

# 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](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](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”

## ARTICLES

**ISPJ 2024** — Non-Step-Indexed Separation Logic with Invariants and Rust-Style Borrows. Group-Recommended Ph.D. Theses Express by Information Processing Society of Japan. Aug 15, 2024.

<https://note.com/ipsj/n/nc0ae275045eb>

**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/p/pub/8311/54-1.pdf#page=7](https://dl5s7ayfvssw3.cloudfront.net/WEB_info/p/pub/8311/54-1.pdf#page=7)

## TALKS

**PPL Summer School 2024, Invited Lecture** — The World of Separation Logic Iris. <http://ppl.jsst.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](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](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.