

Prateek Sahu

Architecture, Computer Systems, and Embedded Systems

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EDUCATION

- Ph.D. bound at **University of Texas at Austin** in **Electrical and Computer Engineering** (2017 - Present: 3.9 GPA)
- Undergraduate at **Indian Institute of Technology, Kanpur** in **Electrical Engineering** (2011 - 2015: 8.2 GPA)

RESEARCH STATEMENT

My research interests include understanding architectural and micro-architectural tradeoffs for the performance of systems and apply them for secure processor designs. Currently, my research includes studying various digital side and covert channels and micro-architectural solutions for efficient malware detection with a minimal performance impact.

RESEARCH

- **Detection of micro-architectural attacks** (UT Austin, Jan 2018 - present)
 - Research and development of micro-architectural malware detector based on contention of resources by various domains.
 - We evaluate the model against cache based side and covert channels like Prime-Probe and Spectre and demonstrate the effectiveness of it against a baseline system.
- **Hardware implications of 'Serverless' application stack** (UT Austin, Sept 2018 - present)
 - Research around micro-benchmarking of FaaS models like those on AWS Lambda and OpenFaaS on various metrics such as network, compute and memory.
 - Goal of this research is to evaluate such services with emphasis on latencies and utilization.

PAST PROJECTS

- **Low-power real-time object recognition SoC Design** (SoC Design Project, Dr. A. Gerstlauer)
FPGA design and implementation of GEMM module of YOLO model on Zedboard using Vivado HLS tools
- **Verilog System Design for 32-bit x86 ISA subset** (MicroArchitecture Course Project, Dr. Yale Patt)
CPU Design of a 7-stage pipelined machine with Memory module and branch predictor for subset of x86 ISA
- **Intelligent instruction duplication for Side-Channel Defence** (Security for HW/SW Course Project, Dr. M. Tiwari)
Compiler solution for duplication of instructions which work on dummy data as a defence against side-channels
- **LC-3b Processor Design in C** (Computer Architecture Course Project, Dr. Mattan Erez)
State machine and pipelined cycle accurate simulator for LC-3b ISA including exception and interrupt handling
- **Operating Systems Design on NachOS** (OS Course Project, Prof. Mainak Chaudhuri)
Built up NachOS with syscall implementations, thread synchronization and virtual memory.
- **Cache Block Replacement** (Dr. Mainak Chaudhuri)
Replacement algorithm using age, frequency and re-use distance of a cache line giving a 1% increase over LRU.

RELEVANT COURSES

Computer Architecture	Data Structure and Algorithms	Microarchitecture
Operating Systems	Security in HW/SW Systems	Compiler

WORK

- **Graduate Research Assistantship** at University of Texas at Austin, SPARK Labs (ECE) (Spring 2018 - Current)
- **Teaching Assistantship** at University of Texas at Austin for Operating Systems course (Fall Semester 2017)
- **Member of Technical Staff** at **VMware India** Software Pvt. Ltd (2015 - 2017)
 - IDF for system health monitoring tool using vSphere metrics

- Public cloud cost analytics using utilization statistics
- Microservices using Docker containers and Spark cluster for OTA updates to the application suite

SKILLS

- Languages: C, C++, Java, Verilog, Python
- Tools and Software: gem5, qemu, Vivado HLS, Matlab
- ISA: ARM v8, x86, MIPS, 8086
- Productivity tools: git, Latex