JASON D. BAKOS
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EDUCATION

2005	Ph.D., Computer Science, University of Pittsburgh Dissertation: "Lightweight Hierarchical Error Control Codes for Multi-Bit Differential Channels"
June 1999	B.S. with Honors, Computer Science, Youngstown State University

POSITIONS AND EMPLOYMENT

2017-	*Professor*, Dept. of Computer Science and Engineering University of South Carolina
2011-2017	*Associate Professor (tenured)*, Dept. of Computer Science and Engineering University of South Carolina
2005-2011	*Assistant Professor*, Dept. of Computer Science and Engineering University of South Carolina
1999-2005	*Research/Teaching Assistant*, Dept. of Computer Science University of Pittsburgh

HONORS AND AWARDS

2022	Department of Computer Science and Engineering Senior Faculty Research Award
2018	Department of Computer Science and Engineering Undergraduate Teaching Award
2009	NSF CAREER Award Recipient (Award Number CCF-0844951)
2007	Appointed, ACM Upsilon Pi Epsilon
2004	Third place winner, DAC/ISSCC Student Design Contest, 41st Annual IEEE/ACM Design Automation Conference, Paper Title: "SiGe Prototype Chip Design Implementing CMOS Fixed Bit-Load Drivers and Receivers for Next Generation High-Speed Board-Level Interconnect"
2004	First place winner, 5th Annual Compunetix Graduate Student Research Competition, University of Pittsburgh, Paper Title: "Hierarchical Error Correction Codes over Multi-Bit Differential Signaling"
2002	Second place winner, DAC/ISSCC Student Design Contest, 39th Annual IEEE/ACM Design Automation Conference, Paper Title: "Design of a Crossbar Switch Chip for Use in a Demonstration System of an Optoelectronic Multi-Chip Module"

PUBLICATIONS

Textbooks

B3 Jason D. Bakos, "Integrative Design and Programming of Internet-of-Things and Cyberphysical Platforms," Cognella Publishers, 2024.

B2 Jason D. Bakos, "Embedded Systems: ARM Programming and Optimization, Second Edition," Elsevier Publishers, 2024.

B1 Jason D. Bakos, "Embedded Systems: ARM Programming and Optimization," Elsevier Publishers, 2015.

Patents

P2 Jason D. Bakos, "System and method for sparse matrix vector multiplication processing," US patent number US20120278376.

P1 Bo Wang, Antonello Monti, Jason Bakos, Marco Riva, "Driver Circuit for Gallium Nitride (GaN) Heterojunction Field Effect Transistors (HFETS)," U.S. Patent Number US8054110.

Journal Publications ***(student authors in italics)***

J20 *Ehsan Kabir*, Jason D. Bakos, David Andrews, Miaoqing Huang, "A runtime-adaptive transformer neural network accelerator on FPGAs," Microprocessors and Microsystems, Volume 120, 2026.

J19 *MD Arafat Kabir*, *Nathaniel Fredricks*, *Tendayi Kamucheka*, Joel Mandebi, Miaoqing Huang, Jason D. Bakos, David Andrews, "DA-VinCi: A Deeplearning Accelerator Overlay Using In-Memory Computing," ACM Trans. on Reconfigurable Technology and Systems (TRETS).

J18 *Zhymir Thompson*, Austin Downey, Jason D. Bakos, Jie Wei, Jacob Dodson, "Multi-modal generative adversarial networks for synthesizing time-series structural impact responses," Mechanical Systems and Signal Processing, 2023.

J17 Rasha Karakchi, Jason D. Bakos, "NAPOLY: A Non-deterministic Automata Processor OverLaY," ACM Transactions on Reconfigurable Technology and Systems, Vol. 16, No. 3, 2023.

J16 *Emmanuel A. Ogunniyi*, *Claire Drnek*, Seong Hyeon Hong, Austin R.J. Downey, Yi Wang, Jason D. Bakos, Peter Avitabile, and Jacob Dodson, "Real-time structural model updating using local eigenvalue modification procedure for applications in high-rate dynamic events," Mechanical Systems and Signal Processing, 195:110318, Jul. 2023.

J15 Matthew Nelson; Vahid Barzegar; Simon Laflamme; Chao Hu; Austin Downey; Jason Bakos; Adam Thelen; Jacob Dodson, "Multi-step ahead state estimation with hybrid algorithm for high-rate dynamic systems," Mechanical Systems and Signal Processing, Volume 182, 1 January 2023, 109536.

J14 Hung-Tien Huang, Austin R.J. Downey, and Jason D. Bakos, "Audio-based wildfire detection on embedded systems," MDPI Electronics, 11(9), 2022, doi:10.3390/electronics11091417.

J13 *Matthew Milton*, Andrea Benigni, Jason Bakos, "System-Level, FPGA-Based, Real-Time Simulation of Ship Power Systems," IEEE Trans. on Energy Conversion, Vol. 32, No. 2. June 2017.

J12 *Zheming Jin*, Jason D. Bakos, "Memory Interface Design for 3D Stencil Kernels on a Massively Parallel Memory System," ACM Transactions on Reconfigurable Technology and Systems (TRETS), Vol. 8, Issue. 4, 2015.

J11 *Ibrahim Savran*, *Yang Gao*, Jason D. Bakos, "Large-scale Pairwise Sequence Alignments on a Large-scale GPU Cluster," IEEE Design and Test, January/February 2014, *invited*.

J10 *Fan Zhang*, *Yan Zhang*, Jason D. Bakos "Accelerating Frequent Itemset Mining on Graphics Processing Units," Journal of Supercomputing, February 2013.

