Yuankun Xue

CONTACT INFORMATION

Ph.D. candidate
Department of Electrical Engineering
Viterbi School of Engineering
University of Southern California

(Cell): 213.400.8361
(Email): yuankunx@usc.edu
http://yuankunx.wixsite.com/yuankun

TECHNICAL EXPERTISE

Algorithm design, Machine learning, Mathematical optimization and software development, Complex Network, Time Series Analysis, Information Theory, Bioinformatics, Computer Architecture

DEVELOPMENT LANGUAGES

Python, C/C++, Matlab, R, Linux Shell, Perl, Verilog

EDUCATION

University of Southern California, Los Angeles, CA, USA
Ph.D. candidate, Electrical Engineering, 2014 - now
Overall GPA: 3.91/4

Fudan University, Shanghai, China
M.S., Electrical Engineering, 2014, Graduated with Highest honor

Fudan University, Shanghai, China
B.S., Electrical Engineering, 2011

SELECTED PROJECTS

Design and Optimization of NoC-based Systems For Cyber-physical System(CPS)
Jan 2014 - Present
*Published **8** papers(including **5** first-author papers)* all on top-tier conferences and journals like **DAC, CODES+ISSS, ICCAD, TVLSI and NOCS.**
1. Developed the first large scale Networks-on-chip (NoC) based manycore accelerator for Protein Folding Simulation that has achieved near-linear speedup (**DAC 2014**).
2. Proposed network bandwidth and resource time-multiplexing approaches for hierarchical parallel genetic algorithm (HPGA) accelerator (**NOCS 2014**).
3. Proposed a user-cooperation based linear network-coding scheme to improve significantly the throughput of collective communication of NoC-based manycore system (**NOCS 2015**).
4. Developed a general mathematical optimization framework for automatic synthesis of on-chip network topology with guaranteed performance bound (**NOCS 2016**).
5. Proposed a complex-network theory based scalable and realistic benchmark synthesis tool using LLVM for performance evaluation of manycore system (**CODES+ISSS 2016**).

Machine-learning based Mathematical Modeling and Analysis of Complex Systems
July 2015 - Present
*Published **4** first-author papers* on top-tier conferences and journals including **DATE, Allerton Conference, ICCPS, TODAES**

1. Proposed a spatio-temporal fractal dynamical system model capturing the inter-dependencies of muscles involved in forearm movements. Develop a multi-regression algorithm for parameter estimation.(**DATE 2016**)
2. Proposed a mathematical framework investigating the minimum number of sensors to ensure Observability of physiological systems. Proved the feasibility space of the problem is submodular and proposed a greedy-algorithm that delivers solutions with guaranteed optimality. (**Allerton Conference 2016**)
3. Proposed a dynamical graph model for internet-of-things (IoT) that enables the investigation

of a set of under-explored key challenges in IoT domain (**TODAES, accepted to appear**
4. Proposed a new mathematical strategy for constructing compact yet accurate fractional-order non-linear models of complex systems dynamics that aim to scrutinize the causal effects and influences by analyzing the statistics of the magnitude increments and the inter-event times of stochastic processes (**ICCPS**, to appear).

Journal Review

Guest reviewer for:
Nature Scientific Report, *IMA Journal of Mathematical Control and Information*, *IEEE Transactions on Very Large Scale Integration Systems*, *Hindawi Mathematical Problems in Engineering*

Honors and Awards

Student travel grant of Networks-on-chip Symposium (NOCS 2015).
Excellent Graduate of Shanghai 2014.

