Masab Ahmad

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Research Interests

Computer Architecture and Security, Parallel Graph Algorithms, Machine Learning Scheduling. My research is about efficient architectural and system level parameters that can be scheduled onto many core machines such as multicores and GPUs.

Education

2016–present **Ph.D. Electrical and Computer Engineering**, *University of Connecticut*, Storrs, CT, USA.
Advisor: Omer Khan

2014–2016 **M.S. Electrical and Computer Engineering**, *University of Connecticut*, Storrs, CT, USA.
Advisor: Omer Khan, Thesis: Characterizing Graph Algorithms for Scheduling in Many Core Machines

2009–2013 **B.E. Electrical Engineering**, *National University of Sciences and Technology (NUST), Electrical Engineering*, Islamabad, Pakistan.
Thesis: Non-Invasive Blood Glucose Monitoring using Near Infrared Spectroscopy

Professional Experience

2014 - Present **Research Assistant, University of Connecticut (UConn)**, *(Working with Prof. Omer Khan) Projects:*.

Situationally Adaptive Scheduling (SAS).
Currently developing a high level scheduler that optimally schedules algorithms for parameters such as input dependence, performance, and accuracy, on target architectures (multicores and GPUs).

Multicore Programming.
Developing parallel benchmarks pertaining to ubiquitous graph and big data algorithms. Analyzing performance, throughput, and memory constraints in the context of parallel programming paradigms (locks and atomics).

GPU Programming.
Developing and analyzing various parallel graph and big data benchmarks, on various GPUs, in the context of high level scheduling, and performance.

Computer Security, In collaboration with Prof. Marten van Dijk.
Designing frameworks that can detect various exploits, ranging from hardware trojans to memory overflows, in various architectures.

Summer 2015 **Research Intern, Naval Research Lab (NRL)**.
Worked with Chris J. Michael at NRL to analyze and do efficient scheduling for path planning algorithms on GPUs. Designed GPU-aware programs that take into account issues such as scalability and memory bandwidth. Analysis done on real world graphs projected by the US Navy.

Teaching Experience

Fall 2015 **Teaching Assistant, *University of Connecticut***, Digital Design Lab and Digital Systems Design, Designed and graded VHDL programming assignements for undergraduate level digital design course.

Fall 2011 **Teaching Assistant, *National University of Sciences and Technology***, Complex Variables and Transforms, Taught advanced undergraduate level calculus.

Spring 2009 **Instructor, *Independent***, Taught basic mathematics and sciences to high school students from underrepresented and impoverished communities.

Publications

IISWC 2015 **Masab Ahmad**, Farrukh Hijaz, Qingchuan Shi, Omer Khan, CRONO: A Benchmark Suite for Multithreaded Graph Algorithms Executing on Futuristic Multicores, *IEEE International Symposium on Workload Characterization, (IISWC)*, October 2015. *Best Paper Nominee.*

ICCD 2015 Syed K. Haider, **Masab Ahmad**, Farrukh Hijaz, Astha Patni, Ethan Johnson, Matthew Seita, Omer Khan, Marten van Dijk, M-MAP: Multi-Factor Memory Authentication for Secure Embedded Processors, *IEEE International Conference on Computer Design, (ICCD)*, October 2015.

HPEC 2015 **Masab Ahmad**, Kartik Lakshminarasimhan, Omer Khan, Efficient Parallelization of Path Planning Workload on Single-chip Shared-memory Multicores, *IEEE High Performance Extreme Computing Conference, (HPEC)*, September 2015.

HASP 2015 **Masab Ahmad**, Syed K. Haider, Farrukh Hijaz, Marten van Dijk, Omer. Khan, Exploring the Performance Implications of Memory Safety Primitives in Many-core Processors Executing Multi-threaded Workloads, *ACM Workshop on Hardware and Architectural Support for Security and Privacy, (HASP)*, June 2015.

EDN 2014 **Masab Ahmad**, Awais M. Kamboh, Ahmad Khan, Non-invasive blood glucose monitoring using near-infrared spectroscopy, *Medical Design Center, EDN*, August 2014. *Hundreds of shares based on entrepreneurial impact on Twitter.*

ISCAS 2014 **Masab Ahmad**, Awais M. Kamboh, Rehan Hafiz, Power & throughput optimized lifting architecture for Wavelet Packet Transform, *IEEE International Symposium on Circuits and Systems, (ISCAS)*, June 2014.

Publications under Preparation

IISWC 2016 **Masab Ahmad**, Halit Dogan, Syed Kamran Haider, Hamza Omar, Farrukh Hijaz, Qingchuan Shi, Omer Khan, Atomic Acceleration of Graph and Big Data Analytics on Futuristic Multicores, *IEEE International Symposium on Workload Characterization, (IISWC)*, May 2016. (Under Preparation)

IISWC 2016 Halit Dogan, **Masab Ahmad**, Farrukh Hijaz, Hamza Omar, Omer Khan, A Shared Memory Benchmark Suite for Big Data and Machine Learning Workloads, *IEEE International Symposium on Workload Characterization, (IISWC)*, May 2016. (Under Preparation)

PACT 2016 Qingchuan Shi, Hamza Omar, **Masab Ahmad**, Halit Dogan, Omer Khan, A Cross-Layer Multicore Architecture to Tradeoff Program Accuracy and Resilience Overheads in Graph and Big Data Analytics, *International Conference on Parallel Architectures and Compilation Techniques, (PACT)*, March 2016. (Under Preparation)

PACT 2016 **Masab Ahmad**, Halit Dogan, Chris J. Michael, Omer Khan, SAS: A Situationally Adaptive Scheduler for Efficient Execution of Graph and Data Analytic Workloads, *International Conference on Parallel Architectures and Compilation Techniques, (PACT)*, March 2016. (Under Preparation)

CCS 2016 Syed Kamran Haider, Chenglu Jin, **Masab Ahmad**, Devu Mankishila, Marten van Dijk, Omer Khan, HaTCh: A Formal Framework of Hardware Trojan Design and Detection, *ACM Conference on Computer and Communications Security (CCS)*, May 2015. (Under Preparation) (Available: `https://eprint.iacr.org/2014/943`)

CAL 2015 **Masab Ahmad**, Chris J. Michael, Omer Khan, SAS: A Situationally Adaptive Scheduler for Efficient Execution of Graph and Data Analytic Workloads, *IEEE Computer Architecture Letters, (CAL)*, December 2015. (Submitted)

Awards and Honors

- US. Dept. of Education **GAANN Fellowship**, 2014-2017.
- **NUST Undergraduate Merit Scholarship**, 2009-2013.

Mentoring

Summer 2015 Supervised students for their undergraduate honors thesis.

Summer 2014 Mentored several students under the Research Experience for Undergraduates (REU) program at the University of Connecticut. The program targeted computer security education for undergraduates. Students included from diverse backgrounds, including students with disabilities.

Open Source Initiative

I open source all my work on github. These works include *CRONO*, a graph benchmark suite for multicores, and several other works on path planning. Link: *https://github.com/masabahmad*

Programming Languages and Tools

C/C++, Python, Shell, Makefiles, Verilog/VHDL.

References

Omer Khan
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