Calvin Deutschbein (they/them)

CONTACT INFORMATION

Assistant Professor of Computer Science
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RESEARCH INTERESTS

Mining Secure Behavior of Hardware Designs: specification mining, data mining, machine learning, computer security, cybersecurity, hardware security, secure design, security validation, computer architecture hardware design languages (HDL), information flow tracking (IFT), logics of specification, register transfer level (RTL), instruction set architecture (ISA), hyperproperties, reduced instruction set computers (RISC), complex instruction set computers (CISC), x86, temporal logics, linear temporal logic (LTL)

ACADEMIC APPOINTMENTS

Assistant Professor of Computer Science, Willamette University — August 2021 to present
School of Computing & Information Sciences.

Adjunct Professor, Elon University — Spring 2020
Department of Computer Science

Instructor, The University of North Carolina at Chapel Hill — Summer 2018
Department of Computer Science

Research Scholar, Semiconductor Research Corporation — October 2018 to August 2021
SRC Research Scholars Program

EDUCATION

The University of North Carolina at Chapel Hill, Chapel Hill, NC

Ph.D., Computer Science, August 2021

- Thesis: *Mining Secure Behavior of Hardware Designs*
- Advisor: Cynthia Sturton
- Area: Hardware Security

M.S., Computer Science, August 2017

- Thesis: *Multi-core Cyclic Executives for Safety-Critical Systems*
- Advisor: Sanjoy Baruah
- Area: Real-Time Systems

The University of Chicago, Chicago, IL

B.S., Computer Science, March 2015

- Thesis: *Performance and Energy Limits of a Processor-integrated FFT Accelerator*
- Advisor: Andrew A. Chien
- Area: Computer Architecture

B.A., Mathematics, March 2015

REFEREED JOURNAL PUBLICATIONS

[1] C. Deutschbein, A. Meza, F. Restuccia, R. Kastner, C. Sturton. Toward Hardware Security Property Generation at Scale In: *IEEE Security & Privacy*, April 2022. doi:10.1007/s13389-022-00306-w

[2] R. Zhang, C. Deutschbein, P. Huang, C. Sturton. End-to-End Automated Exploit Generation for Processor Security Validation. *IEEE Design & Test Special Issue: Hardware Security Top Picks*. 2021.
doi:10.1109/MDAT.2021.3063314

[3] C. Deutschbein, T. Fleming, A. Burns, S. Baruah. Multi-core Cyclic Executives for Safety-Critical Systems. *Science of Computer Programming*, March 2019.
doi:10.1016/j.scico.2018.11.004

Refereed Conference Publications

[4] S. Aftabjahani, M. Tehranipoor, F. Farahmandi, Farimah, B. Ahmed, R. Kastner, F. Restuccia, A. Meza, K. Ryan, N. Fern, J. van Woudenberg, R. Velegalati, C. Breunesse, C. Sturton, C. Deutschbein. Promising Directions for Automation of Security Assurance. In: *Special Session: CAD for Hardware Security at 2023 IEEE 41st VLSI Test Symposium (VTS)*, June 2023.
doi:10.1109/VTS56346.2023.10140100

[5] C. Deutschbein, A. Meza, F. Restuccia, R. Kastner, C. Sturton. Isadora: Automated Information Flow Property Generation for Hardware Designs. In: *Proceedings of the 5th Workshop on Attacks and Solutions in Hardware Security (ASHES)*, November 2021.
doi:10.1145/3474376.3487286

[6] C. Deutschbein, C. Sturton. Evaluating Security Specification Mining for a CISC Architecture. In: *Proceedings of the IEEE International Symposium on Hardware Oriented Security and Trust (HOST)*, December 2020.
doi:10.1109/HOST45689.2020.9300291

[7] R. Zhang, C. Deutschbein, P. Huang, C. Sturton. End-to-End Automated Exploit Generation for Processor Security Validation. In: *MICRO-51: Proceedings of the 51st Annual IEEE/ACM International Symposium on Microarchitecture*, October 2018.
doi:10.1109/MICRO.2018.00071

