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EDUCATION

- **University of Tennessee, Knoxville, TN-37916, USA**
GPA 4.00/4.00
2021–August 2025
- **University of Kentucky, Lexington, KY-40506, USA**
GPA 3.879/4.00
2017–2021

*PhD in Computer Engineering**Bachelor of Science in Computer Engineering*ENGINEERING
SKILLS[Level:
Advanced]

- **Programming Languages:** Python, Embedded C, C, C++, C#, Rust, Java, ARM/x86 Assembly, Matlab, Verilog/SystemVerilog, VHDL.
- **Architectures/Applications:** RTOS, Cryptography, OOP, CUDA, RISC-V, ARM, Linux Kernel, MapReduce, Multi-core computing, CAN, I2C, UART, FPGA Design, RTL Design/Verification.
- **Machine Learning & Quantum Libraries:** Keras, Pytorch, Tensorflow, Deep Learning, Anomaly Detection, IBM Qiskit, PennyLane.
- **Design Tools:** Visual Studio, CMake, GCC, µVision, Git, Logic Analyzers, Oscilloscopes, Debuggers.
- **Operating Systems:** Windows, Linux (Unix), Android OS, FreeRTOS.

EXPERIENCE

- **NSF Graduate Research Fellow**, Dept of EECS, University of Tennessee, Knoxville (2022-Present)
- Teaching Assistant, Dept of EECS, University of Tennessee, Knoxville (2021-Present)
- Undergraduate Research Assistant, Dept of ECE, University of Kentucky, Lexington (2019-2021)

DISTINCTIONS
AND
AWARDS

- **2022–Present - NSF Graduate Research Fellowship Program (GRFP):**
Prestigious fellowship awarded to outstanding students with significant contributions to STEM.
- **2025 - UTK Gonzalez Outstanding Graduate Teaching Assistant Award:**
Award for outstanding commitment, dedication, and notable ambition in EECS academic pursuits.
- **2021 - Upsilon Pi Epsilon (UPE) Award:**
IEEE Computer Society Award for Academic Success in Computer Engineering.
- **2020 - Schneider Electric Fellowship, University of Kentucky:**
Smart-Home Research on ML-based CPS Anomaly Detection in collaboration with SPARK Lab.

RELEVANT
PROJECTS

- **Crystals-KYBER-based Post-Quantum Cryptographic 3D Printing Security - HOST 2024 Hardware Demonstration with UTK SEAMTN**
 - Developed a Crystals-KYBER **post-quantum cryptographic framework in embedded C** for 3D Printer in collaboration with Southeastern Advanced Machine Tools Network (SEAMTN).
 - Engineered a novel & highly efficient **CAN communication tree/graph** structure for 3D printers with colleague Joseph Clark.
 - Built a proof-of-concept 3D printer farm, presented as hardware demo at security conference HOST 2024, with **simple API callback structure for plug-and-play**.
 - Taught prospective engineers offensive/defensive security for manufacturing networks with Kali.
- **GUI Operating System Designed for RISC-V Architecture - Graduate Classwork in Advanced Operating System Design**
 - Designed an **operating system & SBI in C** from scratch for **RISC-V** with GUI/input support.
 - Implemented supervisor, hypervisor, and user modes for security and privilege protection.
 - Utilizes **“hardware threading”** for a multi-core RISC-V ISA with power saving capabilities.
- **Smart-Home Sensor Anomaly Detection using Keras Deep Learning - Research Collaboration with Schneider Electric fellowship**
 - Proposed a **Keras ML model** to identify sensor anomalies in Honda US Smart Home data.
 - Trained a **deep learning neural network in Python** in collaboration w/ Schneider Electric.
- **ASHRAE-based Smart Home COMFORT Controller - UKY Senior Project, Best CAPSTONE Award 2021**
 - **Lead team** of engineers to develop a lightweight, **secure communication firmware/API with embedded C, C++, and C#** for WLAN-based, smart integration for HVAC devices.

