornBelt: A Semantic Foundation for Functional Verification of Rust Programs with Unsafe Code. With Xavier Denis. <https://www.youtube.com/watch?v=pOg4dEhr5hI>

ESOP 2020 — RustHorn: CHC-based Verification for Rust Programs.

JSSST 2020, Invited Talk — RustHorn: CHC-based Verification for Rust Programs. https://www.youtube.com/watch?v=Ah_Bds6I_YI

PPL 2020 — RustHorn: CHC-based Verification for Rust Programs.

PPL 2019 — CHC-based Program Verification Exploiting Ownership Types.

WORK

Apr 2024 - Now — JSPS Fellow (PD) at **Atsushi Igarashi & Kohei Suenaga's Lab, Kyoto University**

SERVICE

Jan 2025 - Mar 2025 — Program committee member of **PPL 2025**.

SKILLS

Languages: Japanese (Native speaker), English (Advanced, EIKEN Grade 1, TOEFL iBT 92)

Programming: C/C++, Rust, Coq, OCaml, Haskell, TypeScript, ...

EDUCATION

Apr 2021 - Mar 2024 — **Ph.D., Computer Science**

Apr 2019 - Mar 2021 — M.S., Computer Science

Apr 2015 - Mar 2019 — B.S., Information Science

University of Tokyo, Japan. Supervised by **Naoki Kobayashi**.

Apr 2009 - Mar 2015 — **Nada High School**

EXPERIENCE

Aug 2024 — Lecturer of S15 **Rust Program Verification Seminar** at **IPA Security Camp 2024**.

Nov 2022 - Feb 2023 — **Software Engineer Intern** at **ChromeOS** Velocity Team, **Google Tokyo**.

Sept 2020 - July 2021 — **Research Intern** at the **RustBelt** team, led by Derek Dreyer, at **Max Planck Institute for Software Systems**.

Aug 2019 - Jan 2020 — **Software Engineer Intern** at **CADDi**, a startup in Japan that builds a digital marketplace for manufacturing. Interview article: https://www.wantedly.com/companies/caddi/post_articles/200577

Mar 2017 - Mar 2019 — **Research Intern** at **Morishita Lab**, a lab studying human genome informatics, in Dept. of Computational Biology and Medical Sciences, Grad School of Frontier Science, University of Tokyo.

Dec 2015 - Dec 2016 — **President** of **UTokyo Piano Society**, a piano club of ~200 members.