

Leiming Yu

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Research Interests

GPU Performance Optimization and Modeling, High Performance Computing, Machine Learning

Education

Northeastern University, Boston, MA, USA Ph.D. in Computer Engineering Advisor: David Kaeli	Jan 2011-April 2019
University of Bridgeport, Bridgeport, CT, USA Master in Electrical Engineering Advisor: Buket Barkana	Jan 2008-Dec 2010
Shanghai Maritime University, Shanghai, China Bachelor in Electrical Engineering	Sep 2002-Sep 2006

Publications

Journals and Book Chapters

- [J7] Gong, Xun, Xiang Gong, Leiming Yu, and David Kaeli. "HAWS: Accelerating GPU Wavefront Execution through Selective Out-of-order Execution." *ACM Transactions on Architecture and Code Optimization (TACO)* 16, no. 2 (2019): 15.
- [J6] Yaoshen Yuan, Leiming Yu, Zafer Doğan, and Qianqian Fang. "*Graphics Processing Units-accelerated Adaptive Nonlocal Means Filter for Denoising Three-dimensional Monte Carlo Photon Transport Simulations.*" *Journal of biomedical optics* 23, no. 12 (2018): 121618.
- [J5] Leiming Yu, Fanny Nina-Paravecino, David Kaeli, and Qianqian Fang. "*Scalable and Massively Parallel Monte Carlo Photon Transport Simulations for Heterogeneous Computing Platforms.*" *Journal of biomedical optics* 23, no. 1 (2018): 010504.
- [J4] Fanny Nina-Paravecino, Leiming Yu, Qianqian Fang, and David Kaeli. "*High-performance Monte Carlo Simulations for Photon Migration and Applications in Optical Brain Functional Imaging.*" In *Handbook of Large-Scale Distributed Computing in Smart Healthcare*, pp. 67-85. Springer, Cham, 2017.
- [J3] Yan Zhang, Hideyo Inouye, Michael Crowley, Leiming Yu, David Kaeli, and Lee Makowski. "*Diffraction Pattern Simulation of Cellulose Fibrils Using Distributed and Quantized Pair Distances.*" *Journal of Applied Crystallography* 49, no. 6 (2016): 2244-2248.
- [J2] Xiangyu Li, Leiming Yu, David Kaeli, Yuanyuan Yao, Poguang Wang, Roger Giese, Vicent Yusa and Akram Alshawabkeh, "*A Framework for Big Metabolomic Data Management and Analysis*", *IARIA Journal*. Vol 9, 2016.
- [J1] Xiangyu Li, Leiming Yu, David Kaeli, Yuanyuan Yao, Poguang Wang, Roger Giese, and Akram Alshawabkeh. "*Big Data Analysis on Puerto Rico Testsite for Exploring Contamination Threats.*" *ALLDATA* 2015 (2015): 36.

Conference Proceedings

- [C9] Dong, Shi, Zlatan Feric, Leiming Yu, David Kaeli, John Meeker, Ingrid Y. Padilla, Jose Cordero, Carmen Velez Vega, Zaira Rosario, and Akram Alshawabkeh. "*An Efficient Data Management Framework for Puerto Rico Testsite for Exploring Contamination Threats (PROTECT).*" In *2018 IEEE International Conference on Big Data (Big Data)*, pp. 5316-5318. IEEE, 2018.

[C8] Leiming Yu, Fanny Nina-Paravecino, David Kaeli, and Qianqian Fang. "Fast Monte Carlo Photon Transport Simulations for Heterogeneous Computing Systems." In *Clinical and Translational Biophotonics*, pp. JTh3A-38. Optical Society of America, 2018.

[C7] Yaoshen Yuan, Leiming Yu, and Qianqian Fang. "Denoising in Monte Carlo Photon Transport Simulation Using GPU-accelerated Adaptive Non-Local Mean Filter." In *Optical Tomography and Spectroscopy*, pp. JTh3A-41. Optical Society of America, 2018.

[C6] Leiming Yu, Xun Gong, Yifan Sun, Qianqian Fang, Norm Rubin, and David Kaeli. "Moka: Model-based Concurrent Kernel Analysis." In *2017 IEEE International Symposium on Workload Characterization (IISWC)*, pp. 197-206. IEEE, 2017.

[C5] Yifan Sun, Xiang Gong, Amir Kavyan Ziabari, Leiming Yu, Xiangyu Li, Saoni Mukherjee, Carter McCardwell, Alejandro Villegas, and David Kaeli. "Hetero-mark, A Benchmark Suite for CPU-GPU Collaborative Computing." In *2016 IEEE International Symposium on Workload Characterization (IISWC)*, pp. 1-10. IEEE, 2016.

[C4] Yash Ukidave, Fanny Nina-Paravecino, Leiming Yu, Charu Kalra, Amir Momeni, Zhongliang Chen, Nick Materise, Brett Daley, Perhaad Mistry, and David Kaeli. "Nupar: A Benchmark Suite for Modern GPU Architectures." In *Proceedings of the 6th ACM/SPEC International Conference on Performance Engineering*, pp. 253-264. ACM, 2015.

