

CHUCHU FAN

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EDUCATION

University of Illinois at Urbana-Champaign

Ph.D. Candidate in Computer Engineering

Aug. 2013 - May 2019

Advisor: Prof. [Sayan Mitra](#)

- Research Interest: Formal methods on Cyber-Physical Systems; Verification of Autonomous Driving; Formal Synthesis of Control Systems; Theoretical Computer Science; Game Theory;
- Tools developed: [DryVR](#); [C2E2](#); [RealSyn](#)

Tsinghua University

B.E. in Automation (with honor)

Sep. 2009 - Jul. 2013

Advisor: Prof. [Haiming Lu](#) and [Mingguo Zhao](#)

University of Southern California

Visiting Scholar in Computer Science

Jun. 2012 - Aug. 2012

Advisor: Prof. [Laurent Itti](#)

INDUSTRIAL EXPERIENCES

Rational Cyphy Inc. (Champaign, IL)

Technical Director

Jan. 2016 - Jun. 2016

- Leading a group of software engineers to develop and commercialize formal verification tools

Toyota Technical Center, Model Based Development Group (Los Angeles, CA) Jan. 2015 - May 2015

Research Intern

Mentor: [James Kapinski](#)

- Project: Verification of parametric complex nonlinear systems

Microsoft Research Asia, Mobile and Sensing Systems Group (Beijing, China) Jan. 2012 - Jun. 2012

Research Intern

- Projects: Hardware design of wireless sensor networks and wearable health monitoring systems

HONORS AND AWARDS

Mavis Future Faculty Fellows (MF3) of UIUC 2018

M. E. Van Valkenburg Graduate Research Award 2018

Selected Attendee of the 5th Heidelberg Laureate Forum 2017

Yi-Min Wang and Pi-Yu Chung Endowed Research Award 2017

Rising Stars in EECS (Class of 2016) 2016

EMSOFT Best Paper Finalist 2016

Rambus Computer Engineering Fellowship 2016

Robert Bosch Best Verification Result Award 2015

First-class Scholarships honored by the Soar Foundation and by SAMSUNG 2011,2012

Best Hardware Award in Electronic Design Competition in Tsinghua 2011

SELECTED PUBLICATIONS

JOURNAL

17. **Chuchu Fan**, James Kapinski, Xiaoqing Jin and Sayan Mitra. “Simulation-driven reachability using matrix measures.” *ACM Transactions on Embedded Computing Systems (TECS)*, 2018.
16. **Chuchu Fan**, Bolun Qi and Sayan Mitra. “Road to safe autonomy with data and formal reasoning.” *Design & Test, IEEE*, 2018.
15. Zhenqi Huang, **Chuchu Fan**, and Sayan Mitra. “Bounded Invariant Verification for Time-Delayed Nonlinear Networked Dynamical Systems.” *IFAC Nonlinear Analysis: Hybrid Systems*, 2016.
14. Zhenqi Huang, **Chuchu Fan**, Alexandru Mereacre, Sayan Mitra, and Marta Kwiatkowska. “Simulation-based Verification of Implantable Medical Devices with Guaranteed Coverage.” *Design & Test, IEEE*, 2015.
13. 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

12. **Chuchu Fan**, Umang Mathur, Sayan Mitra and Mahesh Viswanathan. “Controller Synthesis Made Real: Reach-avoid Specifications and Linear Dynamics.” *Computer-Aided Verification (CAV)*, 2018. [**Artifact Evaluated**]
11. **Chuchu Fan**, Zhenqi Huang and Sayan Mitra. “Approximate Partial Order Reduction.” *International Symposium on Formal Methods (FM)*, 2018.
10. **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.
9. **Chuchu Fan**, Bolun Qi, Sayan Mitra and Mahesh Viswanathan. “DRYVR:Data-driven verification and compositional reasoning for automotive systems.” *Computer-Aided Verification (CAV)*, 2017. [**Artifact Evaluated**]
8. **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**]
7. **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.
6. **Chuchu Fan** and Sayan Mitra. “Bounded Verification with On-the-Fly Discrepancy Computation.” *Automated Technology for Verification and Analysis (ATVA)*, 2015.
5. Md. Ariful Islam, Richard Defrancisco, **Chuchu Fan**, Radu Grosu, Sayan Mitra and Scott Smolka. “Model Checking Tap Withdrawal in C. Elegans.” *Hybrid Systems Biology (HSB)*, 2015.
4. Parasara Sridhar Duggirala, **Chuchu Fan**, Sayan Mitra, and Mahesh Viswanathan. “Meet a Powertrain Verification Challenge.” *Computer-Aided Verification (CAV)*, 2015. [**Artifact Evaluated**]
3. **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**]
2. Zhenqi Huang, **Chuchu Fan**, Alexandru Mereacre, Sayan Mitra, and Marta Kwiatkowska. “Invariant verification of nonlinear hybrid automata networks of cardiac cells.” *Computer-Aided Verification (CAV)*, 2014.

