

Mario J. Badr

CONTACT INFORMATION	The Edward S. Rogers Department of Electrical and Computer Engineering Room 1107, Sandford Fleming Bldg. 10 King's College Road, Toronto, ON M5S 3G4 Canada University of Toronto		
RESEARCH INTERESTS	Many-core/multi-core/heterogeneous architectures, synchronization, cache coherence, interconnection networks, analytical models, computer systems performance analysis.		
EDUCATION	Ph.D., Computer Engineering <i>University of Toronto</i> Dissertation: "Novel Evaluation Methodologies for Future Architectures" Advisor: Natalie Enright Jerger	September, 2013 - Present <i>Toronto, Ontario, Canada</i>	
	M.A.Sc, Computer Engineering <i>University of Toronto</i> Thesis: "Synthetic Traffic Models that Capture Cache Coherence Behaviour" Advisor: Natalie Enright Jerger	January 2014 <i>Toronto, Ontario, Canada</i>	
	B.A.Sc, Electrical Engineering <i>University of Toronto</i>	May 2011 <i>Toronto, Ontario, Canada</i>	
INDUSTRY EXPERIENCE	Qualcomm Research Silicon Valley <i>Intern (C++, OpenCL, Hexagon, CMake)</i> Used the Multicore Asynchronous Runtime Environment (MARE) to develop a heterogeneous application with multiple domain-specific kernels. Provided feedback to the MARE team on performance issues and bottlenecks.	Santa Clara, California, USA <i>May, 2015 - August, 2015</i>	
	Environment Canada <i>Intern (Java, XML)</i> Implemented new features and bug fixes for the NinJo workstation, a tool for meteorologists. Notable projects include upgrading the visualization framework for lightning strikes to be faster and use significantly less memory, incorporating storm cell data for Canada, and helping to create a configurable view of weather data for a given storm cell.	Toronto, Ontario, Canada <i>June, 2009 - August, 2010</i>	
AWARDS & SCHOLARSHIPS	Ontario Graduate Scholarship - \$15,000 Awarded for excellence in graduate studies.	2017	
	Electrical & Computer Engineering Teaching Assistant Award Awarded by student vote and department review to the top three teaching assistants for the Fall semester.	2016	
	Roberto Padovani Intern Scholarship - \$5,000 Awarded to seven Qualcomm Research interns across the globe for outstanding technical contributions made during their internship.	2015	
	Thomas Noakes & Queen Elizabeth II Graduate Scholarship - \$15,000 Awarded for excellence in science and technology.	2015	

	<p>Teaching Assistant Teaching Excellence Award - \$200 2015</p> <p>Awarded to four recipients across the three University of Toronto campuses based on nominations, references, and teaching philosophy.</p>
JOURNAL PUBLICATIONS	<p>Joshua San Miguel, Karthik Ganesan, Mario Badr, and Natalie Enright Jerger. <i>The EH Model: Analytical Exploration of Energy-Harvesting Architectures</i>. In IEEE Computer Architecture Letters (CAL), November 2017.</p>
CONFERENCE PUBLICATIONS	<p>Joshua San Miguel, Mario Badr, and Natalie Enright Jerger. <i>Load Value Approximation</i>. In Proceedings of the International Symposium on Microarchitecture (MICRO), December 2014. (acceptance rate: 19%)</p> <p>Mario Badr and Natalie Enright Jerger. <i>SynFull: Synthetic Traffic Models Capturing a Full Range of Cache Coherence Behaviour</i>. In Proceedings of the International Symposium on Computer Architecture (ISCA), June 2014. (acceptance rate: 18%)</p>
WORKSHOP PUBLICATIONS	<p>Mario Badr and Natalie Enright Jerger. <i>Fast and Accurate Performance Analysis of Synchronization</i>. In Proceedings of the 9th International Workshop on Programming Models and Applications for Multicores and Manycores (PMAM), February 2018. (acceptance rate: 53%)</p> <p>Tushar Kumar, Aravind Natarajan, Wenjia Ruan, Mario Badr, Dario Suarez Gracia, Calin Cascaval. <i>Abstract Representation of Shared Data for Heterogeneous Computing</i>. In the 30th International Workshop on Languages and Compilers for Parallel Computing (LCPC), October 2017. (acceptance rate: 65%)</p> <p>Ajaykumar Kannan, Mario Badr, Parisa Khadem Hamedani and Natalie Enright Jerger. <i>Offloading to the GPU: An Objective Approach</i>. In the 3rd International Workshop on Parallelism in Mobile Platforms (PRISM), June 2015.</p>
PRESENTATIONS	<p>Mario Badr, Natalie Enright Jerger, Riken Gohil, Radhika Jagtap, and Matteo Andreozzi. <i>Generating Synthetic Traffic for Heterogeneous Architectures</i> At the ARM Research Summit, September 2017.</p> <p>Mario Badr and Natalie Enright Jerger. <i>SynFull: Traffic Models Capturing Cache Coherence Behaviour</i>. At the International Symposium on Computer Architecture (ISCA), June 2014.</p> <p>Mario Badr and Natalie Enright Jerger. <i>SynFull: Synthetic Traffic Models That Capture Cache Coherent Behaviour</i>. At the University of Toronto Electrical and Computer Engineering Graduate Symposium (Connections), May 2014. Awarded <i>Best Oral Presentation</i>.</p> <p>Mario Badr and Natalie Enright Jerger. <i>Realistic Synthetic Traffic</i> At the University of Toronto Electrical and Computer Engineering Graduate Symposium (Connections), May 2012.</p>
SOFTWARE ARTIFACTS	<p>SimSync <i>Apache License 2.0</i></p> <p>A tool for analyzing the performance of multi-threaded applications on multi- and many-core processors. SimSync focuses on the impact of synchronization on the performance of each thread. Available: https://github.com/mariobadr/simsync-pmam</p> <p>SynFull <i>MIT License</i></p> <p>Implementation of a statistical simulation methodology for design-space exploration of Networks-on-Chip. Includes R scripts for creating models and an executable to generate synthetic traffic. Available: https://github.com/mariobadr/synfull-isca</p>

