

MICHAEL SANDBORN

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EDUCATION

Vanderbilt University

Ph.D. Computer Science, Russel G. Hamilton Scholar

Advisors: [Jules White](#), [Kevin Leach](#)

Expected Fall 2024

Cumulative GPA: 4.0/4.0

Research focus: Cyber-physical Systems, Computer Security

Vanderbilt University

B.S. Computer Science, B.S. Applied Mathematics

August 2016 - December 2019

Cumulative GPA: 3.5/4.0

Selected Courses: Algorithms, Computer Networks, Cryptography, Deep Learning, Formal Verification, Operating Systems, Natural Language Processing, Computational Game Theory, Number Theory, Social Network Analysis

SKILLS

Languages	Python, C/C++, Spanish	Tools	Ghidra, Docker, Cuckoo
Frameworks	PyTorch, Flask, LLVM	OSs	macOS, Linux

EXPERIENCE

DARPA Assured Micro-Patching

Graduate Research Assistant - PI: Dr. Baris Kasikci

October 2022 - Present

Nashville, TN

- Binary rewriting and micropatching on ARM targets to understand and mitigate previction side channels
- Contributing to AI-assisted reverse engineering tools including compiler provenance prediction and source code recovery

Vanderbilt University

Grader - Foundations of Machine Learning - Instructor: Dr. Dana Zhang

August 2022 - December 2022

Nashville, TN

- Host 3 weekly office hours to assist students in machine learning fundamentals using scikit-learn and PyTorch
- Graded, debugged, and left feedback on student Python code submissions

DARPA Symbiotic CPS Design Challenge (FA8750-20-C-0537)

Graduate Research Assistant - PI: Peter Volgyesi

October 2020 - February 2023

Nashville, TN

- Automated collection of mass properties from parametric CAD models for $\approx 100\times$ speedup of UAV design space exploration
- Formulated design grammar and drag surrogate using graph neural networks to predict drag profiles of arbitrary UAV geometries
- Developed parser and visualizer for UAV flight dynamics simulation to facilitate iterative UAV design updates

Etsy, Inc.

Software Engineering Intern - Seller Ads & Insights

May 2019 - August 2019

New York, NY

- Developed, tested, and shipped features of a revamped ads dashboard for web and mobile serving over 2 million sellers on Etsy.com
- Identified and corrected an existing bug in production code for parsing localized currency input for seller advertising budgets

PUBLICATIONS

Yifan Zhang, [Michael Sandborn](#), Stefan Larson, Daniel Moyer, Yu Huang, Kevin Leach, *Structure-Aware Adaptation of LLMs for Code Vulnerability Detection*, NAACL 2024, under review.

[Michael Sandborn](#), Zach Stoebner, Wes Weimer, Stephanie Forrest, Ryan Dougherty, Jules White, Kevin Leach, *Reducing Malware Analysis Overhead with Coverings*, Transactions on Dependable and Secure Computing (TDSC) 2024, to appear.

[Michael Sandborn](#), Carlos Olea, Anwar Said, Mudassir Shabir, Peter Volgyesi, Xenofon Koutsoukos, Jules White, *Towards AI-Augmented Design Space Exploration Pipelines for UAVs*, Book series: Intelligent Computing. Artificial Intelligence (Machine Learning, Convolutional Networks and Large Language Models). Edited by Leonidas Deligiannidis, George Dimitoglou, Hamid Arabnia and Ahmad Tafti. Publisher: De Gruyter.

Henry Gilbert, Ruida Zeng, [Michael Sandborn](#), Jules White, Douglas Schmidt, *Cyber-Physical Component Verification with Global Collision Estimation Through Markov Integration*, International Conference on Intelligent Systems and New Applications (ICISNA), March 17-19, 2023, Liverpool UK.

Henry Gilbert, [Michael Sandborn](#), Douglas C. Schmidt, Jesse Spencer-Smith, Jules White, *Semantic Compression with Large Language Models*, 2023, Preprint.

Harsh Vardhan, Umesh Timalisina, Michael Sandborn, Peter Volgyesi, Janos Sztipanovits, *Anvil: A SciML tool for CFD-based design evaluation with AI-powered shape optimization algorithms*, 2023, submitted to Advances in Engineering Software.

Sam Hays, Michael Sandborn, Jules White *Reducing Usefulness of Stolen Credentials in SSO Contexts*, 2024, Preprint.

Carlos Olea, Michael Sandborn, Peter Volgyesi, Jules White, *String Grammars for Preliminary UAV Design Exploration*, 14th International Conference on Mechanical and Aerospace Engineering, Jul. 18-21, 2023, Porto, Portugal

Jules White, Quchen Fu, Sam Hays, Michael Sandborn, Carlos Olea, Henry Gilbert, Ashraf Elnashar, Jesse Spencer-Smith, Douglas C Schmidt *A prompt pattern catalog to enhance prompt engineering with chatgpt*, 2022, Preprint.

Michael Sandborn, Carlos Olea, Anwar Said, Mudassir Shabbir, Peter Volgyesi, Xenofon Koutsoukos, Jules White, *What a drag! Streamlining the UAV design process with design grammars and drag surrogates*, International Conference on Computational Science and Computational Intelligence (CSCI) 2022 (**24% Acceptance Rate**), in proceedings.

Michael Sandborn, Carlos Olea, Sam Hays, Jules White, *An Architecture for Component Authentication Using Secure Cyber-physical Information and Blockchain*, International Conference on Fog and Mobile Edge Computing (FMEC) 2021.

Michael Sandborn, Clayton Wright, Jules White, *Towards cyber-physical authentication of additively manufactured components*, International Conference on Emerging Ubiquitous Systems and Pervasive Networks (EUSPN) 2021.

Michael Sandborn, Carlos Olea, Jules White, Chris Williams, Pablo Tarazaga, Logan Sturm, Mohammad Albakri, Charles Tenney. *Towards Secure Cyber-physical Information Association for Parts*, Journal of Manufacturing Systems, Volume 59, April 2021 (**8.63 Impact Factor, 18% Acceptance Rate**).