Zhengchun Liu

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Education

- **Universitat Autònoma de Barcelona** — Barcelona, Spain
  Ph.D. in Computer Science, Advisor: Dr. Emilio Luque — *2013.09 - 2016.07*
  - Sobresaliente 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 Manufacturing Engineering of Flight Vehicle — *2006.09 - 2010.06*
  - Comprehensive Evaluation: 94.2/100, Ranking: 3/94; GPA: 84.6/100

Research Work Experience

1. **Computation Institute, University of Chicago, U.S.A.** 2018.03 - present
   Research Scientist with a joint appointment with Argonne National Laboratory
   – Performance modeling and characterization of high performance computing system.
   – Design a scalable architecture for smart science ecosystems.
   – Explore methods for distributed and autonomous management of the systems.
   – Embed intelligence in relevant computer systems via machine learning.

2. **Mathematics and Computer Science Division** 2016.09 - 2018.03
   Argonne National Laboratory, U.S.A.
   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
   – Simulating to explain the behavior of scientific workflows over a distributed infrastructure.
   – Designing cyberinfrastructure for on-demand scientific experiment data analysis.
   – Architecture, methods, and algorithms to support self-tune and self-manage science ecosystems.

3. **Universitat Autònoma de Barcelona, Barcelona, Spain** 2013.09 - 2016.08
   Research Fellow, PhD candidate, Advisor: Emilio Luque
   – Modeling & simulating hospital emergency department using HPC and agent-based model.
   – Modeling & simulation for healthcare operations management.
   – Healthcare system operation data analysis and population aging study.
   – Model verification, model parameters calibration and model validation.
   – Optimization, Parallel programming, Agent-based modeling and simulation.

4. **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.
   – Developed a framework template for efficient simulation on multi-GPU and multi-Core 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.

5. **Northwestern Polytechnical University, Xi'an, China** 2006.09 - 2013.09
   – Designed and developed a rapid control prototype and testbed system for designing drones.
   – Design and implement flight control algorithms on real-time embedded control systems.
   – Developed a distributed, hardware-in-the-loop interactive simulation system for fixed-wing drone.
   – Learned and earned collaborative leadership.
   – Six-Degree-of-Freedom flight dynamics model of fixed-wing drone.

Engineering Work Experience

1. **Xi'an FengLiTong Electronic CO. LTD. Shaanxi, China** 2010.05 - 2013.06
   – *Software Engineer (Part-time)*
   – μC/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.
   – Implemented the over-the-air firmware updating service using In-Application Programming.
   – Developed a backend communication server for million vehicle-traveling-data-recorders.
   – Effective communication skills were improved through collaborating with more than 20 engineers.

2. **Outsourcing Service** as an Embedded Engineer 2010.09 - 2013.07
   – Designed and developed a Human Machine Interfaces, and 8051 MCU based integrated power management for ambulances (hardware design and firmware programming).
   – Designed and developed a temperature control system for machine tool oil-cooling (hardware design and firmware programming).

Selected Awards, Grants & Honors

- 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
- The 2nd Place in the 4th Spanish Parallel Programming Contest . . . . . Sep. 2014
- China National Scholarship, Ministry of Education, China
  (award to 0.2% of outstanding undergraduate students) . . . . . Oct. 2009
- Champion of the Chinese Robot Competition (dancing session) . . . . . Dec. 2008
- China National Scholarship, Ministry of Education, China
  (award to 0.2% of outstanding undergraduate students) . . . . . Oct. 2008
- First Class Scholarship for Undergraduate Students (three times) . . . . . 2007 - 2009

Technical Skills

- Proficient in C/C++, Python, MATLAB and Embedded C Programming.
- Extensive experience with Parallel software development, including MPI and programming models for multicore and heterogeneous architectures (e.g. CUDA, OpenCL, OpenMP).
- Familiar with cluster computing framework (e.g., Apache Spark) and massive datasets mining.
- Rich experience on backend software development.

- Extensive experience with embedded system, real-time OS, hardware and firmware development.

Professional Service

- *Co-Chair*: SRMPDS 2017; SRMPDS 2018
- *Technical Program Committee*: SIMUL 2015; SIMUL 2016; DAAC 2017
- *External Reviewer*: COMPUTATION TOOLS 2015; Euro-Par 2017; CLUSTER 2017; HiPC 2017; WoWS 2017; IPDPS 2018.
- *Journal Reviewer*: Algorithms-MDPI.

