



Zhengchun Liu

 Assistant Computer Scientist at Argonne National Laboratory

 Scientist At-Large, CASE, The University of Chicago

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Research Work Experience

- 1. Data Science and Learning, Argonne National Laboratory, U.S.A.** 2019.08 - present
Assistant Computer Scientist
 - Data Science and Learning for Computer System(Explain, Predict and Optimize).
 - Artificial Intelligence for Science.
 - Performance modeling and characterization of high performance computing system.
- 2. Computation Institute, University of Chicago, Illinois, U.S.A.** 2018.03 - 2019.08
Research Scientist, also hold a joint appointment at Argonne National Laboratory
 - Design a scalable architecture for smart science ecosystems.
 - Embed intelligence in relevant computer systems via machine learning.
- 3. Mathematics and Computer Science Division, Argonne National Laboratory, Illinois, U.S.A.** 2016.09 - 2018.03
Postdoctoral Appointee, Advisor: Rajkumar Kettimuthu, Mentor: Sven Leyffer
 - Building robust analytic models for science at extreme scales
 - Modeling, simulating & optimizing for large data transfers over wide area networks.
- 4. Universitat Autònoma de Barcelona, Barcelona, Spain** 2013.09 - 2016.08
Research Fellow, PhD candidate, Advisor: Emilio Luque
 - Performance modeling for scientific simulation on GPU-accelerated supercomputer.
- 5. Oak Ridge National Laboratory, Tennessee, U.S.A.** 2015.12 - 2016.04
Visiting Researcher, Host: Kalyan S. Perumalla
 - Performance modeling, verification and validation for scientific simulation on multi-GPU clusters.
 - Designed and developed a large-scale vehicle evacuation simulator on GPUs using CUDA.
 - Implemented an earthquake wave propagation model on multiple GPUs using CUDA.
- 6. Northwestern Polytechnical University, Xi'an, China** 2010.09 - 2013.09
Research Assistant
 - Designed and developed a rapid control prototype system for designing drones.
 - Developed a distributed, hardware-in-the-loop interactive simulation system for fixed-wing drone.

Engineering Work Experience

- 1. Xi'an FengLiTong Electronic CO. LTD. Shaanxi, China** 2010.05 - 2013.06
Software Engineer (Part-time)
 - μ C/OS-II real-time operating system porting and board support package developing.
 - USB driver and filesystem on ARM Cortex-M3 MCUs for exchanging data.
 - GPS data parsing, reliable communication via GSM network.
 - Developed a backend communication server for million vehicle-traveling-data-records.

2. **Outsourcing Service** as an Embedded System Engineer 2010.09 - 2013.07
 - An integrated power management for ambulances (hardware and firmware).
 - Developed a temperature control system for machine oil-cooling (hardware and firmware).

Selected Awards, Grants & Honors

- **Impact Argonne** award for notable achievement in Innovation. May 2020
- **Top Winner** of the first Technology Challenge at SC'19. Nov. 2019
- **Pacesetter Award** by Data Science and Learning, Argonne National Laboratory Jan. 2019
- **Extraordinary Doctorate Award** by the Universitat Autònoma de Barcelona Jun. 2018
- **The 1st Place** in the 10th Marathon of Parallel Programming Contest Oct. 2015
- **The 1st Place** in the 5th Spanish Parallel Programming Contest Sep. 2015
- **China National Scholarship**, Ministry of Education, China
(award to 0.2% of outstanding undergraduate) ×2 2008, 2009
- **Champion of the Chinese Robot Competition** (dancing session) Dec. 2008

Professional Activities and Memberships

- *Professional Membership*: Association for Computing Machinery (ACM); HiPEAC.
- *Editorship*: Journal of Future Generation Computer Systems (FGCS), Impact Factor=5.8.
- *Co-Chair*: [SRMPDS 2017, 2018, 2019, 2020](#); [AI-Science'19](#).
- *Technical Program Committee*: [ICDS'19](#); [DAAC'17-19](#); [DLS'19](#); [ICDCS'20](#); [SC'20](#); [HPCC'20](#).
- *Journal Reviewer*: Sensors–MDPI; FGCS; JOCS; IEEE–Access; IEEE–TCI; Applied Optics–OSA.

