# BRETT SAIKI

Graduate Student ~ Research Assistant

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## SUMMARY

Graduate student doing research in programming languages, computer number systems, and term rewriting; obsessed with all things floating-point in both software and hardware.

**Languages:** C, C++, Racket, Rust, Java, Python
**Interests:** Programming Languages, Floating-point, Numerics, Verification

## EDUCATION

**University of Washington** | *Paul G. Allen School of Computer Science and Engineering* — Sep. 2023 — Present
M.S. Computer Science and Engineering — Seattle, WA

**University of Washington** | *Paul G. Allen School of Computer Science and Engineering* — Aug. 2019 — Jun. 2023
B.S. Computer Engineering, B.A. Mathematics — Seattle, WA

## EXPERIENCE

**University of Washington** | Seattle, WA — Sep. 2023 — Present
Research Assistant
- developing tools and libraries for floating-point accuracy optimization and term rewriting
- collaborating with undergraduate students, graduate students, and professors

**Intel Corporation** | Folsom, CA — Jun. 2023 — Sep. 2023
Mathematical Hardware Intern — Jun. 2022 — Sep. 2022
- developed compilers for translating numerical specifications, libraries for formally verifying hardware designs, and visualization tools for simulating numerical algorithms
- improved high-level graphics hardware algorithms

**University of Washington** | Seattle, WA — Sep. 2022 — Jun. 2023
Undergraduate Research Assistant — Dec. 2019 — Jun. 2022
- developed tools and libraries for floating-point accuracy optimization and term rewriting
- collaborated with graduate students, professors, and industrial groups

**University Enterprises Inc.** | Santa Ana, CA — Jun. 2019 — Aug. 2019
*Contracted by State Compensation Insurance Fund (SCIF)*
Summer Intern
- learned lifecycle of a worker's compensation insurance claim
- indexed digital documents, digitized physical claims, contacted medical providers for work status updates

## PUBLICATIONS

**Equality Saturation Theory Exploration à la Carte**
*Object-Oriented Programming, Systems, Languages and Applications (OOPSLA) 2023*
Anjali Pal, Brett Saiki, Ryan Tjoa, Cynthia Richey, Amy Zhu, Oliver Flatt, Max Willsey, Zachary Tatlock, Chandrakana Nandi

**Odyssey: An Interactive Workbench for Expert-Driven Floating-Point Expression Rewriting**
*ACM Symposium on User Interface Software and Technology (UIST) 2023*
Edward Misback, Caleb C. Chan, Brett Saiki, Eunice Jun, Zachary Tatlock, Pavel Panchekha

**Rewrite Rule Inference Using Equality Saturation** | *Distinguished Paper Award*
*Object-Oriented Programming, Systems, Languages and Applications (OOPSLA) 2021*
Chandrakana Nandi, Max Willsey, Amy Zhu, Brett Saiki, Yisu Wang, Adam Anderson, Adriana Schulz, Dan Grossman, Zachary Tatlock

**Combining Precision Tuning and Rewriting**
*IEEE International Symposium on Computer Arithmetic (ARITH) 2021*
Brett Saiki, Oliver Flatt, Chandrakana Nandi, Pavel Panchekha, Zachary Tatlock

## RESEARCH

**FPBench** | Project
FPCore tools, compilers, benchmarks
*NSV 2016*

**Herbie** | Project
Floating-point accuracy improver
*PLDI 2015, ARITH 2021, UIST 2023*

**Ruler** | Project
Rewrite rule synthesizer for equality-saturation applications
*OOPSLA 2021, OOPSLA 2023*

## PROJECTS

**Minim** | Project
Scheme interpreter written in C

**mpmfnum** | Project | Docs
Number systems library in Rust

**generic-flonum** | Project | Docs
Alternate MPFR interface in Racket with subnormalization and exponent bounds