- Designed Smart HVAC with the UKY Spark Lab to meet ASHRAE “COMFORT” standards.
- Documented various performance and functionality metrics for future use in Spark Lab.
- **Compiler Design for “Computer Science eXperimental” Programming Language - Graduate Classwork in Advanced Compiler Design**
 - Developed **Java-based comprehensive compiler** for the “CSX_go” Programming Language.
 - Implemented all five compiler stages: **symbol table, lexical analyzer, parser generator, semantic checker, and code generator.**
 - Compiles output for the **Java Virtual Machine** for portability and code size.
 - Employs the **JFlex Lexical Analyzer, CUP LALR Parser, and Jasmin JVM Assembler.**
- **Post-Quantum Cryptographic Vehicular Security Framework - UTK/DoD-funded Security Dissertation Research**
 - Developed a **PUF-based, embedded CAN framework in C** that is safe from quantum threats for commercial vehicles while adhering to original ISO 11898 protocol specifications.
 - Built embedded **Physically Unclonable Function** testbench for performance analysis.
- **Quantum Anomaly Detection for Industrial Control Systems - Collaborative Research with Oak Ridge National Lab (ORNL)**
 - Engineered high-accuracy **Quantum ML models in Python** for detecting cyberattacks in critical infrastructures with Oak Ridge National Lab (ORNL).
 - Determined metrics for parametrizing the success, or advantage, of a CPS-related QSVM model on detecting real-world industrial cyberattacks.
 - Investigated the effects of modern NISQ noise in **quantum machine learning.**
 - Designed Python framework for easy integration of IBM Qiskit in Cyberphysical Systems.
- **FPGA-Based Multilayer Perceptron (MLP) as a Neural Network using Verilog - Personal Research Project alongside Md. Saif Hassan Onim**
 - Designed an **MLP neural network accelerator in SystemVerilog** with parametrizable layers.
 - Implemented **wrapper/controller** for easy interfacing with SoC RAM and I/O.
 - Evaluated various performance metrics of the FPGA design in terms of power, area, and timing.

MAJOR ACADEMIC COURSES

- **Systems Programming, Computer Programming, Adv. Operating System Design, Adv. Algorithm Design/Analysis, Adv. Compiler Design, Computer Architecture, Machine Learning, Adv. Embedded System Design, Network/Software/Embedded Security, GPU & Multicore Programming, Data Mining and Analytics, Emerging Computing/Quantum, System on Chip Design, Signals and Systems, Digital Logic Design**

PUBLICATIONS

- **Tyler Cultice, Md. Saif Hassan Onim, Annarita Giani and Himanshu Thapliyal**, “Anomaly Detection for Real-World Cyber-Physical Security using Quantum Hybrid Support Vector Machine”, *Proceedings of IEEE Computer Society Annual Symposium on VLSI 2024 (ISVLSI 2024), Knoxville, TN, USA, July 1-3, 2024 (Best Paper Award)*
- **Tyler Cultice, Joseph Clark, Himanshu Thapliyal**. “A Novel Hierarchical Security Solution for Controller-Area-Network-Based 3D Printing in a Post-Quantum World.” *Sensors* 23.24 (**2023**): 9886.
- **Tyler Cultice, Joseph Clark, and Himanshu Thapliyal**. “Lightweight Hierarchical Root-of-Trust Framework for CAN-Based 3D Printing Security.” *Proceedings of the Great Lakes Symposium on VLSI 2023*. **2023**.
- **Tyler Cultice, and Himanshu Thapliyal**. “Vulnerabilities and Attacks on CAN-Based 3D Printing/Additive Manufacturing.” *IEEE Consumer Electronics Magazine* 13.1 (**2023**): 54-61.
- **Chin, Jun-Cheng, Himanshu Thapliyal, and Tyler Cultice**. “CAN Bus: The Future of Additive Manufacturing (3D Printing).” *IEEE Consumer Electronics Magazine* (**2022**).
- **Tyler Cultice, and Himanshu Thapliyal**. “PUF-based post-quantum CAN-FD framework for vehicular security.” *Information* 13.8 (**2022**): 382.
- **Tyler Cultice, Dan Ionel, and Himanshu Thapliyal**. “Smart home sensor anomaly detection using convolutional autoencoder neural network.” *2020 IEEE International Symposium on Smart Electronic Systems (iSES)(Formerly iNiS)*. IEEE, **2020**.
- **Tyler Cultice, Carson Labrado, and Himanshu Thapliyal**. “A puf based can security framework.” *2020 IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*. IEEE, **2020**.