J9 *Zheming Jin*, Jason D. Bakos, "A Heuristic Scheduler for Port-Constrained Floating-Point Pipelines," International Journal of Reconfigurable Computing, Vol. 2013, Article ID 849545, 9 pages, 2013.

J8 *Zheming Jin*, Jason D. Bakos, "Extending the BEAGLE Library to a Multi-FPGA Platform," BMC Bioinformatics, 2013, 14:25.

J7 *Yan Zhang*, *Fan Zhang*, *Zheming Jin*, Jason D. Bakos, "An FPGA-Based Accelerator for Frequent Itemset Mining," ACM Trans. Reconfigurable Technology and Systems (TRETS), Vol. 6, Issue 1, May 2013.

J6 *Tiffany M. Mintz*, Jason D. Bakos, "A Cluster-on-a-Chip Architecture for High-Throughout Phylogeny Search," IEEE Trans. on Parallel and Distributed Systems, Vol. 23, No. 4, April 2012.

J5 Jason D. Bakos, "High-Performance Heterogeneous Computing with the Convey HC-1," Computing in Science and Engineering, Vol. 12, No. 6, November/December 2010, *invited*.

J4 *Bo Wang*, Marco Riva, Jason D. Bakos, Antonello Monti, "Integrated Circuit Implementation for a GaN HFET Driver Circuit," IEEE Trans. on Industry Applications, IEEE Trans. Industry Applications, Vol. 46, No. 5, Sept./Oct. 2010.

J3 *Stephanie Zierke*, Jason D Bakos, "FPGA acceleration of the phylogenetic likelihood function for Bayesian MCMC inference methods," BMC Bioinformatics 2010, 11:184.

J2 Jason D. Bakos, *Panormitis E. Elenis*, "A Special-Purpose Architecture for Solving the Breakpoint Median Problem," IEEE Transactions on Very Large Scale Integration (VLSI) Systems, Vol. 16, No. 12, Dec. 2008.

J1 Jason D. Bakos, Donald M. Chiarulli, Steven P. Levitan, "Lightweight Error Correction Coding for System-Level Interconnects," IEEE Transactions on Computers, Vol. 56, No. 3, March 2007.

Peer-reviewed Conference Publications *(student authors in italics)*

C57 *Suyash Vardhan Singh*, *Anzhelika Kolinko*, *Md Hasibul Amin*, Ramtin Zand, Jason D. Bakos, "A Decomposition-Based Memristive Crossbar Solver and FPGA-Accelerated Hardware Implementation," Proc. 35th Great Lakes Symposium on VLSI (GLSVLSI 2025).

C56 Md Hasibul Amin, Mohammadreza Mohammadi, Jason D. Bakos, Ramtin Zand, "CrossNAS: A Cross-Layer Neural Architecture Search Framework for PIM Systems," Proc. 35th Great Lakes Symposium on VLSI (GLSVLSI 2025).

C55 *Suyash Vardhan Singh*, *Iftakhar Ahmad*, Miaoqing Huang, David Andrews, Austin Downey, Jason D. Bakos, "N-TORC: Native Tensor Optimizer for Real-time Constraints," Proc. 33rd IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM 2025).

C54 *Ehsan Kabir*, Austin Downey, Jason D. Bakos, David Andrews, Miaoqing Huang, "Optimized Coding and Parameter Selection for Efficient FPGA Design of Attention Mechanisms," Proc. 33rd IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM 2025).

C53 *Suyash Vardhan Singh*, *Iftakhar Ahmad*, David Andrews, Miaoqing Huang, Austin R.J. Downey, Jason D. Bakos, "Resource Scheduling for Real-Time Machine Learning," Proc. 33rd IEEE International Symposium on Field-Programmable Gate Arrays (FPGA 2025).

C53 *Ehsan Kabir*, Jason D. Bakos, David Andrews, and Miaoqing Huang, "ProTEA: Programmable Transformer Encoder Acceleration on FPGA," Proc. 10th Workshop on Heterogeneous High-Performance Reconfigurable Computing (H2RC 2024) at ACM/IEEE Supercomputing 2024.

C52 *MD Arafat Kabir*, *Tendayi Kamucheka*, *Nathaniel Fredricks*, Joel Mandebi, Jason D. Bakos, Miaoqing Huang, David Andrews, "IMAGine: An In-Memory Accelerated GEMV Engine Overlay," Proc. 34th International Conference on Field-Programmable Logic and Applications (FPL 2024).

C51 *Ehsan Kabir*, *Daniel Coble*, *Joud N. Satme*, Austin R.J. Downey, Jason D. Bakos, David Andrews, and Miaoqing Huang, "Accelerating LSTM-based High-Rate Dynamic System Models," Proc. 33rd IEEE International Conference on Field Programmable Logic (IEEE FPL 2023).

C50 *Md Arafat Kabir*, *Ehsan Kabir*, *Joshua Hollis*, *Eli Levy-Mackay*, *Atiyehsadat Panahi*, Jason D. Bakos, Miaoqing Huang, David Andrews, "FPGA Processor-in-Memory Architectures (PIMs): Overlay or Overhaul?" Proc. 33rd IEEE International Conference on Field Programmable Logic (IEEE FPL 2023).

C49 *M. Kabir*, *J. Hollis*, *A. Panahi*, J. Bakos, M. Huang, D. Andrews, "Making BRAMs Compute: Creating Scalable Computational Memory Fabric Overlays", Proc. of the 31st IEEE International Symposium on Field-Programmable Custom Computing (FCCM 2023).