TUTORIAL

1. 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.

PATENTS

2. “Bounded Verification through Discrepancy Computations”, TF14195-02(US), granted Feb. 2016.
1. “Image Super-Resolution via Analysis Sparse Prior”, CN103049885, granted Apr. 2013.

GRANTS

3. [PI] NSF SBIR-1549058 “SBIR Phase I: Debugging Smart Cyber-Physical Systems”
2. [Awardee] Summer 2016 and summer 2017, Travel Scholarship to attend the CAV 2016 and CAV 2017 Conferences
1. [Awardee] Fall 2015, Conference Travel Grant from UIUC College of Engineering

TALKS

8. “DRYVR: Data-driven verification and compositional reasoning for automotive systems”, *CAV*, Heidelberg, Germany, 2017.
7. “Data-driven Verification of Cyber-physical systems”, *Invited talk at Vanderbilt University*, Nashville, TN, 2017.
6. “Locally Optimal Reach Set Over-approximation for Nonlinear Systems”, *Embedded Systems Week*, Pittsburgh, PA, 2016. & *Feedback Friday of UIUC*, Urbana, IL, 2016.
5. “Automatic Reachability Analysis for Nonlinear Hybrid Models with C2E2”, *CAV*, Toronto, Canada, 2016.
4. “Simulation-driven Verification of Cyber-Physical Systems”, *Invited talk at French-American Doctoral Exchange Seminars*, Grenoble, France, 2016. & *Invited talk at CSL Social Hours*, Urbana, IL, 2016.
3. “Bounded Verification with On-the-Fly Discrepancy Computation”, *International Symposium on Automated Technology for Verification and Analysis*, Shanghai, China, 2015.
2. “Local Discrepancy Computation in Simulation-guided Verification”, *Invited talk at Midwest Verification Day*, Urbana, IL, 2015.
1. “Progress on Powertrain Verification Challenge with C2E2”, *CPS Week*, Seattle, WA, 2015.

ACADEMIC SERVICES

- **Chair of Social Media; Repeatability Evaluation Committee Member** (HSCC’18)
- **Artifact Evaluation Committee Member** (CAV’17)
- **Reviewer for the following journals:** International Journal on Formal Methods in System Design, IET Cyber-Physical Systems: Theory & Applications, IEEE Trans. on Intelligent Vehicles, Mobile Information Systems, and Journal of Discrete Event Dynamic Systems.
- **Reviewer for the following conferences:** CAV’16,17, HSCC’15,16,17,18, EMSOFT’18, RTSS’14,16,17, IC-CPS’16,17, FORMATS’15, ARCH’15, and QEST’14.
- **Teaching Assistant** at UIUC: ECE313 (Probability)
- **Lecturer** at UIUC: ECE584 (Embedded System Verification)

MENTORING, LEADERSHIP & ACTIVITIES

- **French-American Doctoral Exchange Program** (Class of 2016): One of the ten students selected from the U.S.
- **Undergraduate Student Research Mentor** (Aug. 2015 - Present): Bolun Qi (joining Facebook Inc.), Yu Meng (pursuing master’s degree in UIUC), Nishant Dash (ongoing), Minghao Jiang (ongoing), Rongzhou Li (ongoing), Yangge Li (on going)
- **Vice Chair of the Automation Student Association of Science and Technology at Tsinghua University** (Jul. 2010 - Jul. 2012): Responsible for organizing technology activities for over 600 students; directed the Future Intelligent Robot Club sponsored by Texas Instruments.
- **Volunteer Teacher** (Jun. 2010 - Sep. 2010): In the Chun-Lei Education Support Program for underdeveloped areas in southwest China.