TAYLOR T. JOHNSON

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EDUCATION

2013 **PhD, Electrical and Computer Engineering**, *University of Illinois at Urbana-Champaign*, Urbana, IL.
- Dissertation: *Uniform Verification of Safety for Parameterized Networks of Hybrid Automata*
- Committee: Sayan Mitra (Adviser), Tarek Abdelzaher, William H. Sanders, Mahesh Viswanathan

2010 **MSc, Electrical and Computer Engineering**, *University of Illinois at Urbana-Champaign*, Urbana, IL.
- Thesis: *Fault-Tolerant Distributed Cyber-Physical Systems: Two Case Studies*
- Adviser: Sayan Mitra

2008 **BSEE, Electrical and Computer Engineering**, *Rice University*, Houston, TX.
- Senior Project: *Sensorless Synchronous Motor Control in Downhole Tools* (with Frank Havlak and Elica Skorcheva at Rice, and Fadi Abousleiman, Farès Hantous, and Slim Besbes at Supélec, Gif-sur-Yvette, France)
- Advisers: Albert Hoefel and Peter Swinburne (Schlumberger); J.D. Wise and Fathi H. Ghorbel (Rice)

ACADEMIC AND RESEARCH POSITIONS

8/2016 – Present **Assistant Professor**, *Vanderbilt University*, Electrical Eng. and Computer Science , Nashville, TN.
- Research Interests: Cyber-physical systems (CPS), which encompases the Internet of Things (IoT); Formal methods and formal verification; Hybrid systems; Distributed systems; Software engineering; Real-time, networked embedded control systems and software; CPS domains such as transportation systems (aerospace and automotive), power/energy systems, and robotics
- Director of VeriVITAL: The Verification and Validation for Intelligent and Trustworthy Autonomy Laboratory

9/2013 – 8/2016 **Assistant Professor**, *University of Texas at Arlington*, Computer Science and Eng., Arlington, TX.
- Courtesy Appointment: Electrical Engineering

5/2015-5/2016 **Adjunct Faculty**, *University of Connecticut*, UTC Institute for Advanced Systems Engineering.
- Supervised capstone projects for two teams, SE 5309: Capstone Projects for Embedded Systems.
- Taught an all online summer 2015 graduate course for UTC engineers, SE 5302: Formal Methods.

Summers 2014 and 2015 **Visiting Research Faculty**, *AFOSR Summer Faculty Fellowship Program (SFFP) and AFRL Visiting Faculty Research Program (VFRP), Information Directorate, Air Force Research Laboratory*, Rome, NY.
- Research with Steven Drager and Stanley Bak to develop formal verification methods for hybrid systems and apply them to Air Force CPS, resulting in papers [C14,C16,C17,C20,J4] and software tools [S2,S3].

8/2008 – 8/2013 **Research and Teaching Assistant**, *University of Illinois at Urbana-Champaign*, Electrical and Computer Engineering, Urbana, IL.

Summer 2011 **Visiting Graduate Researcher**, *Air Force Summer Faculty Fellowship Program, Space Vehicles Directorate, Air Force Research Laboratory*, Albuquerque, NM.
- Research with R. Scott Erwin and Prof. Sayan Mitra to develop and apply hybrid systems abstraction and verification techniques to Air Force space systems problems, particularly verification of conjunction (collision) avoidance for satellite rendezvous maneuvers, resulting in paper [C8].

INDUSTRY POSITIONS

Summer 2010 **Intern in Electrical Engineering**, *Schlumberger Technology Corporation*, Sugar Land, TX.
- Designed, implemented, and analyzed a real-time state estimator for maximum available power produced by a turbo-alternator, used for stalling protection of a turbine in a power control loop outside already cascaded velocity and torque control loops for permanent magnet synchronous motor (PMSM) control of a pump. This work resulted in a conference publication [C3]—that won a best paper award—and patent [P1].

Summer 2008 **Intern in Electrical Engineering**, *Etudes et Productions Schlumberger*, Clamart, France.
- Analyzed and modeled analog and mixed-signal electronics designs for correctness by hand and using computer tools like PSpice with Monte Carlo simulation.

Summer 2007 **Intern in Computer Engineering**, *Schlumberger Technology Corporation*, Sugar Land, TX.
- Implemented new features on FPGAs in VHDL used in Space Vector Pulse Width Modulation (SV-PWM) control of permanent magnet synchronous motors (PMSMs).

Summer 2006 **Intern in Computer Engineering**, *Schlumberger Technology Corporation*, Sugar Land, TX.
- Designed, implemented, tested, and documented a networked boot loader and application framework in 8051 assembly and C for a microcontroller, utilizing CAN for networking via an SPI interface to a CAN transceiver.

Summer 2005 **Intern in Computer Science**, *Schlumberger Technology Corporation*, Sugar Land, TX.
- Designed and implemented an intranet web application in PHP and Javascript (AJAX) with a SQL database backend system to gather, store, and report static analysis metrics on embedded systems source code.

AWARDS AND HONORS

4/2016 **Best Software Repeatability Evaluation Award for [C21]**, 19th ACM International Conference on Hybrid Systems: Computation and Control (HSCC), Cyber-Physical Systems Week (CPSWeek) 2016, Austria, Vienna.

2/2016 **Young Investigator Research Program (YIP) Award**, Air Force Office of Scientific Research (AFOSR).
Received grant award [AG6].

6/2015 **Computer and Information Science and Engineering (CISE) Research Initiation Initiative (CRII) Award**, National Science Foundation (NSF), Computer and Information Science and Engineering (CISE).
Received grant award [AG2].

Summer 2015 **Fellow**, *Air Force Research Laboratory, Information Directorate*, Air Force Office of Scientific Research (AFOSR), Summer Faculty Fellowship Program (SFFP), Rome, NY..
Received grant award [CG3].