Education

- **Universitat Autònoma de Barcelona** Barcelona, Spain
Ph.D. in Computer Science, Advisor: Prof. Emilio Luque 2013.09 - 2016.07
– Cum Laude (the highest honor) and international mention
- **Northwestern Polytechnical University** Xi'an, China
MSc. in Guidance, Navigation and Control 2010.09 - 2013.04
- **Northwestern Polytechnical University** Xi'an, China
BSc. in Aircraft Manufacturing Engineering 2006.09 - 2010.06

Publications

§**Refereed conference/workshop papers** [* student supervised]

1. Aniket Tekawade, **Zhengchun Liu**, Peter Kenesei, Tekin Bicer, Francesco De Carlo, Rajkumar Kettimuthu, Ian Foster. *3D Autoencoders For Feature Extraction In X-ray Tomography*. 2021 IEEE International Conference on Image Processing.

2. Ryan D. Lewis*, **Zhengchun Liu**, Rajkumar Kettimuthu, Michael E. Papka. *Log-Based Identification, Classification, and Behavior Prediction of HPC Applications*. HPCSYSPROS@SC'20.
3. Ziling Wu*, Tekin Bicer, **Zhengchun Liu**, Vincent De Andrade, Yunhui Zhu, Ian T. Foster. *Deep Learning-based Low-dose Tomography Reconstruction with Hybrid-dose Measurements*. AI4S@SC'20.
4. Tirthak Patel, **Zhengchun Liu**, Rajkumar Kettimuthu, Paul Rich, Bill Allcock, Devesh Tiwari. *Job Characteristics on Large-Scale Systems: Long-Term Analysis, Quantification, and Implications*. The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC'20).
5. **Zhengchun Liu**, Ryan Lewis, Rajkumar Kettimuthu, Kevin Harms, Philip Carns, Nageswara Rao, Ian Foster and Michael Papka. *Characterization and Identification of HPC Applications at Leadership Computing Facility*. International Conference on Supercomputing (ICS'20).
6. Qiao Kang, Ankit Agrawal, Alok Choudhary, Alex Sim, Kesheng Wu, Rajkumar Kettimuthu, Peter Beckman, **Zhengchun Liu** and Wei-keng Liao. *Spatiotemporal Real-Time Anomaly Detection for Supercomputing Systems*. BDPM@IEEE Big Data.
7. Nageswara Rao, Neena Imam, Rajkumar Kettimuthu, **Zhengchun Liu** and Ian Foster, *Estimation of RTT and Loss Rate of Wide-Area Connections Using MPI Measurements*, IEEE/ACM INDIS'19.
8. Nageswara Rao, Neena Imam, Rajkumar Kettimuthu, **Zhengchun Liu** and Ian Foster, *Machine Learning Methods for Connection RTT and Loss Rate Estimation Using MPI Measurements Under Random Losses*, Machine Learning for Networking (MLN'19), **Best Paper Awarded**.
9. Vibhatha Abeykoon*, **Zhengchun Liu**, Tekin Bicer, Rajkumar Kettimuthu, Geoffrey Fox and Ian Foster. *Scientific Image Restoration Anywhere*. XLOOP @SC'19.
10. **Zhengchun Liu**, Tekin Bicer, Rajkumar Kettimuthu and Ian Foster. *Deep Learning Accelerated Light Source Experiments*. IEEE/ACM Deep Learning on Supercomputers DLS@SC'19.
11. Joaquin Chung, **Zhengchun Liu**, Rajkumar Kettimuthu and Ian Foster. *Toward an Elastic Data Transfer Infrastructure*. IEEE International Conference on eScience (eScience'19)
12. Yuanlai Liu*, **Zhengchun Liu**, Rajkumar Kettimuthu, Nageswara Rao, Zizhong Chen and Ian Foster. *Data transfer between scientific facilities - bottleneck analysis, insights and optimizations*. IEEE/ACM International Symposium in Cluster, Cloud, and Grid Computing (CCGrid'19).
13. **Zhengchun Liu**, Rajkumar Kettimuthu, Prasanna Balaprakash, Nageswara S. V. Rao and Ian Foster. *Building a Wide-Area Data Transfer Performance Predictor: An Empirical Study*. International Conference on Machine Learning for Networking (MLN'18).
14. Nageswara Rao, Qiang Liu, Satyabrata Sen, **Zhengchun Liu**, Rajkumar Kettimuthu, and Ian Foster. *Measurements and Analytics of Wide-Area File Transfers over Dedicated Connections*. The 20th International Conference on Distributed Computing and Networking (ICDCN'19).
15. Nageswara Rao, Satyabrata Sen, **Zhengchun Liu**, Rajkumar Kettimuthu, and Ian Foster. *Learning Concave-Convex Profiles of Data Transport Over Dedicated Connections*. International Conference on Machine Learning for Networking (MLN'18), **Best Paper Awarded**.
16. Nageswara Rao, Qiang Liu, **Zhengchun Liu**, Rajkumar Kettimuthu, and Ian Foster. *Throughput Analytics of Data Transfer Infrastructures*. EAI Conference on Testbeds and Research Infrastructures for the Development of Networks & Communities (TRIDENTCOM'18), **Best Paper Awarded**.
17. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster and Yuanlai Liu. *A comprehensive study of wide area data movement at a scientific computing facility*. IEEE 38th International Conference on Distributed Computing Systems (SNTA@ICDCS'18).
18. Rajkumar Kettimuthu, **Zhengchun Liu**, Ian Foster, Peter H. Beckman, Alex Sim, John Wu, Wei-keng Liao, Qiao Kang, Ankit Agrawal, and Alok Choudhary. 2018. *Toward Autonomic Science*