TEACHING EXPERIENCE	Engineering Communication <i>APS111, APS112, APS112T</i> Facilitated tutorials for group projects with a focus on the engineering design process including how to: define the problem, develop solutions, and objectively compare designs. Taught the fundamentals of the design process in the Fall semester (APS111), providing feedback on written work and group dynamics. Continued to provide feedback and refine fundamentals in the Winter Semester (APS112) where students worked on a client-facing project. Also participated in the summer-session for students who were struggling with their course load (i.e., T-Program, APS112T).	Teaching Assistant <i>1st Year Undergraduates, T-Program</i>
	Computer Programming <i>APS105, APS105T, APS106T, ECE244, ECE297</i> Taught computer programming using the C (APS105, APS105T, APS106T) and C++ languages (ECE244, ECE297). Fundamental topics for both C and C++ included data structures, recursion, sorting, input/output, memory management on the stack and heap. Additional C++ topics included value versus reference semantics and object-oriented programming. The fundamentals learned were applied in a design project (ECE297), where I mentored student groups in implementing an application similar to Google Maps. The majority of teaching took place in tutorials (10-80 students) and computer labs.	Teaching Assistant <i>1st & 2nd Year Undergraduates, T-Program</i>
	<p>In addition to tutorials and labs, I have also delivered lectures and developed course materials. For APS105, I delivered the 2013 Exam Jam review session. For ECE244, I delivered two lectures on recursion using an in-depth maze example with a step-by-step visualization of the maze traversal. For ECE297, I proposed, developed, and delivered optional tutorials on software design.</p>	
UNIVERSITY SERVICE	Computer Organization & Architecture <i>ECE352, ECE552</i> Supervised and helped students implement a simple von Neumann processor using verilog in a computer lab setting (ECE352). Also taught computer architecture concepts (e.g., caches, pipelining, register renaming, prefetching) in the lab. Delivered tutorials on Amdahl's Law, quantitative analysis, cache coherence, and memory consistency.	Teaching Assistant <i>3rd & 4th Year Undergraduates, Graduates</i>
	Appointed Graduate Representative Executive Committee of Faculty Council - Faculty of Applied Science & Engineering	2015-2016
	Graduate Representative Faculty Council - Faculty of Applied Science & Engineering	2015-2016
	President Electrical and Computer Engineering Graduate Students' Society	2015-2016
	Department Steward Canadian Union of Public Employees	2013-2014
	Social Event Coordinator Electrical and Computer Engineering Graduate Students' Society	2012-2013
PROFESSIONAL DEVELOPMENT	Teaching in Higher Education One semester course Learned more about teaching theories and styles and was observed by peers while teaching a tutorial on Computer Architecture. Developed a course syllabus for a fictitious course.	2015

Teaching Engineering in Higher Education <i>One semester course</i> Studied concepts and research on curriculum, teaching, and learning in engineering education.	2015
Prospective Professors in Training <i>Thirteen Seminars, One semester course</i> Began preparations for becoming a professor in academia and prepared an academic dossier.	2014-2015
Mini-MBA <i>Ten Classes</i> Gained an understanding of fundamental business concepts and participated a case competition.	2015
Oral Presentation Skills <i>Five Classes</i> Examined presentation structure and the use of visual aids. Exchanged feedback with peers.	2014
Prewriting Strategies for Developing and Organizing Your Ideas <i>Four Classes</i> Learned several new strategies for developing and organizing ideas before the writing process.	2014
NSERC Proposal Workshop <i>Three Classes</i> Examined features of good and bad proposal writing, and exchanged feedback with peers.	2014
Teaching Fundamentals Certificate <i>Six Workshops</i> Improved my teaching skills with workshops on pedagogy, research, academic integrity, and students in difficulty.	2012-2013