3/2013 **Yi-Min Wang and Pi-Yu Chung Endowed Research Award**, *Electrical and Computer Engineering, University of Illinois at Urbana-Champaign*, Urbana, IL.

3/2013 **ECE Rambus Fellowship in Electrical and Computer Engineering**, *Electrical and Computer Engineering, University of Illinois at Urbana-Champaign*, Urbana, IL.

6/2012 **Best Overall Paper Award of Three Collocated Conferences for [C7]**, *IFIP International Conference on Formal Techniques for Distributed Systems: Joint International Conference of 14th Formal Methods for Open Object-Based Distributed Systems and 32nd Formal Techniques for Networked and Distributed Systems (FORTE/FMOODS 2012), of the 7th International Federated Conference on Distributed Computing Techniques (DisCoTec 2012)*, KTH, Stockholm, Sweden.

2012 – 2013 **Computer Engineering Fellowship Sponsored by Intel Corporation**, *Electrical and Computer Engineering, University of Illinois at Urbana-Champaign*, Urbana, IL.

2/2011 **Best Paper Award for [C3]**, *2nd IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL.

12/2009 **Most Interesting Cyber-Physical Systems Research Problem Award for [D2]**, *30th IEEE Real-Time Systems Symposium (RTSS)*, Washington, DC.

2004 – 2008 **Coca-Cola Scholars Scholarship**.

2004 – 2008 **Robert C. Byrd Honors Scholarship**.

2004 – 2008 **Bluebonnet Electric Cooperative Scholarship of Excellence**.

STUDENT AWARDS AND HONORS

9/2015 **NSF Travel Awards for the PhD Student Forum at Formal Methods in Computer-Aided Design (FMCAD 2015)**, *Luan Viet Nguyen (DS1) and Omar Beg (DS2), Austin, TX, September 27-30, 2015.*

5/2015 **NSF and ACM SIGBED Travel Awards for Cyber-Physical Systems Week (CPSWeek 2015)**, *Luan Viet Nguyen (DS1) and Hoang Dung Tran (DS3), Seattle, WA, April 12-16, 2015.*

12/2014 **NSF Travel Award for CPS Verification and Validation: Industrial Challenges and Foundations (CPS V&V I&F)**, *Luan Viet Nguyen (DS1), Carnegie Mellon University, Pittsburgh, PA, December 12, 2014.*

12/2014 **3rd Place in US/India Chamber of Commerce Spirit of Innovation Competition**, *Amol Vengurlekar (MA1), Ruoshi Zhang (MA2), Luan Viet Nguyen (DS1), and Eric Nelson (IS2) for project related to paper [W2], which came with a* $1000 *award.*

4/2014 **NSF Graduate Research Fellowship Program (GRFP) Honorable Mention**, *Shamina Shahrin Hossain (MP1), April 2014.*

TEACHING EXPERIENCE

Vanderbilt University

Spring 2017 **Automated Verification (CS6315)**, *Instructor*.
10 students

Fall 2016 **Computer Organization (CS2231)**, *Instructor*.
35 students

University of Connecticut

Spring 2016 **Capstone Projects for Embedded Systems (SE5309), United Technologies Corporation (UTC), Institute for Advanced Systems Engineering (IASE)**, *Adjunct Faculty; Capstone Project Mentor*, Supervised two student teams for capstone embedded system design projects using formal methods concepts and tools as a part of their Embedded Systems Graduate Certificates..
6 students, online-only course

Summer 2015 **Formal Methods (SE5302), United Technologies Corporation (UTC), Institute for Advanced Systems Engineering (IASE)**, *Adjunct Faculty; Instructor of Record (Main Instructor)*, Developed and taught this all online course on formal methods to graduate-level engineers in industry from UTC through the UTC IASE. The online courses were taught to engineers across three continents (in North America, Europe, and Asia). Formal methods tools used include nuXmv, NuSMV, Simulink Design Verifier, Simulink Verification and Validation, Frama-C, Daikon, and PVS. Guest lecturers provided by Prof. Sayan Mitra of Illinois, Dr. Eelco Scholte of UTC, and Jay Abraham of the MathWorks.
26 students, online-only course

University of Texas at Arlington

Fall 2015 **Automated Software Engineering (CSE6323)**, *Instructor*.
9 students; developed course

Summer 2015 **Introduction to Engineering and Engineering Mathematics (ENGR1.0x)**, *Guest Lecturer*, Created modules on computer science mathematics, particularly discrete math and graph theory.
Massive Open Online Course (MOOC) through edX via UTArlingtonX for high school students.

Spring 2015 **Mobile Systems Engineering (CSE4340 / CSE5349)**, *Instructor*.
32 students (18 undergraduates in 4340 and 14 graduates in 5349); redeveloped course

Fall 2014 **Computer Organization and Assembly Language Programming (CSE2312)**, *Instructor*.
49 students; also provided all course materials for another fall 2014 section, which has been reused in five subsequent sections in spring 2015, summer 2015, and fall 2015.

Spring 2014 **Special Topics in Advanced Systems and Architecture: Cyber-Physical Systems (CSE6359)**, *Instructor*.
9 students; developed course

Fall 2013 **Computer Organization and Assembly Language Programming (CSE2312)**, *Instructor*.
47 students; redeveloped course and also provided course materials for spring 2014 and summer 2014 sections.

University of Illinois at Urbana-Champaign

Spring 2010 **Introduction to Computing Systems (ECE190)**, *Graduate Teaching Assistant*.

Spring 2009 **Introduction to Computing Systems (ECE190)**, *Graduate Teaching Assistant*.

Fall 2008 **Introduction to Electrical and Computer Engineering (ECE110)**, *Graduate Teaching Assistant*.