Infrastructure: Architecture, Limitations, and Open Issues. The 1st Autonomous Infrastructure for Science workshop (AI-Science@HPDC'18).

19. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster and Nageswara S.V. Rao. *Cross-geography Scientific Data Transfer Trends and User Behavior Patterns*. Proceedings of the 27th International Symposium on High-Performance Parallel and Distributed Computing (HPDC'18).
20. **Zhengchun Liu**, Rajkumar Kettimuthu, Sven Leyffer, Prashant Palkar and Ian Foster. *A mathematical programming and simulation based framework to evaluate cyberinfrastructure design choices*. The 13th IEEE International Conference on eScience (IEEE eScience'17).
21. **Zhengchun Liu**, Prasanna Balaprakash, Rajkumar Kettimuthu and Ian Foster. *Explaining Wide Area Data Transfer Performance*. Proceedings of the 26th International Symposium on High-Performance Parallel and Distributed Computing (HPDC'17), 167-178.
22. **Zhengchun Liu**, Dolores Rexachs, Francisco Epelde, and Emilio Luque. *Support managing population aging stress of emergency departments in a computational way*. 2017 International Conference on Computational Science (ICCS'17), Volume 108, 2017, Pages 149-158.
23. **Zhengchun Liu**, Eduardo Cabrera, Dolores Rexachs, Francisco Epelde, and Emilio Luque. *Simulating the Micro-level Behavior of Emergency Department for Macro-level Features Prediction*. Proceedings of the 2015 Winter Simulation Conference (WSC'15). Pages 171–182
24. Xueping Zhu, **Zhengchun Liu** and Jun Yang. *Model of Collaborative UAV Swarm Toward Coordination and Control Mechanisms Study*. 2015 International Conference on Computational Science (ICCS'15), Vol 51, 493-502.
25. **Zhengchun Liu**, Eduardo Cabrera, Manel Taboada, Francisco Epelde, Dolores Rexachs and Emilio Luque. *Quantitative Evaluation of Decision Effects in the Management of Emergency Department Problems*. International Conference on Computational Science (ICCS'15), Vol 51, Pages 433-442.
26. **Zhengchun Liu**, Eduardo Cabrera, Dolores Rexachs and Emilio Luque. *A Generalized Agent-Based Model to Simulate Emergency Departments*. Proceeding of the 6th International Conference on Advances in System Simulation (SIMUL'14).