C48 *Alexander B. Vereen*, *Emmanuel A. Ogunniyi*, Austin R.J. Downey, Erik Blasch, Jason D. Bakos, Jacob Dodson, "Optimal Sampling Methodologies for High-rate Structural Twinning," Proc. 26th International Conference on Information Fusion, Jun. 27-30, 2023 (FUSION 2023).

C47 *Puja Chowdhury*, *Anzhelika Kolinko*, Austin R.J. Downey, Jason D. Bakos, Jacob Dodson, "Deterministic Hardware Implementation of High-Rate Time-Series Forecasting," ASME 2022 Smart Materials, Adaptive Structures, and Intelligent Systems (SMASIS2022).

C46 *Joud Satme*, *Daniel Coble*, *Braden Priddy*, Austin R. J. Downey, Jason D. Bakos, and Gurcan Comert, "Progress towards data-driven high-rate structural state estimation on edge computing devices," in Volume 10: 34th Conference on Mechanical Vibration and Sound (VIB). American Society of Mechanical Engineers, Aug. 2022. doi:10.1115/detc2022-90118.

C45 *Atiyehsadat Panahi*, *Ehsan Kabir,* Austin Downey, David Andrews, Miaoqing Huang, Jason D. Bakos," High-Rate Machine Learning for Forecasting Time-Series Signals," Proc. 30th IEEE International Conference on Field Programmable Custom Computing Machines (FCCM 2022).

C44 *Emmanuel Ogunniyi*, Austin R. J. Downey, Jason Bakos, "Development of a real-time solver for the local eigenvalue modification procedure" Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2022. SPIE, Apr 2022. doi:10.1117/12.2613208.

C43 *Puja Chowdhury*, *Vahid Barzegar*, *Joud Satme*, Austin Downey, Simon Laflamme, Jason D. Bakos, Chao Hu, "Deterministic and low-latency time-series forecasting of nonstationary signals" Active and Passive Smart Structures and Integrated Systems XVI. SPIE, apr 2022. doi:10.1117/12.2629025.

C42 *Joud Satme*, *Corinne Smith*, Austin R. J. Downey, Jason D. Bakos, Nikolaos Vitzilaios, Dimitris Rizos, "Compensation technique for accurate acceleration measurements using a UAV deployable and retrievable sensor package," Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2022. SPIE, Apr. 2022. doi:10.1117/12.2612945.

C41 *Zhymir Thompson*, Austin Downey, Jason Bakos, Jie Wei, "Synthesizing Dynamic Time-series Data for Structures Under Shock Using Generative Adversarial Networks," Data Science in Engineering, Volume 10, 2022.

C40 *Ishrat Singh*, *Philip Conrad*, *Puja Chowdhury*, Jason D. Bakos, Austin Downey, "Real-time Forecasting of Vibrations with Nonstationarities," Proceedings of the 39th IMAC, A Conference and Exposition on Structural Dynamics 2021, Springer International Publishing, p. 21-29, Oct 2021. Feb 2021, doi:10.1007/978-3-030-76004-5_4.

C39 *Puja Chowdhury*, *Philip Conrad*, Jason D. Bakos, Austin Downey, "Time Series Forecasting for Structures Subjected to Nonstationary Inputs," Proceedings of the ASME 2021 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS 2021), doi:10.1115/SMASIS2021-68338.

C38 *Ishrat Singh*, *Philip Conrad*, *Puja Chowdhury*, Jason D. Bakos, and Austin Downey, "Real-time Forecasting of Vibrations with Nonstationarities," IMAC-XXXIX (Society for Experimental Mechanics).

C37 *Rasha Karakchi*, *Charles A. Daniels*, Jason D. Bakos, "An Overlay Architecture for Pattern Matching," Proc. 30th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP 2019).

C36 *Madushan Abeysinghe*, Jesse Villarreal, Lucas Weaver, Jason D. Bakos, "OpenVX Graph Optimization for Visual Processor Units," Proc. 30th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP 2019).

C35 H. L. Ginn III, J. D. Bakos, A. Benigni, "Fast Coordination of Power Electronic Converters for Energy Routing in Shipboard Power Systems," Proc. 2018 International Ship Control Systems Symposium (iSCSS 2018).

C34 *Rasha Karakchi*, *Lothrop O. Richards*, and Jason D. Bakos, "A Dynamically Reconfigurable Automata Processor Overlay," Proc. International Conference on Reconfigurable Computing and FPGAs 2017 (ReConFig 2017).

C33 *Ivan Panchenko*, Jason D. Bakos, Herbert L. Ginn, "Control System Communication Architecture for Power Electronic Building Blocks," Proc. IEEE Electric Ship Technologies Symposium 2017 (ESTS 2017).

C32 *Rasha Karakchi, Jordan Bradshaw,* Jason D. Bakos*,* "High-Level Synthesis of a Genomic Database Search Engine," Proc. 2016 International Conference on Reconfigurable Computing and FPGAs (ReConFig 2016).

C31 *Jordan Bradshaw*, *Rasha Karakchi*, Jason D. Bakos, "Two-Hit Filter Synthesis for Genomic Database Search," Proc. 24th IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM 2016).

C30 *Fan Zhang*, *Yang Gao*, Jason D. Bakos, "Lucas-Kanade Optical Flow Estimation on the TI C66x Digital Signal Processor," Proc. 18th Annual IEEE High Performance Extreme Computing Conference (HPEC 2014), Sept. 2014.

C29 *Yang Gao*, *Fan Zhang*, Jason D. Bakos, "Sparse Matrix-Vector Multiply on the Keystone II Digital Signal Processor," Proc. 18th Annual IEEE High Performance Extreme Computing Conference (HPEC 2014), Sept. 2014.