Rice University

Spring 2008 **Applied Algorithms and Data Structures (COMP314)**, *Undergraduate Teaching Assistant*.

Spring 2008 **Intermediate Programming (COMP212)**, *Undergraduate Teaching Assistant*.

Fall 2007 **Digital Logic Design (ELEC326)**, *Undergraduate Lab Assistant*.

Spring 2007 **Intermediate Programming (COMP212)**, *Undergraduate Teaching Assistant*.

Spring 2007 **Microcontroller and Embedded Systems Laboratory (ELEC226)**, *Undergraduate Lab Assistant*.

Spring 2006 **Intermediate Programming (COMP212)**, *Undergraduate Teaching Assistant*.

PUBLICATIONS AND PRESENTATIONS

Co-authors with a trailing † indicate thesis students formally advised or co-advised, with a trailing ° are postdocs formally mentored, and co-authors with a trailing ⋆ indicate students informally mentored.

PAPERS SUBMITTED AND PENDING REVIEW DECISIONS

[U3] Omar Beg†, Houssam Abbas, ***Taylor T. Johnson***, and Ali Davoudi, "Model Validation of PWM DC-DC Converters," under revision for IEEE Transactions on Industrial Electronics (TIE), February 2017.

[U2] Luan Viet Nguyen†, ***Taylor T. Johnson***, Stanley Bak, and Steven Drager, "Cyber-Physical Specification Mismatches," under review for ACM Transactions on Cyber-Physical Systems (TCPS), January 2017.

[U1] Weiming Xiang° and ***Taylor T. Johnson***, "Robust Exponential Stability and Disturbance Attenuation for Discrete-Time Switched Systems under Arbitrary Switching," under revision for IEEE Transactions on Automatic Control, October 2016.

JOURNAL ARTICLES

[J9] Weiming Xiang°, Hoang Dung Tran†, and ***Taylor T. Johnson***, "Output Reachable Set Estimation for Switched Linear Systems and Its Application in Safety Verification," under revision for IEEE Transactions on Automatic Control, December 2016 (Conditionally Accepted, To Appear).

[J8] Weiming Xiang° and ***Taylor T. Johnson***, "Event-Triggered Control for Continuous-Time Switched Linear Systems," IET Control Theory and Applications, February 2017 (To Appear).

[J7] Hoang Dung Tran†, Luan Viet Nguyen†, Weiming Xiang°, and ***Taylor T. Johnson***, "An Automatic Order-Reduction Abstraction for Safety Verification of Periodically Switched Systems," Springer Discrete Event Dynamic Systems, Special Issue on Formal Methods in Control, February 2017 (To Appear).

[J6] Omar Beg†, ***Taylor T. Johnson***, and Ali Davoudi, "Detection of False-data Injection Attacks in Cyber-Physical DC Microgrids," IEEE Transactions on Industrial Informatics (TII), Special Section on Systems of Power Converters: Design, Modeling, Control, and Implementation, January 2017.

[J5] Sergiy Bogomolov, Alexandre Donzé, Goran Frehse, Radu Grosu, ***Taylor T. Johnson***, Hamed Ladan, Andreas Podelski, and Martin Wehrle. "Abstraction-Based Guided Search for Hybrid Systems," August 2016, *International Journal on Software Tools for Technology Transfer (STTT)*, Springer. Extension of [C11] (Special Issue from SPIN 2013). [pdf]

[J4] ***Taylor T. Johnson***, Stanley Bak, Marco Caccamo, and Lui Sha, "Real-Time Reachability for Verified Simplex Design," *ACM Transactions on Embedded Computing Systems (TECS)*, February 2016. Extension of [C14]. [pdf]

[J3] ***Taylor T. Johnson*** and Sayan Mitra. "Safe and Stabilizing Distributed Multi-Path Cellular Flows," *Theoretical Computer Science (TCS)*, Elsevier, Volume 579, May 2015. Extension of [C1]. [pdf]

[J2] Luan Viet Nguyen†, Hoang Dung Tran† and ***Taylor T. Johnson***. "Virtual Prototyping for Distributed Control of a Fault-Tolerant Modular Multilevel Inverter for Photovoltaics," *IEEE Transactions on Energy Conversion (TEC)*, Special Issue on Advanced Distributed Control of Energy Conversion Devices and Systems, December 2014. [pdf]

[J1] ***Taylor T. Johnson*** and Sayan Mitra. "Safe Flocking in Spite of Actuator Faults Using Directional Failure Detectors," in *Journal of Nonlinear Systems and Applications (JNSA)*, Watam Press, Waterloo, Canada, 2011. Extension of [C2]. [pdf]

CONFERENCE PROCEEDINGS PAPERS

[C29] Weiming Xiang°, ***Taylor T. Johnson***, and Hoang Dung Tran†, "On Reachable Set Estimation for Discrete-Time Switched Linear Systems under Arbitrary Switching," IEEE American Control Conference (ACC 2017), September 2016 (To Appear).

[C28] Andrew Sogokon°, Paul Jackson, and ***Taylor T. Johnson***, " Verifying safety and persistence properties of hybrid systems using flowpipes and continuous invariants," 9th NASA Formal Methods Symposium (NFM 2017), Moffett Field, CA, May 2017 (To Appear). (Acceptance: ??%; ?? of 31)

[C27] Luan Viet Nguyen†, James Kapinski, Xiaoqing Jin, Jyotirmoy Deshmukh, Ken Butts, ***Taylor T. Johnson***, "Abnormal Data Classification Using Time-Frequency Temporal Logic," Hybrid Systems Computation and Control 2017 (HSCC 2017), CPSWeek 2017, Pittsburgh, PA, April 2017 (To Appear).