[8] C. Deutschbein, T. Fleming, A. Burns, S. Baruah. Multi-core Cyclic Executives for Safety-Critical Systems. In: *Proceedings of the Third International Symposium on Dependable Software Engineering: Theories, Repositorys, and Applications, SETTA 2017*, October 2017.
doi:10.1016/j.scico.2018.11.004

[9] C. Deutschbein, S. Baruah. Preemptive Uniprocessor EDF Schedulability Analysis with Preemption Costs Considered. In: *Proceedings of the 2016 IEEE Real-Time Systems Symposium (RTSS)*, November 2016.
doi:10.1109/RTSS.2016.047

[10] T. Thanh-Hoang, A. Shambayati, C. Deutschbein, H. Hoffmann, A. A. Chien Performance and energy limits of a processor-integrated FFT accelerator. In: *Proceedings of the 2014 IEEE High Performance Extreme Computing Conference (HPEC)*, September 2014.
doi:10.1109/HPEC.2014.7040951

Invited Talks

[11] "Who ya gonna call?": Cybersecurity for the Spectre Era. Pacific University Mathematics, Computer Science, and Data Science Colloquium. 17 November, 2022.

[12] Isadora: Automated Information Flow Property Generation for Hardware Designs. 3rd Annual INTEL Side Channel Academic Program Workshop 2021. 11 November 2021.

[13] Isadora: Automated Information Flow Property Generation for Hardware Designs. Workshop on Secure RISC-V Architecture Design (secrisc-v'21). 7 November 2021.

[14] Creating Information Flow Specifications. Radix Presentation for Tortuga Logic. 20 August 2021.

[15] Extracting IF specifications from HW designs. University of Illinois–Urbana Champaign 20 July, 2021.

[16] "Who ya gonna call?": Cybersecurity for the Spectre Era. California State University Northridge Virtual Research Presentations: Computer Science and Cyber Security. 22 March, 2021.

Chair Service

- Session Chair (Posters), Consortium for Computing Sciences in Colleges Northwestern Region (CCSC-NW 2024).
- Chair, Title III Grant Quantitative Reasoning (QR) Summer Learning Circles, Inquiry-Based Learning for Equity
- Session Chair (Posters), Consortium for Computing Sciences in Colleges Northwestern Region (CCSC-NW 2023).
- Session Chair (Coding and Automaton), Northwest Scientific Association-American Association for the Advancement of Science Pacific Divison 2023

Program Committee Service

- Consortium for Computing Sciences in Colleges Northwestern Region (CCSC-NW 2024). https://www.ccsc.org/northwest/2024/committee.html
- Hardware and Architectural Support for Security and Privacy (HASP 2024), co-located with MICRO 2024. https://haspworkshop.org/2024/committee.html
- Consortium for Computing Sciences in Colleges Northwestern Region (CCSC-NW 2023). https://www.ccsc.org/northwest/2023/committee.html
- Hardware and Architectural Support for Security and Privacy (HASP 2023), co-located with MICRO 2023. https://haspworkshop.org/2023/committee.html
- Real-time And intelliGent Edge computing workshop (RAGE 2023), co-located with CPS-IoT Week 2023. https://rage-workshop.github.io/2023/organizers/
- Hardware and Architectural Support for Security and Privacy (HASP 2022), co-located with MICRO 2022. https://haspworkshop.org/2022/committee.html
- Sixth Workshop on Attacks and Solutions in Hardware Security (ASHES 2022), co-located with ACM CCS 2022. http://ashesworkshop.org/committees-2022

Research Tools

- Aphrodite. Willamette University. https://github.com/wu-jldeyoung/Aphrodite
- Isadora. HyperFloGen. https://github.com/cd-public/Isadora
- Astarte. HW Security @ UNC. https://github.com/cd-public/Astarte
- Undine. HW Security @ UNC. https://github.com/cd-public/Undine
- Coppelia. HW Security @ UNC. https://github.com/rzhang2285/Coppelia

Teaching Materials

- chiTCP. The UChicago χ-Projects. http://chi.cs.uchicago.edu/about.html

Professional Development

- Chair, Title III Grant Quantitative Reasoning (QR) Summer Learning Circles, Inquiry-Based Learning for Equity
- Member, Title III Grant Quantitative Reasoning (QR) Summer Learning Circles, Data Deep Dive into BIPOC Representation in Computing and Data Science