

CURRICULUM VITAE

Yu Zhuang

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Department of Computer Science
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Professional Preparation

2000	Ph.D., Mathematics	Louisiana State University
2000	Ph.D., Computer Science	Louisiana State University

Academic/Professional Appointments

Apr. 2001 – Jul., 2001 Visiting Assist. Prof., Computer Science Dept., Illinois Inst. Tech.
Sep. 2001 – Aug. 2007 Assistant Professor of Computer Science, Texas Tech University
Sep. 2007 – Present Associate Professor of Computer Science, Texas Tech University

Research Interests

- **IoT security:** physical unclonable function (PUF)
- **High-dimensional data modeling/machine learning:** subspace Hessian modeling, application to semiclassical molecular dynamics, application to PUF security vulnerability study
- **High performance scientific computing:** parallel explicit-implicit domain decomposition methods for parabolic equations

Selected Research Projects

- CDS&E: Fast Search of Growing High-Dimensional Big Data to Enable Accurate Semiclassical Molecular Dynamics Studies of Large Molecular Systems. National Science Foundation. Jun. 2021 – May 2024. Sole PI, \$278K
- CSR: Small: Collaborative Research: System research on persistent high-dimensional data access and its application to semiclassical molecular dynamics simulation. National Science Foundation. Sep. 2015 – Aug. 2021. Leading PI, \$256K.
- Computer Simulation of Chemical Dynamics. National Science Foundation. Mar 2010–Feb 2013 (\$435K). Co-PI sharing 33%.
- PIRE: Simulation of electronic non-adiabatic dynamics for reactions with organic macromolecules, Liquids, and Surfaces. National Science Foundation. Sep 2007–Aug 2013. \$2.5M, Co-PI sharing 40%.
- Collaborative Research: SEIDD–Scalable Domain Decomposition Algorithms for Solving Parabolic Problems. National Science Foundation. PI. Sep. 2003–Aug. 2005. \$45K.

Selected Publications

1. B. Thapaliya, K. Mursi, and Y. Zhuang (2021), “Machine Learning-based Vulnerability Study of Interpose PUFs as Security Primitives for IoT Networks”, *IEEE International Conference on Networking, Architecture, and Storage (NAS)*, Riverside, California, October 2021.
2. U Tariq, AO Aseeri, MS Alkatheiri, Y Zhuang (2020), "Context-Aware Autonomous Security Assertion for Industrial IoT", *IEEE Access*, vol. 8, pp. 191785-191794

