Xiaodong Yu, Ph.D., Postdoctoral Appointee@Argonne

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Research Interests

Parallel & Distributed Computing; Reconfigurable Computing; Architecture-aware Algorithm Design; Machine Learning; Program Analysis; System & Software Security

Education

2013 – 2019	**Ph.D. Computer Science, Virginia Tech, Blacksburg VA, USA** Advisor: Prof. Danfeng (Daphne) Yao Dissertation Title: *Algorithms and Frameworks for Accelerating Security Applications on HPC Platforms* Thesis committee: Prof. Danfeng (Daphne) Yao (Chair), Prof. Michela Becchi (NCSU), Prof. Ali Butt, Prof. Matthew Hicks, Prof. Xinming (Simon) Ou (USF)
2010 – 2013	**M.S. Electrical and Computer Engineering, University of Missouri, Columbia MO, USA** Advisor: Prof. Michela Becchi Thesis Title: *Deep Packet Inspection on Large Datasets: Algorithmic and Parallelization Techniques for Accelerating Regular Expression Matching on Many-Core Processors*.
2004 – 2008	**B.S. Mathematics and Applied Mathematics, China University of Mining and Technology (CUMT), China**

Academic & Internship Experience

2019 – current	**Postdoctoral Appointee.** Data Science & Learning Division@Argonne National Lab Supervisor: Dr. Tekin Bicer Mentor: Dr. Stefan M. Wild Projects: Accelerating Ptychographic Image Reconstruction on Multi-node Multi-GPU Platforms; Modularized GPU-based Python Library for Computational Imaging
2013 – 2019	**Graduate Research&Teaching Assistant.** CS@Virginia Tech Advisor: Prof. Danfeng (Daphne) Yao 　　　　 Elizabeth and James E. Turner Jr. '56 Faculty Fellow & L-3 Faculty Fellow Projects: GPU-assisted Android Program Analysis; Cache Side-Channel Attack
Summer 2017	**Intern.** Radeon Technology Group (RTG)@AMD Mentor: Daniel Lowell Project: GPU Deep learning library (MIOpen) development
2011 – 2013	**Graduate Research Assistant.** NPS LAB@University of Missouri Advisor: Prof. Michela Becchi Projects: GPU-based Automata Processing

Research Publications

Journal Articles

1. **Yu, X.**, Nikitin, V., Ching, D. J., Aslan, S., Gursoy, D., & Bicer, T. (2020). Scalable and accurate multi-GPU based image reconstruction of large-scale ptychography data. *Submitted to Optics Express (OSA)*.

2. **Yu, X.**, Wang, H., Feng, W.-c., Gong, H., & Cao, G. (2018). GPU-Based Iterative Medical CT Image Reconstructions. *Journal of Signal Processing Systems (Springer)*. (impact factor = 1.088).

3. **Yu, X.**, Lin, B., & Becchi, M. (2014). Revisiting State Blow-Up: Automatically Building Augmented-FA While Preserving Functional Equivalence. *IEEE Journal on Selected Areas in Commu. 32*(10), 1822–1833. (impact factor = 7.172, journal-first paper).

Conference Proceedings

1. **Yu**, **X.**, Bicer, T., Kettimuthu, R., & Foster, I. (2021). Topology-aware Optimizations for Multi-GPU Ptychographic Image Reconstruction. In *Submitted to the Int'l Conf. on Supercomputing*. ICS'21.

2. **Yu**, **X.**, Wei, F., Ou, X., Becchi, M., Bicer, T., & Yao, D. (2020). GPU-Based Static Data-Flow Analysis for Fast and Scalable Android App Vetting. In *The 34th IEEE International Parallel and Distributed Processing Symposium (IPDPS)*. IPDPS'20. (AR = 24.7%).

3. **Yu**, **X.**, Xiao, Y., Cameron, K., & Yao, D. (2019). Comparative Measurement of Cache Configurations' Impacts on Cache Timing Side-Channel Attacks. In *12th USENIX Workshop on Cyber Security Experimentation and Test*. CSET'19. (AR = 31%). Co-located with USENIX Security '19.

4. Lux, T. C. H., Watson, L. T., Bernard, J., Chang, T. H., Li, B., **Yu**, **X.**, Xu, L., Back, G., Butt, A. R., Cameron, K. W., Hong, Y., & Yao, D. (2018). Nonparametric Distribution Models for Predicting and Managing Computational Performance Variability. In *The Annual IEEE Southeast Conf.* (pp. 1–7). IEEE SoutheastCon'18.