C28 *Krishna Nagar*, Jason D. Bakos, "Accuracy, Cost, and Performance Tradeoffs for Floating-Point Accumulation," Proc. 2013 International Conference on Reconfigurable Computing and FPGAs (ReConFig 2013).

C27 *Yang Gao*, Jason D. Bakos, "Sparse Matrix-Vector Multiply on the Texas Instruments C6678 Digital Signal Processor," Proc. The 24th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP 2013), Washington D.C., June 5-7, 2013.

C26 *Zheming Jin*, Jason D. Bakos, "Memory Access Scheduling on the Convey HC-1," Proc. The 21st IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM 2013), Seattle, Washington, April 28-30, 2013.

C25 *Yang Gao*, Jason D. Bakos, "GPU Acceleration of Pyrosequencing Noise Removal," Proc. 2012 Symposium on Application Accelerators in High-Performance Computing (SAAHPC 2012).

C24 *Yan Zhang*, *Fan Zhang*, Jason D. Bakos, "Frequent Itemset Mining on Large-Scale Shared Memory Machines," Proc. IEEE International Conference on Cluster Computing (CLUSTER 2011), Sept. 26-30, 2011.

C23 *Fan Zhang*, *Yan Zhang*, Jason D. Bakos, "GPApriori: GPU-Accelerated Frequent Itemset Mining," Proc. IEEE International Conference on Cluster Computing (CLUSTER 2011), Sept. 26-30, 2011.

C22 *Krishna K. Nagar*, Jason D. Bakos, "A Sparse Matrix Personality for the Convey HC-1," Proc. 19th Annual IEEE International Symposium on Field Programmable Custom Computing Machines (FCCM'11), May 1-3, 2011.

C21 *Ibrahim Savran*, Jason D. Bakos, "GPU Acceleration of Near-Minimal Logic Minimization," Proc. 2010 Symposium on Application Accelerators for High-Performance Computing (SAAHPC 2010), July 13-15, 2010.

C20 *Krishna. K. Nagar*, Jason D. Bakos, "A High-Performance Double Precision Accumulator," Proc. 8th IEEE International Conference on Field-Programmable Technology (IC-FPT'09), Dec. 9-11, 2009.

C19 *Yan Zhang*, *Yasser Shalabi*, *Rishabh Jain*, *Krishna K. Nagar*, Jason D. Bakos, "FPGA vs. GPU for Sparse Matrix Vector Multiply," Proc. 8th IEEE International Conference on Field-Programmable Technology (IC-FPT'09), Dec. 9-11, 2009.

C18 *Krishna K. Nagar*, Jason D. Bakos, "An Integrated Reduction Technique for a Double Precision Accumulator," Proc. 3rd International Workshop on High-Performance Reconfigurable Computing Technology and Applications (HPRCTA'09), held in conjunction with Supercomputing 2009 (SC'09), Nov. 15, 2009.

C17 Jason D. Bakos, *Krishna K. Nagar*, "Exploiting Matrix Symmetry to Improve FPGA-Accelerated Conjugate Gradient," Proc. 17th Annual IEEE International Symposium on Field Programmable Custom Computing Machines (FCCM'09), April 5-8, 2009.

C16 *Bo Wang*, Marco Riva, Jason D. Bakos, A. Monti, "Integrated Circuit Implementation for a GaN HFETs Driver Circuit," Proc. IEEE Applied Power Electronics Conference and Exposition (APEC 2008), Austin, TX, Feb. 24-28, 2008.

C15 Jason D. Bakos, *Panormitis E. Elenis*, Jijun Tang, "FPGA Acceleration of Phylogeny Reconstruction for Whole Genome Data," Proc. 7th IEEE International Symposium on Bioinformatics & Bioengineering (BIBE 2007), Boston, MA, 14-17 Oct. 2007.

C14 Jason D. Bakos, "FPGA Acceleration of Gene Rearrangement Analysis," Proc. 16th IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM 2007), April 23-25, 2007.

C13 Jason D. Bakos, *Charles L. Cathey*, *E. Allen Michalski*, "Predictive Load Balancing for Interconnected FPGAs," Proc. 16th International Conference on Field Programmable Logic and Applications (FPL 2006), Madrid, Spain, August 28-30, 2006.

C12 *Charles L. Cathey*, Jason D. Bakos, Duncan A. Buell, "A Reconfigurable Distributed Computing Fabric Exploiting Multilevel Parallelism," Proc. 15th IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM 2006), April 24-26, 2006.

C11 Donald M. Chiarulli, Sam Dickerson, Jason D. Bakos, Joel R. Martin, Steven P. Levitan, "Efficient Optical Communications Using Multibit Differential Signaling," Proc. SPIE Symposium on Optoelectronics, Photonics West: Photonics Packaging and Integration VIII, Paper No. 6126-16, San Jose, CA, 21-26 January 2006.

C10 Donald M. Chiarulli, Jason D. Bakos, Joel R. Martin, Steven P. Levitan, "Area, Power, and Pin Efficient Bus Transceiver Using Multi-Bit-Differential Signaling," Proc. IEEE International Symposium on Circuits and Systems (ISCAS 2005), pp. 1662 - 1665 Vol. 2, Kobe, Japan, May 23-26, 2005.

C9 Donald M. Chiarulli, Jason D. Bakos, Joel R. Martin, Steven P. Levitan, "Area, power, and pin efficient bus structures using multi-bit-differential signaling," Proc. SPIE Symposium on Microtechnologies for the New Millennium 2005, pp. 5837-04, VLSI Circuits and Systems II, 5837-4, Sevilla, Spain, May 9-11, 2005.

