

Chuchu Fan

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EDUCATION

Ph.D., Department of Electrical and Computer Engineering, Aug. 2013-present
University of Illinois at Urbana-Champaign

B.S., Department of Automation, Sep. 2009-Jul. 2013
Tsinghua University

ACADEMIC EXPERIENCE

Graduate Research Assistant, Aug. 2013-Present

Department of Electrical and Computer Engineering, UIUC

- Advisor: Prof. Sayan Mitra

Thesis (tentative): Formal verification and synthesis of smart cyber-physical systems

Graduate Teaching Assistant, Aug. 2015-Dec. 2017

Department of Electrical and Computer Engineering, UIUC

- Course: ECE 313, Probability with Engineering Applications
- Course: ECE 584, Embedded System Verification (as guest lecturer)

Visiting Scholar, Jun. 2012-Aug. 2012

iLab, Department of Computer Science, University of Southern California

- Advisor: Prof. Laurent Itti

Project: Speed control system design for Beobot 2.0

Undergraduate Research Assistant, Jul. 2011-Jul. 2013

Institute of Digital Interactive Technology, Tsinghua University

- Advisor: Prof. Haiming Lu

Thesis: Motion-based gesture recognition

Institute of Control Theory and Technology, Tsinghua University

- Advisor: Prof. Mingguo Zhao

Project: Student research training program

WORKING EXPERIENCE

Technical Director, Jan. 2016-Jun. 2016

Research and Development group, Rational Cyphy Inc., Champaign, IL, U.S.

Project: Development and commercialization of the formal verification tool C2E2

Research Intern, Jan. 2015-May. 2015

Model Based Development group, Toyota Technical Center, Los Angeles, CA, U.S.

- Mentor: James Kapinski

Project: Reach set analysis for parametric nonlinear systems

Research Intern, Feb. 2012-Jun. 2012

Mobile and Sensing Systems group, Microsoft Research Asia(MSRA), Beijing, China

- Mentor: Xiaofan Jiang

Project 1: LiveSynergy: A wireless proximity detection platform to provide cloud-based APIs that enable real-time interactions between humans and their physical environment

Project 2: SEPTIMU: A novel wearable system to provide with real-time human wellness monitoring and feedback

HONORS & AWARDS	M. E. Van Valkenburg Graduate Research Award	Apr. 2018
	Selected Participant of the 5th Heidelberg Laureate Forum	Sep. 2017
	Yi-Min Wang and Pi-Yu Chung Endowed Research Award	Feb. 2017
	Selected Participant of the Rising Stars Program	Oct. 2016
	EMSOFT Best Paper Finalist	Oct. 2016
	Rambus Computer Engineering Fellowship	Apr. 2016
	Robert Bosch Best Verification Result Award	Apr. 2015
	Excellent Graduate of Tsinghua University	Jul. 2013
	First-class Scholarship honored by the Soar Foundation	Oct. 2012
	Best Hardware Award in Electronic Design Competition in Tsinghua	Dec. 2011
	First-class Scholarship honored by SAMSUNG	Oct. 2011
	Second Prize in the National Math Competition in Shaanxi Province	Oct. 2008
	Second Prize in the National Physics Competition in Shaanxi Province	Oct. 2007

GRANTS

G3. **[PI]** NSF SBIR-1549058 SBIR Phase I: Debugging Smart Cyber-Physical Systems

G2. **[Awardee]** Summer 2016 and summer 2017, Travel Scholarship to attend the CAV 2016 and CAV 2017 Conferences

G1. **[Awardee]** Fall 2015, Conference Travel Grant from UIUC College of Engineering

PATENTS

P2. Bounded Verification through Discrepancy Computations. TF14195-02(US), granted Feb. 2016

P1. Image Super-Resolution via Analysis Sparse Prior. CN103049885, granted Apr. 2013.

PUBLICATION Journal Papers

P17. Chuchu Fan, James Kapinski, Xiaoqing Jin and Sayan Mitra. *Simulation-driven reachability using matrix measures*, ACM Transactions on Embedded Computing Systems (TECS), 2018.