[C26] Umair Siddique, Khaza Anuaral Hoque°, ***Taylor T. Johnson***, "Formal Specification and Dependability Analysis of Optical Communication Networks," 20th International Conference on Design, Automation, and Test in Europe (DATE 2017), Lausanne, Switzerland, March 2017 (To Appear). (Acceptance: 24%; 193 of 794)

[C25] Weiming Xiang°, Hoang Dung Tran†, and ***Taylor T. Johnson***, "Reachable Set Estimation and Control for Switched Linear Systems with Dwell-Time Restriction," IEEE Conference on Decision and Control [CDC 2016], December 2016. (Acceptance: 59.5%; 1242 of 2086)

[C24] Andrew Sogokon°, Khalil Ghorbal, ***Taylor T. Johnson***, "Decoupled simulating abstractions of nonlinear ordinary differential equations", Chapter in Proceedings of the 21st International Symposium on Formal Methods (FM 2016), Limassol, Cyprus, November 2016. (Acceptance: 26.5%; 43 of 151)

[C23] Parasara Sridhar Duggirala, Chuchu Fan, Matthew Potok, Bolun Qi, Sayan Mitra, Mahesh Viswanathan, Stanley Bak, Sergiy Bogomolov, ***Taylor T. Johnson***, Luan Viet Nguyen†, Christian Schilling, Andrew Sogokon°, Hoang Dung Tran†, Weiming Xiang°. "Tutorial: Software Tools for Hybrid Systems Verification, Transformation, and Synthesis: C2E2, HyST, and TuLiP," IEEE Multi-Conference on Systems and Control (MSC 2016), Buenos Aires, Argentina, September 2016.

[C22] Muhammad Usama Sardar, Nida Afaq, Khaza Anuaral Hoque°, ***Taylor T. Johnson***, Osman Hasan, "Probabilistic Formal Verification of the SATS Concept of Operation", In Proceedings of the 8th NASA Formal Methods (NFM 2016) International Symposium (Sanjai Rayadurgam, Oksana Tkachuk, eds.), Springer International Publishing, pp. 191-205, June 2016. (Acceptance: 37%; 19 of 51)

[C21] Stanley Bak, Sergiy Bogomolov, Thomas A. Henzinger, ***Taylor T. Johnson***, and Pradyot Prakash, "Scalable Static Hybridization Methods for Analysis of Nonlinear Systems," Hybrid Systems Computation and Control 2016 (HSCC 2016), CPSWeek 2016, Vienna, Austria, April 2016. **Best Software Repeatability Evaluation Award**. (Acceptance: 47%; 28 of 65)

[C20] Stanley Bak and ***Taylor T. Johnson***, "Periodically-Scheduled Controller Analysis using Hybrid Systems Reachability and Continuization," *36th IEEE Real-Time Systems Symposium (RTSS)*, Cyber-Physical Systems (CPS) Track, San Antonio, Texas, December 2015. (Acceptance: 22.5%; 34 of 151)

[C19] Luan Viet Nguyen†, Christian Schilling, Sergiy Bogomolov, and ***Taylor T. Johnson***, "Runtime Verification for Hybrid Analysis Tools," *15th International Conference on Runtime Verification (RV 2015)*, Vienna, Austria, September 2015. (Acceptance: 47%; 21 of 45) [pdf]

[C18] ***Taylor T. Johnson***, Raghunath Gannamaraju, and Sebastian Fischmeister, "A Survey of Electrical and Electronic (E/E) Notifications for Motor Vehicles," *24th NHTSA International Technical Conference on the Enhanced Safety of Vehicles (ESV 2015)*, Paper Number 15-0063, Gothenburg, Sweden, June 2015. [pdf]

[C17] ***Taylor T. Johnson***, Stanley Bak, and Steven Drager, "Cyber-Physical Specification Mismatch Identification with Dynamic Analysis," *6th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2015)*, CPSWeek 2015, Seattle, Washington, April 2015. (Acceptance: 27%; 25 of 91) [pdf]

[C16] Stanley Bak, Sergiy Bogomolov, and ***Taylor T. Johnson***, "HyST: A Source Transformation and Translation Tool for Hybrid Automaton Models," *18th International Conference on Hybrid Systems: Computation and Control (HSCC 2015)*, CPSWeek 2015, Seattle, Washington, April 2015. (Acceptance: 39%; 30 of 76) [pdf]

[C15] Leonardo Bobadilla, ***Taylor T. Johnson***, Amy LaViers, and Umer Huzaifa. "Verified Planar Formation Control Algorithms by Composition of Primitives," *AIAA SciTech*, Kissimmee, FL, January 2015. [pdf]

[C14] Stanley Bak, ***Taylor T. Johnson***, Marco Caccamo, and Lui Sha. "Real-Time Reachability for Verified Simplex Design," *35th IEEE Real-Time Systems Symposium (RTSS)*, Rome, Italy, December 2014. (Acceptance: 21%; 33 of 154) [pdf]

[C13] ***Taylor T. Johnson*** and Sayan Mitra. "Anonymized Reachability of Hybrid Automata Networks," *12th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS)*, Florence, Italy, September 2014. (Acceptance: 47%; 17 of 36) [pdf]

[C12] ***Taylor T. Johnson*** and Sayan Mitra. "Invariant Synthesis for Verification of Parameterized Cyber-Physical Systems with Applications to Aerospace Systems," *AIAA Infotech*, Boston, Massachusetts, August 2013. [pdf]

[C11] Sergiy Bogomolov, Alexandre Donzé, Goran Frehse, Radu Grosu, ***Taylor T. Johnson***, Hamed Ladan, Andreas Podelski, and Martin Wehrle. "Abstraction-Based Guided Search for Hybrid Systems," *20th International SPIN Symposium on Model Checking of Software (SPIN)*, Stony Brook, New York, July 2013. (Acceptance: 50%; 20 of 40) [pdf]