C8 Steven P. Levitan, Donald M. Chiarulli, Sam Dickerson, Jason Bakos, Joel Martin, "Power Efficient Communication Using Multi-Bit-Differential Signaling," Proc. IEEE/LEOS 16th Annual Workshop on Interconnections within High-Speed Digital Systems, Santa Fe, NM, May 8-11, 2005.

C7 Donald M. Chiarulli, Steven P. Levitan, Jason Bakos, Charles Kuznia, "Active Substrates for Optoelectronic Interconnect," Proc. IEEE International Symposium on Circuits and Systems (ISCAS 2004), Volume 5, pp. V-592 - V-595, Vancouver, Canada, May 23-26, 2004.

C6 Donald Chiarulli, Jason Bakos, Leo Selavo, Steven Levitan, John Hansson, Michael Weisser, "Photonic Packaging for Mixed-Technology Sensor Systems," Proc. Topical Meeting on Optics in Computing, European Optical Society (OC 2004),

Integrated Photonics Research and Optics in Computing (IPR-OiC'2004), pp. 113-114, Engelberg, Switzerland, April 21-23, 2004.

C5 Steven P. Levitan, Timothy P. Kurzweg, Jose A. Martinez, Mark Kahrs, Jason Bakos, Craig Windish, Jason Boles, John Hansson, Michael Weisser, Charles Kuznia, Donald M. Chiarulli, "Modeling and Simulation of Fiber Image Guide Multi-Chip Modules for MOEMS Applications," Proc. SPIE Photonics West: Micromachining and Microfabrication/MOEMS and Miniaturized Systems IV, Vol. 5346-18, pp. 141-150, San Jose, CA, 25-30 January 2004.

C4 Jason D. Bakos, Donald Chiarulli, and Steven P. Levitan, "Optoelectronic Multi-Chip Module Demonstrator System," in Optics in Computing, OSA Technical Digest, (Optical Society of America, Washington DC, 2003) pp 117-119.

C3 D. Chiarulli, S. Levitan, J. Bakos, "Optoelectronic Multi-Chip Modules," Proc 10th Annual Conference of Mixed Design of Integrated Circuits and Systems (MIXDES2003), Lodz, Poland, June 26-28, 2003.

C2 Leo Selavo, Jason Bakos, Donald M. Chiarulli, Steven P. Levitan, "Encoding Benefits for Fast Optical Transceivers," Proc. 14th IEEE-LEOS Annual Workshop on Interconnections within High-Speed Digital Systems, Santa Fe, New Mexico, 4 – 7 May 2003.

C1 J. D. Bakos, D. M. Chiarulli, and S. P. Levitan, "Optoelectronic Multi-Chip-Module Implementation of a 64 Channel Crossbar Switch," Proc. International Conference of Optics in Computing (OC2002) pp. 161-163, Taipei, Taiwan, April 8-11, 2002.

Dissertations and Theses by Advisees

Ph.D.

P10 Madushan Abeysinghe, "Automated data-flow optimization for Digital Signal Processors," 2024.

P9 Konstantin Rubin, "Multi-Objective Routing for Distributed Controllers," 2021.

P8 Rasha Karakchi, "An Overlay Architecture for Pattern Matching," Ph.D. dissertation, 2019

P7 Jordan Bradshaw, "Regular Expression Synthesis for BLAST Two-Hit Filtering," Ph.D. dissertation, 2016.

P6 Yang Gao, "Automated Scratchpad Mapping and Allocation for Embedded Processors," Ph.D. dissertation, 2014.

P5 Fan Zhang, "Automatic Loop Tuning and Memory Management for Stencil Computations," Ph.D. dissertation, 2014.

P4 Zheming Jin, "Memory Interface Synthesis for FPGA-Based Computing," Ph.D. dissertation, 2014.

P3 Krishna Kumar Nagar, "Accuracy, Cost and Performance Trade-offs for Streaming Set-wise Floating Point Accumulation on FPGAs," Ph.D. dissertation, 2013.

P2 Yan Zhang, "Frequent Itemset Mining on FPGA Co-Processor," Ph.D. dissertation, 2012.

P1 Tiffany Monique Mintz, "Systematic Code Partitioning for the Disjoint-Memory Co-Processor Accelerated Execution Model," Ph.D. dissertation, 2010.

M.S.

M4 Clay Clews, "Hardware Accelerated Simulation of Buck Converters using Physics-Informed Neural Networks," M.S. Thesis, 2025

M3 Lacie Stiffler, "Implementation Costs of Spiking versus Rate-Based ANNs," M.S. Thesis, 2018.

M2 Shaun Gause, "Accelerating Short Read Mapping Using a DSP Based Coprocessor," M.S. Thesis, 2013.

M1 Stephanie Zierke, "A Reconfigurable Implementation of Bayesian Phylogenetic Inference," M.S. Thesis, 2009.

RESEARCH FUNDING

Ongoing External Research Support

G23 Ramtin Zand (PI), **J. Bakos (Co-PI)**, "Cross-Layer Design Automation for In-Memory Analog Computing," NSF, $589K, my share = $294K, 2024-2027.

G22 Enrico Santi (PI), Kristen Booth (Co-PI), Austin Downey (Co-PI), Jamil A. Khan (Co-PI), Bin Zhang (Co-PI), David Matolak (Co-PI), Adel Nasiri (Co-PI), Herbert Ginn (Co-PI), **J. Bakos (Co-PI)**, William Mustain, Ralph White, "Enhanced Digital Twins for Navy Power and Energy Systems," ONR, my share = $150K, 2023-2026.