5. Lux, T. C. H., Watson, L. T., Chang, T. H., Bernard, J., Li, B., **Yu**, **X.**, Xu, L., Back, G., Butt, A. R., Cameron, K. W., Yao, D., & Hong, Y. (2018). Novel Meshes for Multivariate Interpolation and Approximation. In *The Annual ACM Southeast Conf.* (13:1–13:7). ACMSE'18.

6. Nourian, M., Wang, X., **Yu**, **X.**, Feng, W.-c., & Becchi, M. (2017). Demystifying Automata Processing: GPUs, FPGAs or Micron's AP? In *the ACM Int'l Conf. on Supercomputing* (1:1–1:11). ICS'17. (AR = 15.8%).

7. **Yu**, **X.**, Hou, K., Wang, H., & Feng, W.-c. (2017). A framework for fast and fair evaluation of automata processing hardware. In *IEEE Int'l Symp. on Workload Characterization*. IISWC'17.

8. **Yu**, **X.**, Hou, K., Wang, H., & Feng, W.-c. (2017). Robotomata: A Framework for Approximate Pattern Matching of Big Data on an Automata Processor. In *IEEE Int'l Conf. on Big Data* (pp. 283–292). IEEE BigData'17. (AR = 17.9%).

9. **Yu**, **X.**, Wang, H., Feng, W.-c., Gong, H., & Cao, G. (2017). An Enhanced Image Reconstruction Tool for Computed Tomography on GPUs. In *the ACM Int'l Conf. on Computing Frontiers* (pp. 97–106). CF'17. (AR = 35.5%).

10. **Yu**, **X.**, Feng, W.-c., Yao, D., & Becchi, M. (2016). O^{3}FA: A Scalable Finite Automata-based Pattern-Matching Engine for Out-of-Order Deep Packet Inspection. In *the 2016 ACM/IEEE Symp. on Arch. for Networking and Commu. Systems* (pp. 1–11). ANCS'16. (AR = 20.7%).

11. **Yu**, **X.**, Wang, H., Feng, W.-c., Gong, H., & Cao, G. (2016). cuART: Fine-Grained Algebraic Reconstruction Technique for Computed Tomography Images on GPUs. In *16th IEEE/ACM Int'l Symp. on Cluster, Cloud and Grid Computing*. CCGrid'16. (AR = 25%).

12. **Yu**, **X.** & Becchi, M. (2013). Exploring Different Automata Representations for Efficient Regular Expression Matching on GPUs. In *ACM SIGPLAN Not.*

13. **Yu**, **X.** & Becchi, M. (2013). GPU Acceleration of Regular Expression Matching for Large Datasets: Exploring the Implementation Space. In *the ACM Int'l Conf. on Computing Frontiers* (18:1–18:10). CF'13.

Professional Activities

Presentations	ACM PPoPP'13, ACM/IEEE ANCS'16, IEEE/ACM CCGrid'16, IEEE BigData'17, ACM/IEEE SC'18 Doctoral Showcase
Journal Reviews	JSA (elsevier) (2019), JPDC (elsevier) (2019, 2020), COMNET (elsevier) (2019), IEEE TDSC (2018, 2019, 2020), IEEE Access (2017, 2018, 2019, 2020), COMCOM (elsevier) (2018), JSS (elsevier) (2015, 2017), IEEE JSAC (2014)
Conference Reviews	IEEE HPCC 2017, IEEE ATC'18, IEEE GLOBECOM'18, IEEE ICCCN'18, PACT, S&P, NDSS, ACSAC, AsiaCCS etc.
Services	IEEE Fox Valley subsection executive committee member

Honors&Awards

2018	selected to present @ACM/IEEE SC'18 Doctoral Showcase (Selection Rate = 16/27)
	selected as the student volunteer @ACM/IEEE SC'18
2016	**Outstanding Graduate Teaching Assistant Award** CS@VT
	SIGCOMM-Travel Grant for ANCS 2016
2013	**NSF-Travel Grant** for PPoPP 2013

Honors&Awards (continued)

2011	▌ **NSF Student Travel Award** for ANCS 2011
2006 – 2007	▌ **Learning Progress Scholarship** @CUMT China

Skills

Coding	▌ C/C++, CUDA, Python, MPI, ROCm, openCL, Hardware-specific Language, VHDL/Verilog, assembly language, SHELL, OpenMP, Pthread, JAVA
Dev. Envir.&Tools	▌ Linux/Win OS, AP SDK, MATLAB, Xilinx SDK, GEM5, Mathematica