[C10] Shamina Shahrin Hossain*, Sairaj Dhople, and ***Taylor T. Johnson***. "Reachability Analysis of Closed-Loop Switching Power Converters," in *4th IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, Illinois, February 2013. [pdf]

[C9] Parasara Sridhar Duggirala, ***Taylor T. Johnson***, Adam Zimmerman, and Sayan Mitra. "Static and Dynamic Analysis of Timed Distributed Traces," in *33rd IEEE Real-Time Systems Symposium (RTSS)*, San Juan, Puerto Rico, December 2012. (Acceptance: 23%; 35 of 157) [pdf]

[C8] ***Taylor T. Johnson***, Jeremy Green, Sayan Mitra, Rachel Dudley, and R. Scott Erwin. "Verifying Satellite Rendezvous and Conjunction Avoidance: Case studies in verification of nonlinear hybrid systems," in *18th International Symposium on Formal Methods (FM)*, Paris, France, August 2012. (Acceptance: 22%; 28 of 132) [pdf]

[C7] ***Taylor T. Johnson*** and Sayan Mitra. "A Small Model Theorem for Rectangular Hybrid Automata Networks," in *IFIP International Conference on Formal Techniques for Distributed Systems: Joint International Conference of 14th Formal Methods for Open Object-Based Distributed Systems and 32nd Formal Techniques for Networked and Distributed Systems (FORTE/FMOODS)*, Stockholm, Sweden, June 2012. **Best Paper Award**. (Acceptance: 38%; 16 of 42) [pdf]

[C6] ***Taylor T. Johnson*** and Sayan Mitra. "Parameterized Verification of Distributed Cyber-Physical Systems: An Aircraft Landing Protocol Case Study," in *3rd ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*, Beijing, China, April 2012. (Acceptance: 34%; 14 of 41) [pdf]

[C5] ***Taylor T. Johnson***, Zhihao Hong*, and Akash Kapoor*. "Design Verification Methods for Switching Power Converters," in *3rd IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, Illinois, February 2012. [pdf]

[C4] ***Taylor T. Johnson***, Sayan Mitra, and Cédric Langbort. "Stability of Digitally Interconnected Linear Systems," in *50th IEEE Conference on Decision and Control and European Control Conference (CDC/ECC)*, Orlando, Florida, December 2011. [pdf]

[C3] ***Taylor T. Johnson*** and Albert E. Hoefel. "Turbo-Alternator Stalling Protection using Available Power Estimate," in *2nd IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, Illinois, February 2011. **Best Paper Award**. [pdf]

[C2] ***Taylor T. Johnson*** and Sayan Mitra. "Safe Flocking in Spite of Actuator Faults," in *12th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS)*, New York, New York, September 2010. (Acceptance: 44%; 39 of 90) [pdf]

[C1] ***Taylor T. Johnson***, Sayan Mitra, and Karthik Manamcheri. "Safe and Stabilizing Distributed Cellular Flows," in *30th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Genoa, Italy, June 2010. (Acceptance: 15%; 84 of 585) [pdf]

WORKSHOP PROCEEDINGS PAPERS

[W10] Shafiul Chowdhury†, ***Taylor T. Johnson***, and Christoph Csallner "CyFuzz: A Differential Testing Framework for Cyber-Physical Systems Development Environments," 6th International Workshop on Design, Modeling and Evaluation of Cyber Physical Systems (CyPhy 2016), Co-located with Embedded Systems Week (ESweek) 2016, Pittsburgh, PA, August 2016. (Acceptance: 60%; 9 of 15) [pdf]

[W9] Hoang Dung Tran†, Luan Viet Nguyen†, and ***Taylor T. Johnson***, "Large-Scale Linear Systems from Order-Reduction (Benchmark Proposal)," 3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2016), Co-located with CPSWeek 2016, Vienna, Austria, April 2016. [pdf]

[W8] Andrew Sogokon°, Khalil Ghorbal, and ***Taylor T. Johnson***, "Non-linear Continuous Systems for Safety Verification (Benchmark Proposal)," 3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2016), Co-located with CPSWeek 2016, Vienna, Austria, April 2016. [pdf]

[W7] Omar Beg†, Ali Davoudi, and ***Taylor T. Johnson***, "Charge Pump Phase-Locked Loops and Full Wave Rectifiers for Reachability Analysis (Benchmark Proposal)," 3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2016), Co-located with CPSWeek 2016, Vienna, Austria, April 2016. [pdf]

[W6] Luan Viet Nguyen†, Djordje Maksimovic, ***Taylor T. Johnson***, and Andreas Veneris, "Quantified Bounded Model Checking for Rectangular Hybrid Automata," 9th International Workshop on Constraints in Formal Verification (CFV 2015), Co-located with the 34th IEEE/ACM International Conference On Computer Aided Design (ICCAD 2015), November 2015.

[W5] Stanley Bak, Sergiy Bogomolov, and ***Taylor T. Johnson***, "HYST: A Source Transformation and Translation Tool for Hybrid Automaton Models," 1st International Workshop on Symbolic and Numerical Methods for Reachability Analysis (SNR 2015), Co-located with the 27th International Conference on Computer Aided Verification (CAV 2015), San Francisco, California, July 19, 2015.

