MICHAEL B. SULLIVAN

April 2017

Architecture Research Group
NVIDIA Corporation
Austin, TX 78717

(571) 216-1961
mbsullivan@utexas.edu
http://mbsullivan.info

EDUCATION

Cockrell School of Engineering, University of Texas at Austin
2008–2015 Ph.D. in Computer Engineering
Advisors: Mattan Erez & Earl E. Swartzlander, Jr.
Dissertation: Low-Cost Duplication for Separable Error Detection in Computer Arithmetic

Cockrell School of Engineering, University of Texas at Austin
MAY 2011 M.S.E. in Computer Engineering
Advisor: Mattan Erez
Report: Application of Residue Codes for Error Detection in Modern Computers

Volgeneu School of Engineering, George Mason University
JAN 2009 M.S. in Computer Science (GPA 3.95)
MAY 2008 B.S. in Computer Engineering, summa cum laude

College of Science, George Mason University
MAY 2008 B.A. in Mathematical Sciences, summa cum laude

RESEARCH POSITIONS

NVIDIA Corporation, Santa Clara, CA
2015– Research Scientist, Architecture Research Group (ARG)
Researching the design of resilient throughput processors for high-performance and safety-critical systems.

University of Texas, Austin, TX
2010–2015 Research Assistant, Locality Parallelism and Hierarchy Lab (LPH)
Studied the design of efficient and reliable computers with a focus on large-scale high-performance systems.

Los Alamos National Lab, Los Alamos, NM

SMR 2011 Research Assistant, Applied Computer Science (CCS-7)
Gave architectural insight to a multi-disciplinary team focused on the computational co-design of an exascale system tailored to a real-world problem.

George Mason University, Fairfax, VA

SMR 2008 Research Asst., Lab for the Study and Sim. of Human Mvmt.
Developed system software and analysis tools for the study of body movement using the simultaneous capture of muscle activity (EMG), positional movement (magnetic tracking), and video.

2007–2008 Research Assistant, Neural Engineering Lab
Designed, built, and programmed portable research-grade medical instruments, including ECG and EMG devices. Demonstrated the viable low-cost application of system-on-chip hardware to these medical instruments, and investigated the limits of SoC precision through EEG capture.

Argonne National Lab, Argonne, IL

SMR 2007 Research Assistant, Mathematics and Computer Science (MCS)
Worked to reduce the difficulty of profiling and tuning parallel code by developing a framework to automate and encapsulate disparate performance analysis tools. Focused on distributed-memory multiprocessing for large scale supercomputers.

University of California at Irvine, Irvine, CA

SMR 2006 Research Assistant, Nanotechnology Lab
Provided lab assistance for a nanotechnology project spanning the fields of chemistry, physics, and engineering. Developed some data analysis tools for the classification of molecular substances flowing through a single nanopore.

TEACHING EXPERIENCE

University of Texas, Austin, TX

2013–2015 Guest Lecturer, High Speed Computer Arithmetic I

Fairfax County Public Schools, Fairfax, Virginia

2003–2004 Instructional Assistant, Introduction to Programming

George Mason University, Fairfax, Virginia

2004 Mentor, School of Music

OTHER WORK EXPERIENCE

George Mason University, Fairfax, Virginia

2005–2007 Computer Lab Manager, University Scholars Program

PUBLICATIONS

2016 Kim, J., Sullivan, M. B., Choukse, E., Erez, M. "Bit-Plane Compression: Transforming Data for Better Compression in Many-core Architectures," *Proceedings of the International Symposium on Computer Architecture (ISCA)*, 2016.

2016 Kim, J., Sullivan, M. B., Lym, S., Erez, M. "All Inclusive ECC: Thorough End-to-End Protection for Reliable Computer Memory," *Proceedings of the International Symposium on Computer Architecture (ISCA)*, 2016.

2015 Kim, J., Sullivan, M. B., Gong, S. L., Erez, M. "Frugal ECC: Efficient and Versatile Memory Error Protection through Fine-Grained Compression", *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, 2015.

2015 Kim, J., Sullivan, M. B., Erez, M. "Bamboo ECC: Strong, Safe, and Flexible Codes for Reliable Computer Memory", *Proceedings of the International Symposium on High Performance Computer Architecture (HPCA)*, 2015.

2013 Rhu, M., Sullivan, M. B., Leng, J., Erez, M. "A Locality-Aware Memory Hierarchy for Energy-Efficient GPU Architectures", textslProceedings of the International Symposium on Microarchitecture (MICRO), Davis, CA, December 7, 2013.

2013 Sullivan, M. B., Swartzlander, E. E. "On Separable Error Detection for Addition", *Proceedings of the Asilomar Conference on Signals and Systems*, Pacific Grove, CA, November 3, 2013.

2013 Chung, J., Lee, I., Sullivan, M. B., Ryoo, J. H., Kim, D. W., Yoon, D. H., Kaplan, L., Erez, M. "Containment Domains: A Scalable, Efficient, and Flexible Resilience Scheme for Exascale Systems," *Scientific Programming*, Vol. 21, Number 3-4, (January 2013): 197–212.

2013 Sullivan, M. B., Swartzlander, E. E. "Truncated Logarithmic Approximation," *Proceedings of the International Symposium on Computer Arithmetic (ARITH)*, Austin, TX, April 7, 2013.