Advising

- **Joanna Czyżewska**, Wroclaw University of Science and Technology. Poland Summer 2015
  – *European Undergraduate Summer Internship program*
  – Modeling and simulating patients who Leave Without Being Seen in emergency department;
  – Characterizing overcrowding in emergency department under unforeseen scenarios.
- **Yuanlai Liu**, University of California, Riverside. U.S.A Summer 2018
  – *Summer Internship*
  – Collecting system data about end-to-end file transfer.
  – Developing analytical model to explain, predict and possibly optimize the transfer performance.

Publications

§Refereed conference/workshop papers

1. Rajkumar Kettimuthu, **Zhengchun Liu**, Ian Foster, Peter H. Beckman, Alex Sim, John Wu, Weikeng Liao, Qiao Kang, Ankit Agrawal, and Alok Choudhary. 2018. Toward Autonomic Science Infrastructure: Architecture, Limitations, and Open Issues. In Proceedings of the 1st AI-Science workshop in conjunction with HPDC'18, *to appear*.
2. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster and Nageswara S.V. Rao. Cross-geography Scientific Data Transfer Trends and User Behavior Patterns. In Proceedings of the 27th International Symposium on High-Performance Parallel and Distributed Computing (HPDC'18), *to appear*.
3. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster, Peter H. Beckman. Towards a Smart Data Transfer Node. International Workshop on Innovating the Network for Data Intensive Science in conjunction with SC'17.
4. Rajkumar Kettimuthu, **Zhengchun Liu**, David Wheeler, Ian Foster, Katrin Heitmann, Franck Cappello. Transferring a Petabyte in a Day. International Workshop on Innovating the Network for Data Intensive Science in conjunction with SC'17.
5. **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).
6. **Zhengchun Liu**, Prasanna Balaprakash, Rajkumar Kettimuthu and Ian Foster. Explaining Wide Area Data Transfer Performance. In Proceedings of the 26th International Symposium on High-Performance Parallel and Distributed Computing (HPDC 2017), 167-178.

7. **Zhengchun Liu**, Dolores Rexachs, Francisco Epelde, and Emilio Luque. Support managing population aging stress of emergency departments in a computational way. Procedia Computer Science (ICCS 2017), Volume 108, 2017, Pages 149-158.
8. **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 2015). Pages 171–182
9. Xueping Zhu, **Zhengchun Liu** and Jun Yang. Model of Collaborative UAV Swarm Toward Coordination and Control Mechanisms Study. Procedia Computer Science (ICCS 2015), Vol 51, 493-502.
10. **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. Procedia Computer Science (ICCS 2015), Vol 51, Pages 433-442.
11. **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 2014).

§Refereed journal papers

1. **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.
2. **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.
3. **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).

§Invited paper

1. **Zhengchun Liu**, Rajkumar Kettimuthu, Ian Foster and Yuanlai Liu. A comprehensive study of wide area data movement at a scientific computing facility. Scalable Network Traffic Analytics workshop (SNTA'18) in conjunction with the IEEE 38th International Conference on Distributed Computing Systems (ICDCS'18).

§Under peer review papers

1. **Zhengchun Liu**, Rajkumar Kettimuthu, Prasanna Balaprakash and Ian Foster. An Online, Machine-Learning-Based Wide-Area Data Transfer Performance Predictor.

§Other selected papers

1. **Zhengchun Liu** and Emilio Luque. Modeling and Simulation for Healthcare Operations Management using High Performance Computing and Agent-Based Model. [thesis overview] Journal of Computer Science & Technology, Vol. 17, No. 1, 2017.
2. 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, Vol. 108, Issue 17, 2016.
3. **Zhengchun Liu**. High Performance Computing Based Simulation for Healthcare Decision Support. The Second International BSC Doctoral Symposium, Barcelona, Spain. May 5 - 7, 2015.
4. **Zhengchun Liu**, Eduardo Cabrera, Dolores Rexachs and Emilio Luque. Study of Emergency Department by Using High Performance Computing. XXV Jornadas de Paralelismo. Sep. 16-18, 2014.

5. **Zhengchun Liu**, Qi Liu and Jun Yang. Research on Missile's Integrated Testing Platform Based on HLA. Computer and Modernization. 2013, 1(6): 179-181.
6. Xueping Zhu, **Zhengchun Liu**, and Jun Yang. Research on Co-simulation Method in ADAMS and MATLAB for Missile Seeker's Stabilization Platform Design. AsiaSim 2013. November 6 - 8, 2013.
7. **Zhengchun Liu**, and Jun Yang. Design and Implementation of a Missile Seeker Virtual Test-Bed Based on High Level Architecture. Proceedings of the 3d MACE. July 27-29, 2012.

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