

Christopher Wright

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PROFESSIONAL SKILLS PROFILE

C Programming	Parallel Programming	Java Programming
C++ Programming	–OpenMP, MPI, CUDA, TBB	MATLAB Programming
Python Programming	Reverse Engineering/Ghidra	Linux
Compiler Programming/LLVM	Embedded Programming	LaTeX

EDUCATION

Purdue University

Doctor of Philosophy, Electrical and Computer Engineering

Masters of Science, Electrical and Computer Engineering

West Lafayette, IN

May 2021

May 2021

Utah Valley University

B.S. Cum Laude Computer Engineering Minor Computer Science

Orem, UT

May 2015

RESEARCH AND PROFESSIONAL EXPERIENCE

GrammaTech, Inc

Lead Software Engineer/Senior Research Scientist

Albuquerque, NM

June 2022-Present

- Obtaining funding through proposal writing and business partnerships
- Static and Dynamic analysis of firmware, using multiple tools for analysis and optimization passes, including LLVM, Clang, GTIRB, P-code
- Libmatch - Function matching for cross-compiler/architecture firmware to libraries using GTIRB IR.
- HALucinator - Leading development and deployment on HALucinator tool for sponsors. Added debugging in VSCode extensions and automation of the tool.
- Source-code and Binary Vulnerability Research. Zero Day bugs and Reverse Engineering firmware.

Sandia National Laboratory

Senior S&E R&D Cybersecurity

Albuquerque, NM

Apr 2021-July 2022

- Clang and LLVM passes to analyze software and firmware
- *GHALdra* - enables peripheral emulation interaction while performing emulation inside of Ghidra.
- PMatch function matching software for Ghidra
- HQ-Tracer software for QEMU tracing inside Ghidra
- HALucinator re-hosting support layer (VxWorks), intercept handling, architecture expansion and integration with QEMU, fast re-hosting and IDS on embedded systems and PLCs.
- Source-code and Binary Vulnerability Research. Zero Day bugs and Reverse Engineering firmware.
- Automated Binary Analysis and Reporting Framework

Graduate Scholar Researcher

May 2019-Apr 2021

- Static and Dynamic Analysis for System Emulation.
- Publication: **WRIGHT, C.**, MOEGLEIN, W., BAGCHI, S., KULKARNI, M., CLEMENTS, A. 2021. Challenges in Firmware Re-Hosting, Emulation, and Analysis. *ACM Comput. Surv.* 54, 1, Article 5 (January 2022).
- Publication: CLEMENTS, A., CARPENTER, L., MOEGLEIN, W., **WRIGHT, C.** Is Your Firmware Real or Re-Hosted? *BAR '21*

Facebook

Software Engineer Intern, Systems and Infrastructure (PhD)

Seattle, WA

August 2020-Nov 2020

- Using Numerical Analysis and the Polyhedral model to automatically analyze source code of millions of lines of C/C++ code (Angriru). The C/C++ equivalent of the open-source Zoncolan project.

- Integrating optimized ELINA polyhedral model into Facebook source code.
- Clang numerical inter- and intra-procedural analysis to specify relationships between variables in source, which is used for overflow analysis.
- Vulnerability Discovery and sink/source propagation for taint analysis used by security analysis experts.

Purdue University ECE Department

West Lafayette, IN

Research Assistant under Milind Kulkarni

August 2015-April 2021

- Emulating and re-hosting firmware for vulnerability discovery and analysis.
- Designing the grammar and language for SARVAID, a Domain Specific Language for bioinformatics. Optimizations using lex, yacc, C, C++, and LLVM.
- Implementing new genome assembly algorithm with a multi-k graph and single traversal. *Publication at AICoB '19. WRIGHT, C. KRISHNAMOORTY, S. KULKARNI, M.*
- Publication: MAHADIK, K., **WRIGHT, C.**, KULKARNI, M., BAGCHI, S. AND CHATERJI S. Scalable Genome Assembly through Parallel de-Bruijn Graph Construction for Multiple k-mers. Accepted to Nature Scientific Journal 2019.
- Publication: MAHADIK, K., **WRIGHT, C.**, KULKARNI, M., BAGCHI, S. AND CHATERJI, S. Scalable Genomic Assembly Through Parallel de Bruijn Graph Construction for Multiple K-mers. ACM-BCB '17: Proceedings of the 8th ACM International Conference on Bioinformatics, Computational Biology and Health Informatics.
- Publication: MAHADIK, K., **WRIGHT, C.**, ZHANG, J., KULKARNI, M., BAGCHI, S. AND CHATERJI, S. SARVAID: A Domain Specific Language for Developing Scalable Computational Genomics Applications. ICS '16: Proceedings Of The 30th ACM International Conference On Supercomputing.

Pacific Northwest National Laboratory

Richland, WA

Graduate Scholar Researcher

May 2018-August 2018

- Creating a new genome assembly technique and algorithm. *Paper AICoB '19.*
- Using PNNL supercomputers, distributed computing, parallel computing

Lawrence Livermore National Laboratory

Livermore, CA

Graduate Scholar Researcher

May 2016-August 2016

- Statically analyzing programs using LLVM pass to determine the communication pattern of MPI programs.

Utah Valley University CE/CS Department

Orem, UT

Research Assistant under Afsaneh Minaie & Reza Kamali

August 2012 - July 2015

- Implemented multi-threaded virtual machine and compiler for an object-oriented language from scratch.
- Designed and developed a prototype electronic tape measure that was powered and communicated over the audio jack of a mobile device (iPhone 6).
- Wrote the MUSIC (Multiple Signal Classification) algorithm to determine the direction of an incoming signal on an Arduino board using MATLAB and the C programming language.

TEACHING EXPERIENCE

Purdue University ECE Department

West Lafayette, IN

Instructor/Teaching Assistant

August 2016 – Present

- Instructor during Summer 2017 for ECE368 – Data Structures and Algorithms. Created syllabus and organized/presented material for lectures. Created programming assignments and tests. Rated 4.5/5 and 4.7/5 in student course evaluations.
- Teaching assistant for ECE468/ECE573 Compiler and ECE368 Data Structures and Algorithms courses.

Utah Valley University CE/CS Department

Orem, UT

Teaching Assistant & Tutor

August 2012 - July 2015

- Teaching Assistant and Tutor for Digital Design, C#/C++ Programming, Data Structures, Computer Architecture, Embedded Systems 1, Embedded Systems 2, Electronic Systems, Discrete Mathematics, Circuit Theory, Signals and Systems, Digital Signal Processing, High Performance Computer Architecture, Compilers, Calculus 1, Calculus 2, Calculus 3, Ordinary Differential Equations, Linear Algebra.

SOCIETIES/MEMBERSHIPS

IEEE (2013-Present)

ACM (2015-Present)

Eta Kappa Nu (2015-Present)