# Swapnil D. Haria

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## Research Interests

Persistent Memory, Virtual Memory, interplay of operating systems and computer architecture

## Education

**University of Wisconsin-Madison**

*M.S., Ph.D. Candidate (Computer Sciences), Cumulative GPA – 4.0*                    *Fall '14 – present*
Courses - Advanced Computer Architecture I, II, Advanced Operating Systems, Ancient Philosophy, etc.
Awarded **CS Departmental Research Fellowship**

**Birla Institute of Technology & Science (BITS), Pilani**                                         **India**

*B.E. (Electrical and Electronics), Cumulative GPA – 10.0/10.0*                       *Fall '09 – Spring '13*
Awarded **University Gold Medal** and Best Graduating Student Award

## Research Experience

**University of Wisconsin-Madison**                                                        **Madison**

*Research Fellow, Research Assistant [Languages: C, C++, Python, Java]*              *Fall '14 - present*
Advisors: Prof. Mark Hill and Prof. Michael Swift
○ Currently investigating hardware and software techniques for guaranteeing consistency in PM applications
○ Helped create first benchmark suite of realistic Persistent Memory (PM) applications
○ Developed techniques for simplifying virtual memory support in accelerators

**USC Viterbi School of Engineering**                                                   **Los Angeles**

*Research Fellow [Languages: C, Verilog]*                                               *Summer '12*
Explored problems in field of networking applications on reconfigurable hardware under Prof. Viktor Prasanna
○ Developed virtual router architecture optimized for scalability and power-efficiency
○ Created a unified design methodology for optimizing both IPv4/v6 lookup engines

**Indira Gandhi Centre for Atomic Research, Kalpakkam**                                     **India**

*Research Intern [Languages: VHDL]*                                                     *Summer '11*
Implemented FFT-based analysis in VHDL as part of real-time monitoring system on FPGA

## Industrial Experience

**ORACLE**                                                                           **Santa Clara, CA**

*Software Developer [Languages: C]*                                                   *May '15–Aug '15*
Engaged in kernel development as part of the NUMA/Scheduling team in the Solaris Core Kernel Group
○ Investigated the use of hardware performance counters to improve OS scheduling in NUMA/CMT environments
○ Developed a self-managing and extensible kernel framework from scratch

**NVIDIA**                                                                           **Bangalore, India**

*ASIC Engineer [Languages: System Verilog, Verilog, Perl, ARM Assembly]*              *Jan '13–Jul '14*
Involved in functional verification of Denver CPU (part of 64-bit Tegra K1 SOC)
○ Used System Verilog (VMM) for creating and managing testbench infrastructure as unit owner
○ Created unit tests in ARMv8 assembly

## Publications

S. Haria, M. D. Hill, and M. M. Swift, Devirtualizing Virtual Memory for Heterogeneous Systems, *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '18)*.

S. Nalli, S. Haria, M. D. Hill, M. M. Swift, H. Volos, and K. Keeton, An Analysis of Persistent Memory Use with WHISPER, *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '17), China*.

Y.-H.E. Yang, Yun Qu, S. Haria, and V.K. Prasanna, Architecture and performance models for scalable IP lookup engines on FPGA, *International Conference on High Performance Switching & Routing, (HPSR '13)*.

S. Haria and V. Prasanna, Optimal mapping of multiple packet lookup schemes onto FPGA, *International Conference on Reconfigurable Computing and FPGAs (ReConFig '13)*.

S. Haria, T. Ganegedara, and V. Prasanna, Power-efficient and scalable virtual router architecture on FPGA, *International Conference on Reconfigurable Computing and FPGAs (ReConFig '12), Mexico*.

## Academic Projects

**Supporting Virtual Memory in Heterogeneous Systems [C, C++, Python]**: Spring '17 – present
○ Studying virtual memory overheads for near-memory and in-memory systems

**How Applications use Persistent Memory [C, C++, Python]**: Fall '16 – Fall '17
○ Developed Hands-Off Persistence System to improve programmability and performance of PM workloads
○ Collectively assembled a benchmark suite of real-world PM applications to analyze PM usage

**Optimizing Client-side Resource Utilization in Public Clouds [C, Java]**: Spring '15
○ Used application migration and a distributed management framework to improve cloud utilization
○ Developed an extensible lightweight simulator to rapidly validate cloud management policies

**Exploring CPU-GPU Coherence in Heterogeneous Systems [C++, Python, OpenCL]**: Spring '15
○ Investigated the relevance of CPU-GPU coherence for current heterogeneous workloads
○ Modified conventional solutions to minimize hardware overheads and boost performance

**Evaluating Reuse Caches for mobile processors [C++, Python]**: Fall '14
○ Extended research techniques for improving the area utilization of caches
○ Estimated performance, area and power improvements by simulating appropriate workloads

## Technical Skills

Languages – C, C++, Java, Python, Perl, Bash, ARM assembly, System Verilog, Verilog

Tools and Simulators – gem5, gem5-GPU, Intel's Pin tool, McPAT, Cacti

## Scholastic Honors

**Departmental Research Fellowship**, University of Wisconsin-Madison

**Gold Medallist**, Birla Institute of Technology & Science, Pilani

**Best Graduating Student Award**, Electrical and Electronics Engineering Department, BITS, Pilani

**2012 Viterbi-India Program Award** (only 10 students selected nation-wide)

**Institute Merit Scholarship,** BITS, Pilani in all semesters of undergraduate study

## Activities

**Vice-Chair, ACM Student Chapter, UW-Madison**, organized social and technical events for CS students

**President, BITS Model United Nations society**, organized a popular annual college-level Model UN

**Head, Department of Publications and Correspondence,** BITS, Pilani, co-ordinated the participation of over 1000 students for the sports and cultural festivals of BITS, Pilani

**Member, Corroboration and Review Committee, BITS, Pilani,** managed all financial activities of the Students' Union and advisor to all major organizing committees of the Union

**Member, Hoofers Sailing Club**

**Member, BITS Table Tennis team**

## Interests

- Solving crosswords and other puzzles, playing table tennis, reading and sailing