G21 Asif Khan (PI), Chandra Chandrashekhar (Co-PI), Grigory Simin (Co-PI), Tom Vogt (Co-PI), **J. Bakos (Co-PI)**, Bridget Armstrong (Co-PI), Dirk Brown (Co-PI), "Research Institute for Extreme Semiconductor Chips and Entrepreneurship (RICE)," USC VPR internal grant, $2M.

G20 A. Downey (PI), **J. Bakos (Co-PI)**, "Collaborative Research: SHF: Small: Sub-millisecond topological feature extractor for high-rate machine learning," NSF, $266K, my share = $147K, 2023-2026.

G19 J. Imran (PI), **J. Bakos (Co-PI)**, M. Khan (Co-PI), A. Downey (Co-PI), L. Micheli (Co-PI), "LEAP-HI: A Data-Driven Fragility Framework for Risk Assessment of Levee Breach," $2M, my share = $150K, NSF 2152896, 2022-2027.

G18 **J. Bakos (PI)**, Austin Downey (Co-PI), "Collaborative Research:SHF:Medium:Machine Learning on the Edge for Real-Time Microsecond State Estimation of High-Rate Dynamic Events," $691K total, my share = $380K, NSF 1956071, 2020-2025.

G17 **J. Bakos (PI)**, "Data Analysis, Computer Vision, and Machine Learning for DOE-3013 Plutonium Canister Corrosion Surveillance," $1,328,642, Savannah River National Laboratory (SRNL)/Department of Energy, 2019-2026.

Previous External Research Support

G16 Jasim Imran, Austin Downey, **J. Bakos (Co-PI)**, Etienne Toussaint, Mohammed Baalousha, Meeta Banerjee, Erfan Goharian, "NSF Convergence Accelerator Track K: COMPASS: Comprehensive Prediction, Assessment, and Equitable Solutions for Storm-Induced Contamination of Freshwater Systems," NSF, $650K, my share = $15K, 2024-2025.

G15 **J. Bakos (PI)**, Texas Instruments Corporation, "Automated DSP SoC Resource Mapping for Embedded Computer Vision Applications," $750K, 2018-2024.

G14 K. Booth (PI), **J. Bakos (Co-PI)**, A. Downey (Co-PI), "Enhanced Electro-mechanical Powertrain Safety through Deterministic Online Model Assimilation," NASA EPSCoR Rapid Response Research (R3), $88K, my share = $30K, 2022-2023.

G13 **J. Bakos (PI)**, "SHF:Small:A Unified Approach for Scheduling Computer Vision Dataflow Graphs," $249K, NSF 1910748, 2019-2024.

G12 Austin Downey (PI), **J. Bakos (Co-PI)**, "RTML:Small:Collaborative: A Programming Model and Platform Architecture for Real-time Machine Learning for Sub-Second Systems," $260K total, my share = $130K, NSF 1937460, 2019-2023.

G11 **J. Bakos (PI)**, "Data-Driven Models for Predicting Glass Composition," $70K, Savannah River National Laboratory (SRNL), 2020-2021.

G10 Austin Downey (PI), **J. Bakos (Co-PI)**, Paul Ziehl (Co-PI), Sourav Banerjee (Co-PI), Lingyu Yu (Co-PI), "Real-Time Edge Computing in Structures Experiencing Shock," $202K total, my share = $50K, AFOSR DURIP, 2020-2021.

G9 Herbert Ginn (PI), Andrea Benigni (Co-PI), **J. Bakos (Co-PI)**, "Development of Universal Controller Networks to Enable Power Electronic Power Distribution Systems," $310K total, my share = $120K, ONR Electric Ship Research and Development Consortium FY17-21, 2018-2022.

G8 **J. Bakos (PI**), "Automated SoC Resource Mapping for Embedded Computer Vision Applications," $150K, Texas Instruments Corporation, 2016 - 2018.

G7 **J. Bakos (PI)**, "SHF: Small: Collaborative Research: The Automata Programming Paradigm for Genomic Analysis," $500K total, $215K my share (incl. supplements), NSF CCF 1421059, 2014-2017.

G6 Herb Ginn (PI), **J. Bakos (Co-PI)**, "Development of Universal Controller Architecture for SiC Based Power Electronic Building Blocks," $600K total, my share = $200K, ONR N00014-15-1-2346, 2015 – 2017.

G5 **J. Bakos (PI)**, "Kernel Library Development for the Texas Instruments C66 DSP," $210K, Texas Instruments Corporation, 2013-2016.

G4 **J. Bakos (PI)**, "CAREER: Design Automation for High Performance Reconfigurable Computing," $500K, NSF CCF 0844951, 2009-2014.

G3 **J. Bakos (PI)**, "SHF:Small:Co-Processors for High-Performance Genome Analysis," $155K, NSF CCF 0915608, 2009-2011.

G2 Antontello Monti (PI), **J. Bakos (Co-PI)**, "Frequency-Agile Wide-Bandwidth Power Interface to Support Incremental Virtual Prototyping," my share = $49K, ONR N00014-05-1-0734, 2007-2011.

G1 **J. Bakos (PI)**, "Dual Variable Output Fuel Cell Hybrid Bus Testing and Demonstration Project," $313K total, my share = $80K, DOE GA-04-7001-00 via Center for Transportation and the Environment (CTE)/DOT, 2007-2011.

