

# YUSUKE MATSUSHITA

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<https://shiatsumat.github.io>

I am a software scientist, specializing in **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.**  
ACM PLDI 2022, **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.** ACM TOPLAS 2021. Extended and revised version of the ESOP 2020 paper. <https://dl.acm.org/doi/10.1145/3462205>

**ESOP 2020** — **Yusuke Matsushita**, Takeshi Tsukada and Naoki Kobayashi. **RustHorn: CHC-based Verification for Rust Programs.** ESOP 2020. **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)

**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**

## GRANT

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

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

**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

**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=DDdEtxO5dZ4>

**ACM PLDI 2022** — RustHornBelt: A Semantic Foundation for Functional Verification of Rust Programs with Unsafe Code. With Xavier Denis. ACM PLDI 2022.

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

**Invited talk, JSSST 2020** — RustHorn: CHC-based Verification for Rust Programs. **Invited Talk** at JSSST 2020.

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

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

## WORK

**Apr 2024 - Now** — Postdoc (under JSPS’s Fellowship PD) at **Atsushi Igarashi & Kohei Suenaga’s Lab, Kyoto University**, Japan.

## 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**

## SKILLS

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

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

## EXPERIENCE

**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**, Germany

**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, UTokyo, Japan

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