MICHAEL B. SULLIVAN

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EMPLOYMENT

NVIDIA Corporation, Santa Clara, CA & Austin, TX
2015– Research Scientist, Architecture Research Group (ARG)

University of Texas, Austin, TX
2010–2015 Research Assistant, Locality Parallelism and Hierarchy Lab (LPH)

Los Alamos National Lab, Los Alamos, NM
2011 Research Assistant, Applied Computer Science (CCS-7)

George Mason University, Fairfax, VA
2008 Research Asst., Lab for the Study and Sim. of Human Mvmt.
2007–2008 Research Assistant, Neural Engineering Lab

Argonne National Lab, Argonne, IL
2007 Research Assistant, Mathematics and Computer Science (MCS)

University of California at Irvine, Irvine, CA
2006 Research Assistant, Nanotechnology Lab

EDUCATION

Cockrell School of Engineering, University of Texas at Austin
2008–2015 Ph.D. in Computer Engineering

Cockrell School of Engineering, University of Texas at Austin
MAY 2011 M.S.E. in Computer Engineering

Volgeneu School of Engineering, George Mason University
JAN 2009 M.S. in Computer Science
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*

PUBLICATIONS

2018 Sullivan, M. B., Hari, S. K. S., Zimmer, B., Tsai, T., Keckler, S. W. "SwapCodes: Error Codes for Hardware-Software Cooperative GPU Pipeline Error Detection," *Proceedings of the International Symposium on Microarchitecture (MICRO)*, 2018.

2018 Abdulrahman, M., Hari, S. K. S., Sullivan, M. B., Tsai, T., Keckler, S. W. "Optimizing Software-Directed Instruction Replication for GPU Error Detection," *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, 2018.

2018 Chang, C. K., Lym, S., Kelly, N., Sullivan, M. B., Erez, M. "Evaluating and Accelerating High-Fidelity Error Injection for HPC," *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, 2018.

2018 Garg, R., Mohan, A., Sullivan, M. B., Cooperman, G. "CRUM: Checkpoint-Restart Support for CUDA's Unified Memory" *Proceedings of the International Conference on Cluster Computing (CLUSTER)*, 2018.

2018 Li, G., Hari, S. K. S., Sullivan, M. B., Tsai, T., Pattabiraman, K. "Modeling Soft-Error Propagation in Programs," *Proceedings of the International Conference on Dependable Systems and Networks (DSN)*, 2018.

2018 Chang, C. K., Lym, S., Kelly, N., Sullivan, M. B., Erez, M. "Hamartia: A Fast and Accurate Error Injection Framework," *Proceedings of the International Conference on Dependable Systems and Networks (DSN)*, 2018.

2018 Gong, S. L., Kim, J., Lym, S., Sullivan, M. B., David, H., Erez, M. "DUO: Exposing On-chip Redundancy to Rank-Level ECC for High Reliability," *Proceedings of the International Symposium on High Performance Computer Architecture (HPCA)*, 2018.

2017 Li, G., Hari, S. K. S., Sullivan, M. B., Tsai, T., Pattabiraman, K., Emer, J., Keckler, S. W. "Understanding Error Propagation in Deep Learning Neural Network (DNN) Accelerators and Applications," *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis (SC)*, 2017.

2016 Sullivan, M. B., Zimmer, B., Hari, S. K. S., Tsai, T., Keckler, S. W. "An Analytical Model for Hardened Latch Selection and Exploration," *Proceedings of the Workshop on Silicon Errors in Logic–System Effects (SELSE)*, 2016.

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", *Proceedings 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.

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

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, AND RESEARCH GRANTS

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
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

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