Competitive Internal Research Funding

I10 **USC Magellan Award**, 2023
"Magellan-Wang-NMR: Advanced Sine Wave Generation and Analysis for Particle Concentration Measurement and Fuel Classification," $3K

I9 **USC Magellan Journey award**, 2013
Jacob Vaught, $3K

I8 **USC Magellan Apprentice award**, 2019
"A Review of FPGA-Oriented Network-on-Chip Routing Algorithms & Topographies," $1K

I7 **USC Magellan Apprentice award**, 2018
"Unified Register-Memory RISC Architecture for Accelerated NFA Simulation," $1K

I6 **USC SPARC Graduate Research Grant Program**, 2016-2017
"A Special Purpose Compiler and Processor for Pattern Recognition," $5K

I5 **USC Magellan Apprentice award**, 2017
"Generalized Hough Transform on the Tegra X1 Embedded SOC Architecture," $1K

I4 **USC Honors College SURF award**, 2016-2017
"Synthesis of energy efficient neural networks onto a reconfigurable substrate," $1.5K

I3 **USC Magellan Award**, 2015
"Local Alignment Search Built on a Finite Automata Abstractions," $6K

I2 **South Carolina EPSCoR/IDeA**, 2012
"Power Efficiency Instrumentation for DSP-Based Supercomputing," $6K

I1 **USC Magellan Award**, 2006
"MGS: Efficient Router Designs for Special-Purpose Distributed Processing Systems," $3K

SERVICE ACTIVITES

Conference Organizing Committees

2015-2026	Co-chair, Workshop on Heterogeneous High-performance Reconfigurable Computing (H²RC) at Supercomputing
2025	Workshops and Tutorials chair, IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM)
2015-2019	Co-chair, HPRC Track, Intern'l Conf. on Reconfigurable Computing and FPGAs (ReConFig)
2018	Program chair, International Conference on Field-Programmable Technology (IC-FPT)
2017	General chair, IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM)
2016	Program chair, IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM)
2010-2015	Publication chair, IEEE Intern'l Symposium on Field-Programmable Custom Computing Machines (FCCM)

Editorships/Journal Service

2023	Guest editor for ACM TRETS special issue on FCCM 2023
2023	Guest editor for ACM TRETS special issue of FPGA 2023
2017	Editor, Special Issue of TRETS on FCCM 2016
2012-current	Associate editor, ACM Transactions on Reconfigurable Technology and Systems (TRETS)
2008-2012	Information director, ACM Transactions on Reconfigurable Technology and Systems (TRETS)

Conference Technical Program Committees

2023-2026	Proceedings of the 13th International Symposium on Highly Efficient Accelerators and Reconfigurable Technologies (HEART)
2022-2023	IEEE International Parallel and Distributed Processing Symposium (IPDPS)
2019-2025	IEEE Intern'l Conf. on Field-Programmable Technology (IC-FPT)
2019-2025	IEEE Intern'l Symp. on Field Programmable Logic and Applications (FPL)
2011-2018, 2025-2026	IEEE Intern'l Symp. on Field-Programmable Custom Computing Machines (FCCM)
2013-2026	IEEE Intern'l Conf. on Application-Specific Systems, Architectures, and Processors (ASAP)
2011-2019	Intern'l Conf. on Reconfigurable Computing and FPGAs (ReConFig)
2017	ACM International Conference on Computing Frontiers (CF-17)
2017	Intern'l Conf. on High Performance Compilation, Computing and Communications (HP3C)
2016	Workshop on Heterogeneous High-performance Reconfigurable Computing (H2RC), 2016
2010-2017	Intern'l Conf. on High Performance Computing & Simulation (HPCS)
2011-2017	Reconfigurable Architectures Workshop (RAW)
2011-2012	Symp. of Application Accelerators for High Performance Computing (SAAHPC)
2011	IEEE Intern'l Forum on Embedded Multiprocessor System-on-Chip and Multicore (MPSoC)
2009-2010	Workshop on High-Performance Reconfigurable Computing Technology and Applications (HPRCTA)
2006-2009	IEEE Intern'l Symp. on Circuits and Systems (ISCAS)
2007-2009	IEEE Congress on Evolutionary Computation (CEC)
2008	IEEE World Congress on Computational Intelligence (WCCI)
2007	IEEE Intern'l Conf. on Computational Intelligence and Security (CIS)

Journal Reviewer

IEEE Transactions on Computers
IEEE Transactions on Very Large Scale Integration (VLSI) Systems
IEEE Transactions on Parallel and Distributed Systems (TPDS)
IEEE Transactions on Communications (TC)
IEEE Transactions on Design and Test of Computers
IEEE Transactions on Computer Aided Design (TCAD)
IEEE Transactions on Computer Aided Design of Integrated Circuits and Systems
IEEE Transactions on Dependable and Secure Computing
IEEE Transactions on Emerging Topics in Computing
IEEE/ACM Transactions on Computational Biology and Bioinformatics
IEEE Design and Test
IEEE Spectrum
ACM Transactions on Reconfigurable Technology and Systems (TRETS)
ACM Transactions on Design Automation of Electronic Systems (TODAES)
ACM Transactions on Architecture and Code Optimization (TACO)

International Journal of Reconfigurable Computing
International Journal of Parallel, Emergent, and Distributed Systems
Elsevier Journal of Parallel Computing
IET Circuits, Devices, and Systems
Elsevier Integration, the VLSI Journal
Bioinformatics
BMC Bioinformatics
Journal of Bioinformatics
Journal of Circuits, Systems, and Computers
Journal of Imaging (MDPI)
Journal of Parallel and Distributed Computing
Oxford Computer Journal
Hindawi VLSI Design
MDPI Computation

Panel Participation
NSF (19 panels + 4 ad hoc reviews)
DOE STTR/SBIR (1 on-site panel)
NSERC (Canadian NSF) ad hoc reviewer
Qatar National Research Fund ad hoc reviewer
University of South Carolina Internal Grant Review Panel (multiple)