Publications

Conference

13. **Yuankun Xue** and Paul Bogdan, Constructing Compact Causal Mathematical Models for Complex Dynamics, (to appear in) Proceedings of 8th ACM/IEEE International Conference on Cyber-Physical System (ICCPS), 2017.
12. **Yuankun Xue**, Sergio Pequito, Joana Maria Rosado Coelho, Paul Bogdan, George Pappas, Minimum Number of Sensors to Ensure Observability of Physiological Systems: a Case Study, (to appear in) Proceedings of 54th Annual Allerton Conference on Communication, Control, and Computing (Allerton), 2016.
11. Xue Lin, **Yuankun Xue**, Paul Bogdan, Massoud Pedram, Yanzhi Wang and Siddarth Garg, "Power-aware virtual machine mapping in the data-center-on-a-chip paradigm," in Proc. of the 34nd IEEE International Conference on Computer Design (ICCD), Oct. 2016.
10. **Yuankun Xue**, Paul Bogdan, Scalable and Realistic Benchmark Synthesis for Efficient NoC Performance Evaluation: A Complex Network Analysis Approach, (to appear in) Proceedings of the International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS), 2016
9. **Yuankun Xue**, Paul Bogdan, Improving NoC Performance under Spatio-Temporal Variability By Runtime Reconfiguration: A General Mathematical Framework, (to appear in) Proceedings of the 10th International Symposium on Networks-on-Chip (NOCS), 2016
8. **Yuankun Xue**, Saul Rodriguez, Paul Bogdan, A Spatio-Temporal Fractal Model for a CPS Approach to Brain-Machine-Body Interfaces, Design, Automation and Test in Europe Conference and Exhibition (DATE), 2016.
7. **Yuankun Xue**, Paul Bogdan, User Cooperation Network Coding Approach for NoC Performance Improvement, Proceedings of the 9th International Symposium on Networks-on-Chip (NOCS), 2015.
6. Paul Bogdan, **Yuankun Xue**, Mathematical Models and Control Algorithms for Dynamic Optimization of Multicore Platforms: A Complex Dynamics Approach, International Conference On Computer Aided Design (ICCAD), 2015.
5. Paul Bogdan, Turbo Majumder, Arvind Ramanathan, **Yuankun Xue**, NoC Architectures as Enablers of Biological Discovery for Personalized and Precision Medicine, Proceedings of the 9th International Symposium on Networks-on-Chip (NOCS), 2015.
4. Paul Bogdan, **Yuankun Xue**, Cyber-physical systems for personalized and precise medicine, 2015 IEEE 58th International Midwest Symposium on Circuits and Systems (MWSCAS), 2015.

3. Alireza Shafaei, Yanzhi Wang, **Yuankun Xue**, Srikanth Ramadurgam, Paul Bogdan, Massoud Pedram, Prediction of the dark silicon phenomenon under deeply-scaled FinFET technologies, Proceedings of Great Lakes Symposium on VLSI (GLS-VLSI), 2015.
2. **Yuankun Xue**, Zhiliang Qian, Guopeng Wei, Paul Bogdan, Chi-Ying Tsui, Radu Marculescu, An efficient network-on-chip (noc) based multicore platform for hierarchical parallel genetic algorithms, 2014 Eighth IEEE/ACM International Symposium on Networks-on-Chip (NOCS), 2014.
1. **Yuankun Xue**, Zhiliang Qian, Paul Bogdan, Fan Ye, Chi-Ying Tsui, Disease diagnosis-on-a-chip: Large scale networks-on-chip based multicore platform for protein folding analysis, Proceedings of the 51st Annual Design Automation Conference (DAC), 2014

Journal

2. **Yuankun Xue**, Ji Li, Shahin Nazarian and Paul Bogdan, Fundamental Challenges Towards Making IoT a Reachable Reality: A Model-centric Investigation, IEEE Transactions on Design Automation of Electronic Systems (TODAES), 2016 (to appear).
1. Karthi Duraisamy, **Yuankun Xue**, Paul Bogdan, Partha Pratim Pande, Multicast-Aware High-Performance Wireless Network-on-Chip Architectures, IEEE Transactions on Very Large Scale Integration (VLSI) Systems (TVLSI), 2016.

Teaching Experience

TA for EE499 Embedded Systems — 2014 Fall

TA for EE454 Introduction to System-on-Chip — 2015 Spring, 2015 Fall, 2016 Spring

Seminar Talk

Data-Centers-on-a-Chip as Enablers for Cyber-Physical Systems: A Scalable Model of Computation Guiding the Design Methodologies of Network-on-Chip based Manycore Platforms
Cyber-Physical Systems Seminar Series, University of Southern California
September 26, 2016

Languages

Chinese (Native), English (Full working proficiency), Japanese (Full working proficiency)