[W4] Hoang Dung Tran†, Luan Viet Nguyen†, and ***Taylor T. Johnson***, "Benchmark: A Nonlinear Reachability Analysis Test Set from Numerical Analysis," 2nd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2015), Co-located with CPSWeek 2015, Seattle, Washington, April 2015. [pdf]

[W3] Stanley Bak, Sergiy Bogomolov, Marius Greitschus, and ***Taylor T. Johnson***, "Benchmark Generator for Stratified Controllers of Tank Networks," 2nd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2015), Co-located with CPSWeek 2015, Seattle, Washington, April 2015. [pdf]

[W2] Luan Viet Nguyen†, Eric Nelson⋆, Amol Vengurlekar†, Ruoshi Zhang†, Kristopher I. White, Victor Salinas, and ***Taylor T. Johnson***. "Model-Based Design and Analysis of a Reconfigurable Continuous-Culture Bioreactor," in *4th ACM SIGBED International Workshop on Design, Modeling, and Evaluation of Cyber-Physical Systems (CyPhy)*, Co-located with CPSWeek 2014, Berlin, Germany, April 2014. [pdf]

[W1] Luan Viet Nguyen†, and ***Taylor T. Johnson***. "Benchmark: DC-to-DC Switched-Mode Power Converters (Buck Converters, Boost Converters, and Buck-Boost Converters)," in *Applied Verification for Continuous and Hybrid Systems Workshop (ARCH)*, Co-located with CPSWeek 2014, Berlin, Germany, April 2014. [pdf]

DEMONSTRATIONS, POSTERS, AND POSITION PAPERS

[D13] Presented demo, "Hybrid Systems Model Transformations with HyST," at the 8th NASA International Symposium on Formal Methods (NFM 2016), Minneapolis, MN, June 7, 2016.

[D12] Luan Viet Nguyen† and ***Taylor T. Johnson***, "Towards Bounded Model Checking for Timed and Hybrid Automata with a Quantified Encoding," PhD Student Forum, Oral and Poster Sessions, 15th International Conference on Formal Methods in Computer-Aided Design (FMCAD), Austin, TX, September 27-30, 2015.

[D11] Omar Beg† and ***Taylor T. Johnson***, "Computer-Aided Formal Verification for Power Electronics Cyber-Physical systems," PhD Student Forum, Poster Session, 15th International Conference on Formal Methods in Computer-Aided Design (FMCAD), Austin, TX, September 27-30, 2015.

[D10] Luan Viet Nguyen†, Christian Schilling, Sergiy Bogomolov, and ***Taylor T. Johnson***, "HyRG: A Random Generation Tool for Affine Hybrid Automata," Poster Session, 18th International Conference on Hybrid Systems: Computation and Control (HSCC 2015), CPSWeek 2015, Seattle, Washington, April 2015. [pdf]

[D9] Stanley Bak, Sergiy Bogomolov, and ***Taylor T. Johnson***, "HyST: A Source Transformation and Translation Tool for Hybrid Automaton Models," Demonstration Session, 18th International Conference on Hybrid Systems: Computation and Control (HSCC 2015), CPSWeek 2015, Seattle, Washington, April 2015. [pdf]

[D8] Hoang Dung Tran†, Luan Viet Nguyen†, and ***Taylor T. Johnson***, "Transforming Differential Algebraic Equations (DAEs) to Hybrid Automaton Models for Formal Verification," Poster Session, Texas Systems Day 2015, University of Texas at Dallas, Plano, Texas, March 28, 2015.

[D7] Leonardo Bobadilla, ***Taylor T. Johnson***, and Amy LaViers, "Towards Verified Planar Formation Control Algorithms by Composition of Primitives," 5th Workshop on Formal Methods for Robotics and Automation Poster Session, Workshop Co-located with Robotics: Science and Systems Conference (RSS), Berkeley, CA, July 12, 2014. [poster pdf] [abstract pdf]

[D6] Luan Viet Nguyen† and ***Taylor T. Johnson***, "Model-Based Design and Analysis of a Continuous-Culture Bioreactor for Systems Biology Experiments," Texas Systems Day Poster Session, Texas A&M University, College Station, TX, March 28, 2014. [poster pdf]

[D5] ***Taylor T. Johnson*** and Sayan Mitra, "The Passel Verification Tool for Hybrid Automata Networks," Demonstration Session, 16th ACM International Conference on Hybrid Systems: Computation and Control (HSCC), CPSWeek 2013, Philadelphia, PA, April 9, 2013.

[D4] ***Taylor T. Johnson*** and Sayan Mitra, "Verification of Distributed Cyber-Physical Systems: Stability of Digitally Interconnected Linear Systems," Poster Session, Coordinated Science Laboratory 60th Anniversary Symposium, University of Illinois at Urbana-Champaign, Urbana, IL, October 28, 2011. [poster pdf]

[D3] ***Taylor T. Johnson*** and Sayan Mitra, "Verification of Distributed Cyber-Physical Systems: Stability of Digitally Interconnected Linear Systems," Poster Session, Coordinated Science Laboratory Symposium on Emerging Topics in Control and Modeling: Cyber-Physical Systems, Urbana, IL, October 20, 2011. [poster pdf]

[D2] ***Taylor T. Johnson*** and Sayan Mitra, "Handling Failures in Cyber-Physical Systems: Potential Directions," PhD Student Forum on Cyber-Physical Systems, 30th IEEE Real-Time Systems Symposium (RTSS), Washington, DC, December 1, 2009. (**Award for *Most Interesting Cyber-Physical Systems Research Problem***). [pdf]

[D1] ***Taylor T. Johnson*** and Sayan Mitra, "Power Usage of Time and Event-Triggered Paradigms: A Case Study," Poster Session, 15th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), CPSWeek 2009, San Francisco, CA, April 13, 2009. [poster pdf]

PRESENTATIONS

[T49] Presented "Real-Time Reachability for Safety of Autonomous Systems," at the Computer Science and Engineering Graduate Seminar (CSCE 681), Texas A&M University, College Station, TX, March 6, 2017.