§Refereed journal papers

1. **Zhengchun Liu**, Rajkumar Kettimuthu, Joaquin Chung, Rachana Ananthakrishnan, Michael Link, Ian Foster. *Design and Evaluation of a Simple Data Interface for Efficient Data Transfer Across Diverse Storage*. ACM Transactions on Modeling and Performance Evaluation of Computing Systems, 2021.
2. **Zhengchun Liu**, Tekin Bicer, Rajkumar Kettimuthu, Doga Gursoy, Francesco De Carlo and Ian Foster. *TomoGAN: Low-Dose Synchrotron X-Ray Tomography with Generative Adversarial Networks*. Journal of the Optical Society of America A, Vol. 37, No. 2.
3. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster, Peter H. Beckman. *Towards a Smart Data Transfer Node*. Future Generation Computer Systems, 2018(89), Pages 10—18.
4. Rajkumar Kettimuthu, **Zhengchun Liu**, David Wheeler, Ian Foster, Katrin Heitmann, Franck Cappello. *Transferring a Petabyte in a Day*. Future Generation Computer Systems, 2018(88).
5. **Zhengchun Liu**, Dolores Rexachs, Francisco Epelde, and Emilio Luque. *An Agent-based Model for Quantitatively Predicting and Analyzing the Complex Behavior of Emergency Departments*. Journal of Computational Science, Vol. 21, Pages 11—23, 2017.
6. **Zhengchun Liu**, Dolores Rexachs, Francisco Epelde, and Emilio Luque. *A simulation and optimization based method for calibrating agent-based emergency department models under data scarcity*. Computers & Industrial Engineering, Vol. 103, Pages 300–309, 2017.

7. **Zhengchun Liu**, Francisco Epelde, Dolores Rexachs and Emilio Luque. *A Bottom-up Simulation Method to Quantitatively Predict Integrated Care System Performance*. International Journal of Integrated Care. 2016;16(6).
8. Linglong Li, Yaodong Yang, **Zhengchun Liu**, Stephen Jesse, Sergei V. Kalinin and Rama K. Vasudevan. *Correlation between Piezoresponse Nonlinearity and Hysteresis in Ferroelectric Crystals at Nanoscale*. Applied Physics Letters. 2016;17(108).

§Preprint

1. **Zhengchun Liu**, Rajkumar Kettimuthu, Michael E. Papka, Ian Foster. *BFTrainer: Low-Cost Training of Neural Networks on Unfillable Supercomputer Nodes*
2. Jiali Wang, **Zhengchun Liu**, Ian Foster, Won Chang, Rajkumar Kettimuthu, Rao Kotamarthi. *Fast and accurate learned multiresolution dynamical downscaling for precipitation*. arXiv:2101.06813
3. **Zhengchun Liu**, Ahsan Ali, Peter Kenesei, Antonino Miceli, Hemant Sharma, Nicholas Schwarz, Dennis Trujillo, Hyunseung Yoo, Ryan Coffee, Ryan Herbst, Jana Thayer, Chun Hong Yoon, Ian Foster. *Bridge Data Center AI Systems with Edge Computing for Actionable Information Retrieval*.
4. **Zhengchun Liu**, Hemant Sharma, Jun-Sang Park, Peter Kenesei, Jonathan Almer, Rajkumar Kettimuthu, Ian Foster. *BraggNN: Fast X-ray Bragg Peak Analysis Using Deep Learning*. arXiv:2008.08198.
5. Selin Aslan, **Zhengchun Liu**, Viktor Nikitin, Tekin Bicer, Sven Leyffer, Doga Gursoy. *Distributed Optimization with Tunable Learned Priors for Robust Ptycho-Tomography*. arXiv:2009.09498

§Book Chapter

1. Rajkumar Kettimuthu, **Zhengchun Liu**, Tekin Bicer, Ian Foster. *Cyberinfrastructure and System Software for Online Analysis of Large-Scale Data: Challenges and Design Choices*. Handbook on Big Data and Machine Learning in the Physical Sciences. Volume 2: Advanced Analysis Solutions for Leading Experimental Techniques.

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