

Tendayi Kamucheka
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EDUCATION

- **University of Arkansas** Fayetteville, AR
Doctor of Philosophy Computer Engineering Jan. 2019 – Jan. 2024 (Expected)
- **Nanjing University of Aeronautics & Astronautics** Nanjing, China
Bachelor of Engineering in Software Engineering Sept. 2012 – July. 2016

RESEARCH

- **Compiler Design**
Custom accelerator Intermediate Representations for Machine Learning frontends ANTLR, LLVM, MLIR, C++
 - **SPAR Array Processor Project (Fall 2022 - Current):**
 - * Researching intermediate representations and compiler optimizations for custom array processor on FPGA
- **FPGA Functional Testing**
Vendor independent functional testing and counterfeit hardware detection Verilog, VHDL, Python, Linux
 - **CIFT - Independent Functional Testing, Path Delay Project (Summer 2022):**
 - * Designed and implemented Verilog/VHDL slice-level tests for Xilinx 7-series devices
- **FPGA RTL Design**
Quantum computer resistant cryptography C/C++, Verilog, Python, JavaScript, Linux
 - **NIST Post Quantum Cryptography Standardization Process (Summer 2020 - 2022):**
 - * Evaluating candidate post-quantum cryptography algorithms against side-channel assisted attacks.
 - * Implemented reference and masked side-channel resistant RTL designs for CRYSTALS-Kyber on FPGA targets
 - * Created software for automating power trace collection and Differential Power Analysis
- **GPU Accelerated High-Performance Computing**
Leveraging graphics processing units for parallel computation C/C++, CUDA, R, Matlab, Linux
 - **Statistical Learning (Fall 2019):**
 - * Created an R package for simulating particle systems using Sequential Monte Carlo and Markov Chains.
 - * Implemented parallel algorithms for learning statistical distributions of data samples on GPU.
 - * Applications: Statistical learning for weather system predictions, pattern predictions (e.g. wildfire path prediction)

EXPERIENCE

- **University of Southern California - Information Sciences Institute** Arlington, VA
Visiting Research Assistant May 2022 - August 2022
 - **CIFT - Independent Functional Testing, Path Delay Project:** FPGA RTL Design
- **University of Arkansas** Fayetteville, AR
Senior Graduate Assistant Jan 2019 - Present
 - **Senior Graduate Research Assistant:** FPGA RTL Design, Compilers, & High Performance Computing
 - **Senior Graduate Teaching Assistant:** Embedded Systems, Computer Org & Database Management Systems

PUBLICATIONS

- **(Submitted):** Kamucheka, T., Mai, Q., Wei, G., Huang, M., Liu, X., CuSMC: Fast Parallel Implementation for Sequential Monte Carlo on GPU, Journal of Quality Technology. (Github - <https://github.com/tkamucheka/CuSMC>)
- **(Published):** Kamucheka, T., Fahr, M., Teague, T., Nelson, A., Andrews, D., & Huang, M. Power Based Side-Channel Attack Analysis on PQC Algorithms.
- **(Published):** Kamucheka, T., Nelson, A., Andrews, D., & Huang, M. A Masked Pure-Hardware Implementation of Kyber Cryptographic Algorithm.