3. K. Mursi, B. Thapaliya, Y. Zhuang, A. Aseeri, and M. Alkathairi, "A fast deep learning method for security vulnerability study of XOR PUFs", *Electronics*, vol. 9, no.10, 1715, 2020.
4. M. Alamro, K. Mursi, Y. Zhuang, A. Aseeri and M. Alkathairi (2020), "Robustness and unpredictability for double arbiter PUFs on silicon data: Risk assessment and performance evaluation", *Electronics*, vol. 9, no.5, 870, 2020.
5. K. Mursi, Y. Zhuang, M. Alkathairi, A. Aseeri (2019), "Extensive examination of XOR arbiter PUFs as security primitives for resource-constrained IoT devices", *17th International Conference on Privacy, Security and Trust (PST2019)*, Fredericton, New Brunswick, Canada, August 2019.
6. R. Conte, F. Gabas, G. Botti, Y. Zhuang, M. Ceotto (2019), "Semiclassical vibrational spectroscopy with Hessian databases", *Journal of Chemical Physics*, Vol. 150 (24), June 2019, 244118.
7. A. Aseeri, Y. Zhuang, and M.S. Alkathairi (2018), A Subspace Pre-learning Approach to Fast High-Accuracy Machine Learning of Large XOR PUFs with Component-Differential Challenges, *Proc. IEEE International Conference on Big Data*, Seattle, Washington, December 2018.
8. A. Aseeri, Y. Zhuang, and M.S. Alkathairi (2018), A machine learning-based security vulnerability study on XOR PUFs for resource-constraint Internet of Things, *IEEE International Congress on Internet of Things*, July 2-7, 2018, San Francisco, California.
9. M. S. Alkathairi and Y. Zhuang (2017), Towards Fast and Accurate Machine Learning Attacks of Feed-Forward Arbiter PUFs, *IEEE Conference on Dependable and Secure Computing*, Taipei, Taiwan, August 2017.
10. M. S. Alkathairi, Y. Zhuang, M. Korobkov, and A. R. Sangi (2017), An Experimental Study of the State-of-the-Art PUFs Implemented on FPGAs, *IEEE Conference on Dependable and Secure Computing*, Taipei, Taiwan, August 2017.
11. Yu Zhuang (2016), "Symmetric Repositioning of Bisecting K-means Centers for Increased Reduction of Distance Calculations for Big Data Clustering", in *Proceedings of IEEE International Conference on Bigdata*, Washington DC, December 2016.
12. Yu Zhuang, Yu Mao, and Xin Chen (2016), "A Limited-Iteration Bisecting K-means for Fast Clustering Large Datasets", *Proceedings of the 10th IEEE International Conference on Big Data Science & Engineering (BigdataSE)*, Tianjin, China, August 2016.
13. Y Lu, Y Chen, R Latham, Y Zhuang, "Revealing applications' access pattern in collective i/o for cache management", *Proceedings of the 28th ACM international conference on Supercomputing*, 181-190.
14. M. Ceotto, Y. Zhuang, W. Hase (2013), Accelerated direct semiclassical molecular dynamics using a compact finite difference Hessian scheme, *J. Chemical Physics*, Vol. 138, 054116 (February, 2013)
15. M. Paranjothy, R. Sun, Y. Zhuang, W. Hase (2013). Direct chemical dynamics simulations: coupling of classical and quasiclassical trajectories with electronic structure theory. *Wiley Interdisciplinary Reviews: Computational Molecular Science*. vol. 3, no. 3 (May/June, 2013). pp. 296–316.
16. Y. Zhuang, M. Siebert, W. Hase, K. Kay, and M. Ceotto (2012). Evaluating the Accuracy of Hessian Approximations for Direct Dynamics Simulations. *Journal of Chemical Theory and Computation*, Vol. 9, January 2013, pp. 54-64.
17. Y. Zhuang and H. Wu (2012), Efficient Parabolic Solvers Scalable Across Multi-Architectural Levels, *10th IEEE International Symposium on Parallel and Distributed processing with Applications (ISPA'12)*, Leganés, Madrid, Spain, July, 2012.
18. H. Wu, M. Rahman, J. Wang, U. Lourderaj, W. L. Hase, and Y. Zhuang (2010), Higher-accuracy schemes for approximating the Hessian from electronic structure calculations in chemical dynamics simulations, *Journal of Chemical Physics*, Vol.133, Issue 7, 074101, August 2010.
19. U. Lourderaj, K. Song, T.L. Windus, Y. Zhuang, and W.L. Hase (2007), Direct dynamics simulations using Hessian-based predictor-corrector integration algorithms, *Journal of Chemical Physics*, Vol.126, January 2007, 044105.

20. Y. Zhuang (2007), An alternating explicit implicit domain decomposition method for the parallel solution of parabolic equations, *J. Computational & Applied Mathematics*, Vol.206, 549–566, 2007.
21. Yu Zhuang and Xian-He Sun (2005), A highly parallel algorithm for the numerical simulation of unsteady diffusion processes, *Proc. 19th IEEE International Parallel & Distributed Processing Symposium (IPDPS 2005)*, Denver, Colorado, April, 2005.
22. Y. Zhuang and X. Sun (2002), Stabilized explicit-implicit domain decomposition methods for the Numerical Solution of parabolic equations, *SIAM J. Scientific Computing*, vol.24, July 2002, 335-358.
23. Y. Zhuang and X. Sun (2001), A high order fast direct solver for singular Poisson equations, *Journal of Computational Physics*, Vol.171, 79-94, 2001.
24. Yu Zhuang and Xian-He Sun (2001), Stable, globally non-iterative, non-overlapping domain decomposition parallel solvers for parabolic problems, *Proc. IEEE/ACM Conference on High Performance Computing Networking, Storage, and Analysis (Super Computing Conference)*, Denver, Colorado, November 2001.
25. PR Wolenski, Y Zhuang (1998), " Proximal analysis and the minimal time function", *SIAM journal on control and optimization*, vol. 36 (3), 1048-1072.

Teaching

Fall 2021

CS 4379/5379 Parallel Programming/Parallel Processing

Spring 2021

CS 1382 Discrete Computational Structures

CS 5375 Computer System Organization and Architecture

Fall 2020

CS 1382 Discrete Computational Structures

Spring 2020

CS 5375 Computer System Organization and Architecture

Fall 2019

CS 1382 Discrete Computational Structures

CS 1412 Programming Principles II

Spring 2019

CS 5375 Computer System Organization and Architecture

Fall 2018

CS 1412 Programming Principles II

Spring 2018

CS 4379/5379 Parallel and Current Programming/Parallel Processing

CS 5375 Computer System Organization and Architecture

Fall 2017

CS 1412 Programming Principles II

CS 4331/5331: Mining Big Data with HPC

Spring 2017

CS 4379/5379 Parallel and Current Programming/Parallel Processing

CS 5375 Computer System Organization and Architecture

Fall 2016

CS 4331/5331: Data Mining with HPC, Fall 2016