ZACHARY SUSSKIND

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EDUCATION

The University of Texas at Austin *August 2024*
Doctor of Philosophy, Electrical and Computer Engineering
Advisor: Dr. Lizy Kurian John

The University of Texas at Austin *December 2022*
Master of Science, Electrical and Computer Engineering GPA: 4.00

The University of Texas at Austin *May 2019*
Bachelor of Science, Electrical Engineering GPA: 3.77

GRADUATE PROGRAM OF WORK

Major Coursework:

Embedded System Design and Modeling	*Fall 2019*
Microarchitecture	*Spring 2020*
Cross-Layer Machine Learning Algorithm/Hardware Co-Design	*Fall 2020*
Distributed Systems	*Fall 2020*
Computer Performance Evaluation and Benchmarking	*Spring 2021*
Parallel Computer Architecture	*Fall 2022*

Supporting Coursework:

Convex Optimization	*Fall 2019*
Unconventional Computation	*Spring 2020*
Neural Computation	*Spring 2021*
Parallel Algorithms	*Fall 2021*

Other Graduate Coursework:

System-On-Chip Design	*Fall 2018*

WORK EXPERIENCE

NVIDIA *May – August 2022 / 2023*
Research Intern Austin, TX / Remote

· Analyzed performance and energy benefits and tradeoffs in speculative GPU architectures
· Proposed optimizations to reduce data movement, plus analytical models to estimate their impact
· Enhanced an internal cycle-accurate simulator to enable exploring implications for real workloads

NVIDIA *May – August 2020 / 2021*
Architecture Intern Austin, TX / Remote

· Enhanced the GPU functional model by implementing and creating tests for new chip features
· Improved an automated test generation flow to enable rapid creation and validation of new tests
· Developed new tools for collecting and interactively visualizing simulated chip power and energy data

DISSERTATION (IN PROGRESS)

Weightless Neural Networks for Fast, Low-Energy Inference

- Explored the feasibility of neural networks based on lookup tables in edge inference scenarios
- Developed models & learning rules to greatly outperform prior WNNs in accuracy & memory efficiency
- Proposed FPGA architectures with latency, throughput, area, & energy better than the ML SOTA
- Collaborated with an international working group of domain experts
- First-author publications in venues including PACT 2022, ACM TACO, and ICML 2024 *(upcoming)*

SELECTED PUBLICATIONS

Differentiable Weightless Neural Networks. A. Bacellar & Z. Susskind *(co-first)*, M. Breternitz *et al. International Conference on Machine Learning (ICML), 2024 [Upcoming]*

Soon Filter: Advancing Tiny Neural Architectures for High Throughput Edge Inference. A Bacellar, Z. Susskind, M. Breternitz *et al. International Joint Conference on Neural Networks (IJCNN), 2024 [Upcoming]*

ULEEN: A Novel Architecture for Ultra Low-Energy Edge Neural Networks. Z. Susskind, A. Arora, I. Miranda, *et al. ACM Transactions on Architecture and Code Optimization (TACO), 2023*

Dendrite-inspired Computing to Improve Resilience of Neural Networks to Faults in Emerging Memory Technologies. L. John, F. França, S. Mitra, Z. Susskind, *et al. IEEE International Conference on Rebooting Computing (ICRC), 2023*

An FPGA-Based Weightless Neural Network for Edge Network Intrusion Detection. Z. Susskind, A. Arora, A. Bacellar, *et al. International Symposium on Field-Programmable Gate Arrays (FPGA), 2023 [Poster Presentation]*

Pruning Weightless Neural Networks. Z. Susskind, A. Bacellar, A. Arora, *et al. European Symposium on Artificial Neural Networks (ESANN), 2022*

Weightless Neural Networks for Efficient Edge Inference. Z. Susskind, A. Arora, I. Miranda, *et al. International Conference on Parallel Architectures and Compilation Techniques (PACT), 2022*

LogicWiSARD: Memoryless Synthesis of Weightless Neural Networks. I. Miranda, A. Arora, Z. Susskind, *et al. IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP), 2022* ***[Best Paper Candidate]***

Characterizing Neuro-Symbolic Workloads. Z. Susskind, B. Arden, L. K. John, P. Stockton, and E. B. John. *IBM IEEE CAS/EDS AI Compute Symposium, 2021 [Poster Presentation]*

PROFESSIONAL AFFILIATIONS

IEEE Graduate Student Member, Central Texas Section, *Member #93838655*
SRC Research Scholar

FELLOWSHIPS AND GRANTS

Semiconductor Research Corporation, 2021 - 2022, 2023 *GRC Task 3015.001, 3148.001*
Virginia & Ernest Cockrell, Jr. Fellowship, 2019 - 2023
University Graduate Continuing Fellowship, 2023 - Present

TECHNICAL SKILLS

Languages: C, C++, SystemC, Verilog, asm (ARM/x86), Python (+PyTorch)
Tools: Git, Perforce, Vivado, Synopsys VCS, Perf, Pin, Mako
Other: Computer architecture research, Simulator development, Linux