P16. Chuchu Fan, Bolun Qi and Sayan Mitra. *Road to safe autonomy with data and formal reasoning*, Design & Test, IEEE, 2018.

P15. Zhenqi Huang, Chuchu Fan, and Sayan Mitra. *Bounded Invariant Verification for Time-Delayed Nonlinear Networked Dynamical Systems*, IFAC Nonlinear Analysis: Hybrid Systems, 2016.

P14. Zhenqi Huang, Chuchu Fan, Alexandru Mereacre, Sayan Mitra, and Marta Kwiatkowska. *Simulation-based Verification of Implantable Medical Devices with Guaranteed Coverage*, Design & Test, IEEE, vol.32, no.5, pp.27-34, Oct. 2015.

P13. Qiang Ning, Kan Chen, Li Yi, Chuchu Fan, Yao Lu, Jiangtao Wen, *Image Super-Resolution via Analysis Sparse Prior*, IEEE Signal Processing Letters 2013.

Conference Papers

P12. Chuchu Fan, Umang Mathur, Sayan Mitra and Mahesh Viswanathan. *Controller Synthesis Made Real: Reach-avoid Specifications and Linear Dynamics*, Computer-Aided Verification (CAV) 2018.

P11. Chuchu Fan, Zhenqi Huang and Sayan Mitra. *Approximate Partial Order Reduction*, International Symposium on Formal Methods (FM) 2018

P10. Chuchu Fan, Yu Meng, Jürgen Maier, Ezio Bartocci, Sayan Mitra and Ulrich Schmid. *Verifying nonlinear analog and mixed-signal circuits with inputs*, IFAC Conference on Analysis and Design of Hybrid Systems (ADHS) 2018.

P9. Chuchu Fan, Bolun Qi, Sayan Mitra and Mahesh Viswanathan. *DRYVR: Data-driven verification and compositional reasoning for automotive systems*, Computer-Aided Verification (CAV) 2017.

P8. Chuchu Fan, James Kapinski, Xiaoqing Jin and Sayan Mitra. *Locally Optimal Reach Set Over-approximation for Nonlinear Systems*, International Conference on Embedded Software (EMSOFT) 2016. **[Best Paper Finalist]**

P7. Chuchu Fan, Bolun Qi, Sayan Mitra, Mahesh Viswanathan and Parasara Sridhar Duggirala. *Automatic reachability analysis for nonlinear hybrid models with C2E2*, Computer-Aided Verification (CAV) 2016.

P6. Chuchu Fan and Sayan Mitra. *Bounded Verification with On-the-Fly Discrepancy Computation*, Automated Technology for Verification and Analysis (ATVA) 2015.

- P5. Md. Ariful Islam, Richard DeFrancisco, Chuchu Fan, Radu Grosu, Sayan Mitra and Scott S molka. *Model Checking Tap Withdrawal in C. Elegans*. Hybrid Systems Biology (HSB) 2015.
- P4. Parasara Sridhar Duggirala, Chuchu Fan, Sayan Mitra, and Mahesh Viswanathan. *Meet a Powertrain Verification Challenge*, Computer-Aided Verification (CAV) 2015.
- P3. Chuchu Fan, Parasara Sridhar Duggirala, Sayan Mitra, and Mahesh Viswanathan. *Progress on Powertrain Verification Challenge with C2E2**, Applied Verification for Continuous and Hybrid Systems (ARCH) 2015 [**Best Verification Result Award**].
- P2. Zhenqi Huang, Chuchu Fan, Alexandru Mereacre, Sayan Mitra, and Marta Kwiatkowska. *In variant verification of nonlinear hybrid automata networks of cardiac cells*, Computer-Aided Verification (CAV) 2014.