[T48] Presented "Real-Time Reachability for Verification of Autonomous Cyber-Physical Systems," at the Electrical and Computer Engineering Seminar Series (ECE698/699), Rice University, Houston, TX, March 3, 2017.

[T47] Presented "Real-Time Reachability for Verification of Autonomous Systems," at the Computer Science Seminar, University of Houston, Houston, TX, February 20, 2017.

[T46] Invited Presentation, "Cyber-Physical Specification Mismatches," at the Air Force Research Laboratory, Air Vehicles Directorate, Wright-Patterson Air Force Base, Dayton, OH, June 28, 2016.

[T45] Presented paper [C22], "Probabilistic Formal Verification of the SATS Concept of Operation," at the 8th NASA International Symposium on Formal Methods (NFM 2016), Minneapolis, MN, June 8, 2016.

[T44] Invited Presentation, "Hybrid automata: from verification to implementation," at the Mathworks Faculty Research Summit, Natick, MA, June 4, 2016.

[T43] Presented paper [W7], "Charge Pump Phase-Locked Loops and Full Wave Rectifiers for Reachability Analysis (Benchmark Proposal),"at Applied Verification for Continuous and Hybrid Systems (ARCH), Workshop Co-located with CPSWeek 2016, Vienna, Austria, April 11, 2016.

[T42] Presented paper [W9], "Large-Scale Linear Systems from Order-Reduction (Benchmark Proposal),"at Applied Verification for Continuous and Hybrid Systems (ARCH), Workshop Co-located with CPSWeek 2016, Vienna, Austria, April 11, 2016.

[T41] Invited Presentation, "Automated Formal Verification for Cyber-Physical Systems," at the Federal Laboratory Day, Laboratory for Telecommunication Sciences, University of Maryland, College Park, MD, March 29, 2016.

[T40] Invited Presentation, "Automated Formal Verification for Cyber-Physical Systems," at the Electrical Engineering and Computer Science Department, Vanderbilt University, Nashville, TN, March 14, 2016.

[T39] Invited Presentation, "Automated Formal Verification for Aerospace Cyber-Physical Systems," at the Aerospace Engineering Department Seminar, University of Michigan, Ann Arbor, MI, March 8, 2016.

[T38] Presented "Automated Formal Verification for Cyber-Physical Systems," at the College of Engineering Advisory Board Meeting, University of Texas at Arlington, Arlington, TX, January 29, 2016.

[T37] Presented "Temporal and Functional Correctness in Support of Systems Biology Research," at the Green Center for Systems Biology, University of Texas Southwestern Medical Center at Dallas (UT Southwestern), Dallas, TX, January 13, 2016.

[T36] Presented "Automating Verification of Cyber-Physical Systems with HyST," at the Formal Methods Seminar, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana, IL, December 11, 2015.

[T35] Presented paper [W6], "Quantified Bounded Model Checking for Rectangular Hybrid Automata," at the 9th International Workshop on Constraints in Formal Verification (CFV 2015), Austin, TX, November 5, 2015.

[T34] Presented "Real-Time Reachability of Hybrid Systems for Formally Verified Supervisory Control," at the Electrical Engineering Colloquium, University of North Texas, Denton, TX, September 18, 2015.

[T33] Omar Beg[†] presented, "Formal Verification for Software-Controlled Power Electronics," at the Air Force Research Laboratory's Safe & Secure Systems and Software Symposium (S5), Dayton, OH, June 11, 2015.

[T32] Presented paper [C18], "A Survey of Electrical and Electronic (E/E) Notifications for Motor Vehicles," 24th NHTSA International Technical Conference on the Enhanced Safety of Vehicles (ESV 2015), Paper Number 15-0063, Gothenburg, Sweden, June 9, 2015.

[T31] Presented paper [C17], "Cyber-Physical Specification Mismatch Identification with Dynamic Analysis," at *International Conference on Cyber-Physical Systems* (ICCPS 2015) at Cyber-Physical Systems Week (CPS Week 2015), Seattle, WA, April 16, 2015.

[T30] Invited presentation, based on paper [C14], "Real-Time Reachability for Verified Simplex Design," at *8th International Workshop on Numerical Software Verification 2015* (NSV 2015) at Cyber-Physical Systems Week (CPS Week 2015), Seattle, WA, April 13, 2015.

[T29] Presented paper [C15], "Verified Planar Formation Control Algorithms by Composition of Primitives," at *AIAA SciTech*, Kissimmee, FL, January 8, 2015.

[T28] Invited presentation, "Automated Formal Verification of Distributed Cyber-Physical Systems," at Systems and Information Engineering Department Colloquium, University of Virginia, Charlottesville, VA, December 19, 2014.

[T27] Invited presentation, "Cyber-Physical Specification Mismatch Identification with Dynamic Analysis," at the CPS Verification and Validation: Industrial Challenges and Foundations (CPS V&V I&F), Carnegie Mellon University, Pittsburgh, PA, December 12, 2014.

[T26] Invited presentation, "Software Verification and Validation Methods: Automated Formal Verification of Distributed Cyber-Physical Systems," at the IEEE Metrocon, Arlington, TX, October 2, 2014.

[T25] Presented paper [C13], "Anonymized Reachability of Hybrid Automata Networks," at *12th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS)*, Florence, Italy, September 9, 2014.

[T24] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at School of Computer Science Colloquium, McGill University, Montreal, Quebec, Canada, August 12, 2014.

[T23] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at the Air Force Research Laboratory's Information Directorate, Rome, NY, August 5, 2014.

[T22] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at Electrical and Computer Engineering Colloquium, University of Waterloo, Waterloo, Ontario, Canada, July 25, 2014.