2012 Chung, J., Lee, I., Sullivan, M. B., Ryoo, J. H., Kim, D. W., Yoon, D. H., Kaplan, L., Erez, M. "Containment Domains: A Scalable, Efficient, and Flexible Resilience Scheme for Exascale Systems," *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, Salt Lake City, UT, November 12, 2012.

2012 Sullivan, M. B., Swartzlander, E. E. "Truncated Error Correction for Flexible Approximate Multiplication," *Proceedings of the Asilomar Conference on Signals and Systems*, Pacific Grove, CA, November 3, 2012.

2012 Yoon, D. H., Sullivan, M. B., Jeong, M. K., Erez, M. "Towards Proportional Memory Systems", *Intel Technology Journal*, Vol. 17, Issue 1, 2012.

2012 Willert, J., Kelley, C. T., Knoll, D. A., Dong, H., Ravishankar, M., Sathre, P., Sullivan, M. B., Taitano, W. "Hybrid Deterministic/Monte Carlo Neutronics Using GPU Accelerators," *International Symposium on Distributed Computing and Applications to Business, Engineering & Science (DCABES)*, Guilin, China, October 19, 2012.

2012 Sullivan, M. B., Swartzlander, E. E. "Long Residue Checking for Adders," *Proceedings of the International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, Delft, Netherlands, July 9, 2012.

2012 Yoon, D. H., Sullivan, M. B., Jeong, M. K., Erez, M. "The Dynamic Granularity Memory System," *Proceedings of the International Symposium on Computer Architecture (ISCA)*, Portland, OR, June 9, 2012.

2012 Jeong, M. K., Yoon, D. H., Sunwooz, D., Sullivan, M. B., Lee, I., Erez, M. "Balancing DRAM Locality and Parallelism in Shared Memory CMP Systems," *Proceedings of the International Symposium on High Performance Computer Architecture (HPCA)*, New Orleans, LA, February 25, 2012.

2011 Sullivan, M. B., Swartzlander, E. E. "Hybrid Residue Generators for Increased Efficiency," *Proceedings of the Asilomar Conference on Signals*, Pacific Grove, CA, November 3, 2011.

2008 Powell, M. R., Sullivan, M. B., Vlassiouk, I., Constantin, D., Sundre, O., Martens, C. C., Eisenberg, R. E., and Siwy, Z. S.. "Nanoprecipitation-assisted ion current oscillations," *Nature Nanotechnology*, Vol. 3, No. 1 (January 2008): 51–57.

TECHNICAL REPORTS

2011 Lee, I., Basoglu, M., Sullivan, M. B., Yoon, D. H., Kaplan, L., and Erez, M. "Survey of Error and Fault Detection Mechanisms," Technical Report TR-LPH-2011–002, LPH Group, Department of Electrical and Computer Engineering, The University of Texas at Austin, April, 2011.

2011 Sullivan, M. B., Yoon, D. H., and Erez, M. "Containment Domains: A Full-System Approach to Computational Resiliency". Technical Report TR-LPH-2011–001, LPH Group, Department of Electrical and Computer Engineering, The University of Texas at Austin, January, 2011.

POSTER SESSIONS

2013 Sullivan, M. B., Swartzlander, E. E. "Long Residue Checking for Adders," Presented at the TexasWISE Workshop on VLSI, Round Top, TX, March 8, 2013.

2011 Sullivan, M. B., Swartzlander, E. E. "Hybrid Residue Generators for Increased Efficiency," Presented at the 45th Asilomar Conference on Signals, Pacific Grove, CA, November 3, 2011.

2011 Sullivan, M. B., Basoglu, M., Lee, I., Krimer, E., Erez, M. "Echelon: Reliability at the Exascale," Locality, Parallelism, and Hierarchy (LPH) Research Highlight, Austin, Texas, March 3, 2011.

2007 Sullivan, M. B., Siwy, Z. S., Powell, M. R., and Kalman, E. "Voltage-Gating in Synthetic Nanopores Induced by Cobalt Ions," American Chemical Society, Chicago, Illinois, March 26, 2007. Also presented at Innovations 2007, George Mason University, Fairfax, Virginia, April 25, 2007.

2006 Sullivan, M. B., Siwy, Z. S., Powell, M. R., and Kalman, E. "Voltage-Gating in Synthetic Nanopores Induced by Cobalt Ions," IM-SURE Symposium, University of California, Irvine, August 2006.

AWARDS & FELLOWSHIPS

2010–2013 Temple Foundation MCD Fellowship
2008–2010 National Defense Science and Engineering Graduate Fellowship
2009 Graduate Dean Prestigious Fellowship Supplement
2008 NSF Graduate Research Fellowship Program Honorable Mention
2004–2008 George Mason University Scholar
2006–2008 Northern Virginia Technology Council Bannister Scholarship
2005–2008 AFCEA-NOVA Scholarship

PROFESSIONAL AFFILIATIONS

Alpha Chi Honor Society
Alpha Lambda Delta Honor Society
American Chemical Society
Armed Forces Communications & Electronics Association

Institute of Electrical and Electronics Engineers
Golden Key International Honor Society

RESEARCH GRANTS

2007 GMU Undergraduate Faculty-Student Research Apprenticeship Grant
2007 DoE Undergraduate Laboratory Internship Program
2007 NSF-REU Chemistry Leadership Group Travel Award
2006 NSF Research Experience for Undergraduates Program