University Service
University Fellowship and Scholarship Committee (2022-2023)
Faculty Mentor, PROPEL (Junior Faculty Research Mentorship Program) 2021-2026
Faculty Advisor, ACM Student Chapter
Faculty Advisor, Phi Kappa Tau fraternity
Faculty Advisor, USC Bass Fishing Club
Faculty Advisor, USC Wakeboarding Club

Departmental Service
Undergraduate Committee (2006-current)
Ph.D. Qualifier Committee (2008-current)

PROFESSIONAL MEMBERSHIPS
ACM, IEEE, Upsilon Pi Epsilon, Computer Society

INVITED SEMINARS (NOT INCLUDING CONFERENCE/WORKSHOP TALKS)
2022 High-Rate Machine Learning for Forecasting Time-Series Signals, Eglin Air Force Base, June 2022
2012 Research overview, CUNY NSF Workshop on Accelerators in High Performance Computing
2011 Research overview, EPSCoR Workshop at USC for Desktop to Teragrid Project
2010 Research overview, EPSCoR Workshop at Clemson for Desktop to Teragrid Project
2008 Teaching overview, Reconfigurable Computing in Undergraduate Education, UNC-Charlotte
2008 Research overview, UNC-Charlotte

TEACHING AND MENTORING EXPERIENCE

Courses Taught (at USC)
CSCE 212 Introduction to Computer Architecture
CSCE 313 Embedded System Design
CSCE 317 Internet-of-Things and Cyberphysical System Design
CSCE 490/491/492 Capstone Computer System Project
CSCE 611 Advanced Digital Design
CSCE 612 VLSI Design
CSCE 613 VLSI Design 2
CSCE 713 Advanced Topics in Computer Architecture

Graduated Ph.D. Students
2024 **Madushan Abeysinghe**, first position at Texas Instruments
2021 **Konstantin Rubin**, first position tenure track faculty at Francis Marion University

2019 **Rasha Karakchi**, first position instructor at University of South Carolina
2016 **Jordan Bradshaw**, first position at Elauwit
2014 **Yang Gao**, first position at Qualcomm, now at Google
2014 **Fan Zhang**, first position at Google
2014 **Zheming Jin**, first position at University of Alabama, then at Argonne National Laboratory, now at Oak Ridge National Laboratory
2013 **Krishna Kumar Nagar**, first position at Imagination Technologies, now at Intel
2012 **Yan Zhang**, first position at SK Hynix (world's second largest memory chip maker), now at AMD
2010 **Tiffany M. Mintz**, first position at Oak Ridge National Laboratory, now at AMD

Graduated M.S. Students
2025 **Clay Crews**, first position at Integer Technologies
2018 **Lacie Stiffler**, first position at MIT Lincoln Labs
2013 **Shaun Gause**, first position at Department of Homeland Security
2009 **Stephanie Zierke**, first position at Hewlett-Packard, now at Intel

Undergraduate Research Supervision
Asif Khan (2006), Shaun Gause (internally funded, 2007), Patrick Moran (REU, 2009), Yasser Shalabi (REU, 2009), Ross Roessler (REU, 2010), Peter Swanson (REU, 2010), Kino Harding (internally funded, 2010), Kevin Thompson (REU, 2011), Aaron Speed (REU, 2011), Benjamin Morgan (REU, 2012-2013), Nicholas Mauro (REU, 2012),Jonathan Kilby (REU, 2013), Daniel Clements (REU, 2014), Lacie Cochran (REU, 2014-2015), Friel Scott (REU, 2015), Charles Daniels (REU, 2015), Spencer Perry (REU, 2016), Jonathan Livingston (REU, 2016), Lothrop O. Richards (REU, 2017), Charles A. Daniels (REU, 2018)

Ph.D. Committees
2025 Ph.D. Committee, **Joud Satme**, (Mechanical Engineering)
2025 Ph.D. Committee, **Md Hasibul Amin**, (Computer Science and Engineering)
2025 Ph.D. Committee, **Emmanuel Ogunniyi**, (Mechanical Engineering)
2023 Ph.D. Committee, **Shams-Ul-Haq Syed** (Computer Science and Engineering)
2023 Ph.D. Committee, **Puja Chowdhury** (Mechanical Engineering)
2023 Ph.D. Committee, **Mohammed Elbtity** (Computer Science and Engineering)
2023 Ph.D. Committee, **Alex Vereen** (Mechanical Engineering)
2022 Ph.D. Committee, **Fanzhou Fu** (Mechanical Engineering)
2022 Ph.D. Committee, **Andrew Wunderlich** (Electrical Engineering)
2022 Ph.D. Committee, **Aaron De la O** (Electrical Engineering)
2021 Ph.D. Committee, **Matthew Milton** (Electrical Engineering)
2018 Ph.D. Committee, **Mohanad R. Mohsen** (Electrical Engineering)
2016 M.S. Committee, **Matthew Milton** (Electrical Engineering)
2016 Ph.D. Committee, **Jonathan Siegers** (Electrical Engineering)
2015 M.S. Committee, **Subhro Kar**, first position at Red Hat
2012 Ph.D. Committee, **Yiwei Zhang**, first position at Microsoft
2011 Ph.D. Committee, **William Arndt**, first position at Howard Hughes Medical Institute
2011 Ph.D. Committee, **Jian Shi**, first position at Unitrends
2009 Ph.D. Committee, **Bo Wang** (Electrical Engineering), first position at Texas Instruments
2008 Ph.D. Committee, **Laura Taylor** (Statistics), first position as assistant professor at Elon University, now associate professor at Elon University