[C3] Yan Zhang, Leiming Yu, David Kaeli, and Lee Makowski. "Fast Simulation of X-ray Diffraction Patterns from Cellulose Fibrils Using GPUs." In *Bioengineering Conference (NEBEC), 2014 40th Annual Northeast*, pp. 1-2. IEEE, 2014.

[C2] Leiming Yu and B.D. Barkana. "Speech Disorders: An Analysis of Hypernasal Speech Using Signal Processing Techniques", *Proceedings of the 2009 ASEE NE American Society for Engineering Education Conference*, April 3-4, 2009.

[C1] Leiming Yu and B.D. Barkana. "Classifying Hypernasality Using the Pitch and Formants", *Proceedings of the 6th International Conference on Information Technology – New Generations, ITNG 2009*.

Workshop Proceedings

[W6] Leiming Yu, Abraham Goldsmith, and Stefano Di Cairano. "Efficient Convex Optimization on GPUs for Embedded Model Predictive Control." In *Proceedings of the General Purpose GPUs*, pp. 12-21. ACM, 2017.

[W5] Patrick Reilly, Leiming Yu, and David Kaeli. "Accelerating Machine Learning Algorithms in Python", *Boston Area Architecture Workshop*, 2017.

[W4] Saoni Mukherjee, Xiang Gong, Leiming Yu, Carter McCardwell, Yash Ukidave, Tuan Dao, Fanny Nina Paravecino, and David Kaeli. "Exploring The Features of OpenCL 2.0." In *Proceedings of the 3rd International Workshop on OpenCL*, p. 5. ACM, 2015.

[W3] Leiming Yu, Yan Zhang, Xiang Gong, Nilay Roy, Lee Makowski, and David Kaeli. "High Performance Computing of Fiber Scattering Simulation." In *Proceedings of the 8th Workshop on General Purpose Processing using GPUs*, pp. 90-98. ACM, 2015.

[W2] Leiming Yu, John Magrath, Ajey Pandey, Matthew Sears, and David Kaeli. "Speech Recognition on Modern Graphic Processing Units", *Proceedings of the 6th Annual Boston Area Architecture Workshop*.2015.

[W1] Leiming Yu, Ukidave Yash, and David Kaeli. "GPU-accelerated HMM for Speech Recognition." In *Parallel Processing Workshops (ICCPW), 2014 43rd International Conference on*, pp. 395-402. IEEE, 2014.

- Optimized the usage of GPU memory system, math intrinsics, concurrent kernel execution
- Developed an efficient MPI + GPU solution and achieved 28x speedup compared to the MPI + OpenMP solution

September 2012- June 2016

- Database Administrator for Puerto Rico Testsite for Exploring Contamination Threats, Superfund Research Program
 - Used EarthSoft EQuIS for data processing and Microsoft SQL server as the database engine
 - Built a web server using EQuIS Enterprise to automate data reporting for distributed users
 - Applied machine learning techniques (PCA, K-means, Hierarchical Clustering) to identify biomarkers in urine data

September 2011-2012

- K-means Clustering for Spectrum Sensing on GPU/CPU
 - Implemented GPU-accelerated K-means to identify empty wireless band for Spectrum Sensing
 - Attained 70x speedup over the Matlab implementation

Fall 2008- 2010

- Teaching Assistant for Audio Processing Lab and Digital Signal Processing Lab

Talks and Presentations

- Poster on Neural Network Denoiser for Monte Carlo Photon Transport Simulations, SPIE Photonics West, 2019
- Poster on MCX denoising using neural networks, HPC Day, Northeastern University, 2018
- Poster on fast MCX for heterogeneous computing systems, COE PhD Research Expo, 2018
- Tutorial on Monte Carlo eXtreme (MCX) in OpenCL, MCX Workshop, 2017
- Poster Winner on Concurrent Kernel Execution, HPC Day, UMass Dartmouth, 2017
- GTC Talk, "Portable Performance for MCX in 3D Turbid Media for Single and Multiple GPUs", 2016
- Poster Winner on Monte Carlo eXtreme (MCX), HPC Day, UMass Dartmouth, 2016

Teaching Experience

- Invited lectures on GPU Programming for Philips (Andover, MA), 2017
- Lecturer for GPU Class, Northeastern University, 2015-2017
- Teaching Assistant for GPU Class, Northeastern University, 2013
- Teaching Assistant for Audio Processing Lab and Digital Processing Lab, University of Bridgeport, 2008-2010

Awards and Honors

- Student Travel Grant: IISWC 2017
- Student Travel Grant: PPOPP 2015
- Best Poster: HPC Day 2017
- Best Poster: HPC Day 2016

Peer Review

- Journal of Parallel and Distributed Computing (JPDC), 2019
- IEEE Transactions on Computers (TCSI), 2019
- Simulation Modelling Practice and Theory (Elsevier Journal), 2018
- Parallel, Distributed and Network-based Processing (PDP), 2016