

Chris Johannsen

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Education

- Iowa State University**, Ph.D. in Computer Science 2022 - Present
GPA: 4.0, Advisor: Kristin Y. Rozier
- Iowa State University**, B.S. in Computer Engineering and Philosophy 2017 - 2021
GPA: 3.92, *Summa Cum Laude*

Employment

- 1/18 - Now **Research Assistant**, *Iowa State University, Laboratory for Temporal Logic*
▷ Developed new compiler, custom specification language, and various encoding optimizations for R2U2, a runtime verification tool designed for real-time safety critical systems.
▷ Led the OpenUAS undergraduate research team in developing an open source fixed-wing UAS.
- 5/23 - 8/23 **Formal Verification Intern**, *Siemens EDA (fmr. Mentor Graphics)*
5/21 - 8/21 ▷ Developed optimization for ordering of solver queries inside a hardware HLS product.
▷ Implemented abstract interpretation engine for SystemC models.
- 5/22 - 8/22 **Computer Science Laboratory Intern**, *SRI International*
▷ Assisted in design and implementation of an NSF-funded community-driven model-checking intermediate language (IL).
▷ Contributed to a formally verified translation from IL to a low-level model-checking language in the PVS theorem prover.
- 6/20 - 8/20 **Embedded Software Engineering Intern**, *Motorola Solutions Applied Technologies*
▷ Developed software for a localized wireless network in a military context.
- 6/19 - 12/19 **Platform Systems Engineering Co-op**, *Collins Aerospace*
▷ Assisted with avionics updates and testing for aircraft including E-3 Sentry/AWACS and C-130.

Projects

- ▷ **R2U2 Framework**: Realizable Responsive Unobtrusive Unit, a lightweight runtime verification engine. Wrote its compiler, C2PO. [[Website](#)]
- ▷ **SLEC**: Sequential Logic Equivalence Checking. Implemented abstract interpretation engine and improved coverage analysis. [[Website](#)]
- ▷ **SMART**: Stochastic Model-checking Analyzer for Reliability and Timing. Worked on CTL model checking engine. [[Website](#)]

Grants and Scholarships

- ▷ **Scholarship for Attendance at FMCAD 2023**
- ▷ **Travel Scholarship for Verification Mentor Workshop 2023**
Part of CAV 2023.
- ▷ **NASA Cooperative Agreement for advancing the R2U2 statement of work**
2022: \$83,761, Fall 2021: \$31,991, Spring 2021: \$27,742
- ▷ **Iowa State University REU Winter 2020 Session**
Funded for research at Laboratory for Temporal Logic, 2020, \$3,000

- ▷ **Iowa Space Grant Consortium NASA STEM grant**
Awarded to OpenUAS Project as Project Lead, 2020-2021, \$4,203
- ▷ **Award for Competitive Excellence**, Iowa State University
Applied to B.S., 2017-2021, \$32,000
- ▷ **Dennis Muilenburg Scholarship**, Iowa State University
Applied to B.S., 2017-2021, \$16,000

Awards and Honors

- ▷ **Outstanding Senior in Engineering**, Iowa State University, 2021
Awarded to top student in each undergraduate engineering major [[Link](#)]
- ▷ **Phi Beta Kappa**, Member, 2021

Publications

- ▷ Chris Johannsen, Brian Kempa, Phillip H Jones, Kristin Y Rozier, and Tichakorn Wongpiromsarn. Impossible Made Possible: Encoding Intractable Specifications via Implied Domain Constraints. In *International Conference on Formal Methods for Industrial Critical Systems*, pages 151–169. Springer, 2023
- ▷ Chris Johannsen, Phillip Jones, Brian Kempa, Krisitin Yvonne Rozier, and Pei Zhang. R2U2 Version 3.0: Re-imagining a Toolchain for Specification, Resource Estimation, and Optimized Observer Generation for Runtime Verification in Hardware and Software. In *International Conference on Computer Aided Verification (CAV), Paris, France, July 17-22, 2023*, 2023
- ▷ Brian Kempa, Christopher Johannsen, and Kristin Yvonne Rozier. Improving Usability and Trust in Real-Time Verification of a Large-Scale Complex Safety-Critical System. *Ada user journal*, 43(3), 2022
- ▷ Chris Johannsen, Marcella Anderson, William Burken, Ellie Diersen, John Edgren, Colton Glick, Stephanie Jou, Adhyaksh Kumar, John Levandowski, Evelyn Moyer, Taylor Roquet, Alexander VandeLoo, and Kristin Yvonne Rozier. OpenUAS Version 1.0. In *2021 International Conference on Unmanned Aircraft Systems (ICUAS)*, pages 1449–1458, 2021

Technical Talks

- ▷ "C2PO Translates for R2U2: Making Specification More Practical", *Workshop Presentation*, Workshop on Spacecraft Flight Software, Feb. 2023.
- ▷ "SpaceBots: Boldly Going Where No Bots Have Gone Before", *Workshop Presentation*, Workshop on Spacecraft Flight Software, Feb. 2022.
- ▷ "Abstract Interpretation: An Introduction", *Guest Lecture*, COM S 507 - Applied Formal Methods, Iowa State University, Ames, IA, Oct 28, 2021.

Workshops and Training

- ▷ Verification Mentorship Workshop, 2023
- ▷ SRI International Twelfth Summer School on Formal Methods (SSFT), 2023 (Virtual)
- ▷ SRI International Eleventh Summer School on Formal Methods (SSFT), 2022
- ▷ Flight Software Workshop, 2022 (Virtual)

Teaching

- ▷ COM S 507: Applied Formal Methods (Co-Instructor), Fall 2023
- ▷ COM S 507: Applied Formal Methods (Grader), Fall 2019, Fall 2021
- ▷ AER E 361: Computational Techniques for Aerospace Design (Grader): Spring 2021
- ▷ PHIL 230: Moral Theory and Practice, (Grader): Fall 2021