Tutorial

- P1. Parasara Sridhar Duggirala, Chuchu Fan, Sayan Mitra, and others. *Tutorial: Software tools for hybrid systems verification, transformation, and synthesis: C2E2, HyST, and TuLiP*, IEEE Conference on Control Applications (CCA), 2016

TALKS

- T8. DRYVR: Data-driven verification and compositional reasoning for automotive systems
Computer-Aided Verification 2017, Jul. 2017.
Heidelberg, Germany.
- T7. Data-driven Verification of Cyber-physical systems
Institute for Software Integrated Systems - Vanderbilt University
Nashville, Tennessee, U.S.
- T6. *Locally Optimal Reach Set Over-approximation for Nonlinear Systems*,
Embedded Systems Week, Oct. 2016. Pittsburgh, Pennsylvania, U.S.
Feedback Friday, Oct. 2016. Urbana, Illinois, U.S.
- T5. *Automatic Reachability Analysis for Nonlinear Hybrid Models with C2E2*,
Computer-Aided Verification 2016, Jul. 2016.
Toronto, Canada.
- T4. *Verification of Cyber-Physical Systems*,
French-American Doctoral Exchange Seminars, Jul. 2016. Grenoble, France.
Coordinated Science Laboratory Social Hours, Oct. 2015.
University of Illinois at Urbana-Champaign, Urbana, Illinois, U.S.
- T3. *Bounded Verification with On-the-Fly Discrepancy Computation*,
Intl. Symposium on Automated Technology for Verification and Analysis, Oct. 2015.
Shanghai, China.
- T2. *Local Discrepancy Computation in Simulation-guided Verification*,
Midwest Verification Day, Oct. 2015.
University of Illinois at Urbana-Champaign, Urbana, Illinois, U.S.
- T1. *Progress on Powertrain Verification Challenge with C2E2*,

Applied Verification for Continuous and Hybrid Systems, Apr. 2015.
Seattle, Washington, U.S.

SERVICES

Committee member for

M2. 21st ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2018) Repeatability Evaluation and Social Media Chair

M1. 29th International Conference on Computer Aided Verification Artifact Evaluation (CAV 2017 AE)

Reviewer/Sub-reviewer for

R12. Formal Methods in System Design, An International Journal

R11. IEEE Transactions on Intelligent Vehicles

R10. Mobile Information Systems

R9. IET Cyber-Physical Systems: Theory & Applications

R8. Journal of Discrete Event Dynamic Systems, Special Issue on Formal Methods in Control

R7. 28th International Conference on Computer Aided Verification (CAV 2016, 2017)

R6. 7th Intl. Conf. on Cyber-Physical Systems (ICCPS 2016, 2017)

R5. 18th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2015, 2016, 2017, 2018)

R4. IEEE Real-Time Systems Symposium (RTSS 2014, 2016, 2017)

R3. Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2015)

R2. 13th Intl. Conf. on Formal Modeling and Analysis of Timed Systems (FORMATS 2015)

R1. 11th Intl. Conf. on Quantitative Evaluation of Systems (QEST 2014)

MENTORING, LEADERSHIP & ACTIVITIES

Selected U.S. PhD in CPS, Jul. 2016

French-American Doctoral Exchange Program (FADEx), France

Research Mentor, Aug.2015-Present

Department of Electrical and Computer Engineering, UIUC

- Undergraduate Student: Bolun Qi. Project: Developing the automatic verification tool for hybrid systems C2E2
- Undergraduate Student: Yu Meng. Project: Modeling and verification of nonlinear analog and mixed-signal circuits with inputs
- Undergraduate Student: Nishant Dash. Project: Connecting the verification tool DryVR with the planning, control and analysis toolbox Drake
- Undergraduate Student: Minghao Jiang and Rongzhou Li. Project: Developing the user interface the formal synthesis algorithm for the tool DryVR

Female Researcher in Computer Reach Association, Apr. 2016

Grad Cohort Workshop, San Diego, CA

Vice Chair, Jul. 2010-Jul. 2012

Automation Student Association of Science and Technology (ASAST), Tsinghua University, Beijing, China

- Took charge of most the technology activities for over 600 students
- Directed the Future Intelligent Robot Club sponsored by Texas Instruments

Team Leader, Oct. 2010-Oct. 2011

National Electronic Design Competition, Beijing, China

- Took responsibility for hardware part of the robot
- Individual Best Hardware Award and National Third Award

Volunteer Lecturer, Jun. 2010-Sep. 2010

ChunLei Education Support Program, Wantang School, Jianshui, Yunnan, China