[T21] Presented, "Safe Flocking in Spite of Actuator Faults and Planar Distributed Formation Control with One-Dimensional Primitives," at the Air Force Research Laboratory's Information Directorate, Rome, NY, July 23, 2014.

[T20] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at the Air Force Research Laboratory's Safe & Secure Systems and Software Symposium (S5), Dayton, OH, June 10, 2014.

[T19] Invited presentation, "Automated Formal Verification of Distributed Cyber-Physical Systems," at the Trust and Security Seminar, Information Trust Institute, University of Illinois at Urbana-Champaign, Urbana, IL, May 16, 2014.

[T18] Presented paper [W2], "Model-Based Design and Analysis of a Reconfigurable Continuous-Culture Bioreactor," at 4th ACM SIGBED International Workshop on Design, Modeling, and Evaluation of Cyber-Physical Systems, Workshop Co-located with CPSWeek 2014, Berlin, Germany, April 14, 2014.

[T17] Presented paper [W1], "Benchmark: DC-to-DC Switched-Mode Power Converters (Buck Converters, Boost Converters, and Buck-Boost Converters)," at Applied Verification for Continuous and Hybrid Systems (ARCH), Workshop Co-located with CPSWeek 2014, Berlin, Germany, April 14, 2014.

[T16] Presented "Automated Formal Verification for Reliable Cyber-Physical Systems," Computer Science and Engineering Colloquium, Southern Methodist University, Dallas, TX, April 2, 2014.

[T15] Presented "Automatic Safety Verification of Distributed Cyber-Physical Systems," Texas Systems Day, Texas A&M University, College Station, TX, March 28, 2014.

[T14] Presented "Verification and Validation for Reliable Cyber-Physical Systems," at the Computer Science Colloquium, University of Texas at Arlington, Arlington, TX, November 11, 2013.

[T13] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," University of Pennsylvania, Philadelphia, TX, April 3, 2013.

[T12] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," Sandia National Laboratory, Livermore, CA, March 20, 2013.

[T11] Invited presentation, "Safety Verification for Parameterized Hybrid Automata Networks," at Formal Methods in Systems Engineering (FORSYTE), Austrian Society for Rigorous Systems Engineering (ARiSE), Technische Universität Wien and Institute of Science and Technology Austria, Vienna, Austria, January 24, 2013.

[T10] Presented "Safety Verification of Distributed Cyber-Physical Systems," at the Formal Methods Seminar, Department of Computer Science, University of Illinois at Urbana-Champaign, Urbana, IL, September 27, 2012.

[T9] Presented paper [C7], "A Small Model Theorem for Rectangular Hybrid Automata Networks," at the *IFIP International Conference on Formal Techniques for Distributed Systems: Joint International Conference of 14th Formal Methods for Open Object-Based Distributed Systems and 32nd Formal Techniques for Networked and Distributed Systems (FORTE/FMOODS)*, KTH, Stockholm, Sweden, June 15, 2012. (**Best Paper Award**).

[T8] Presented paper [C5], "Design Verification Methods for Switching Power Converters," at the *3rd IEEE Power and Energy Conference at Illinois (PECI)*, University of Illinois at Urbana-Champaign, Champaign, IL, February 24, 2012.

[T7] Presented paper [C4], "Stability of Digitally Interconnected Linear Systems" at the 7th CSL Student Conference, January 27, 2012, Urbana, IL.

[T6] Presented "Fault-Tolerant Distributed Cyber-Physical Systems" to the Control Systems Group, University of New Mexico, Albuquerque, NM, June 16, 2011.

[T5] Presented paper [C3], "Turbo-Alternator Stalling Protection using Available Power Estimate," at the *2nd IEEE Power and Energy Conference at Illinois (PECI)*, University of Illinois at Urbana-Champaign, Urbana, IL, February 25, 2011. (**Best Paper Award**).

[T4] Presented "Automatic Parameterized Verification of Distributed Algorithms" at 6th CSL Student Conference, Urbana, IL, January 28, 2011.

[T3] Presented paper [C2], "Safe Flocking in Spite of Actuator Faults," at *12th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS)*, New York, NY, September 22, 2010.

[T2] Presented paper [C1], "Safe and Stabilizing Distributed Cellular Flows" to the Multi-Robot Systems Lab, Rice University, Houston, TX, July 15, 2010.

[T1] Presented paper [C1], "Safe and Stabilizing Distributed Cellular Flows" at the 5th CSL Student Conference, Urbana, IL, January 29, 2010.

PATENTS

[P1] "Control of a Component of a Downhole Tool", Albert Hoefel, Francois Bernard, Kent D. Harms, Sylvain Ramshaw, Shayan Darayan, and ***Taylor T. Johnson***. Patent No. US 9222352, Patent Issued December 29, 2015. Based in part on paper [C3]. [pdf]

SOFTWARE TOOLS AND ARTIFACTS

[S4] HyRG: Hybrid Random Generator. This software tool randomly generates hybrid automaton models, and is integrated within HyST [S3] to generate models in output formats compatible with several different formal verification tools for hybrid systems. Related papers include [C19,D10]. Available online: http://www.verivital.com/hyrg/

[S3] HyST: Hybrid Source Transformer. This software tool takes hybrid automaton models in the SpaceEx XML or Compositional Interchange Format (CIF) formats and translates them to other popular hybrid systems verification and reachability analysis tools, including Flow*, dReach, HyComp, HyCreate, and development tools including MathWorks' Simulink/Stateflow (SLSF). Related papers include [C21,C20,C19,C16,D9]. *Best repeatability evaluation award [C21]*. Available online: http://www.verivital.com/hyst/

[S2] Hynger: Hybrid iNvariant GEneratoR: This software tool takes MathWorks' Simulink/Stateflow (SLSF) models, instruments them, and produces traces for dynamic analysis in tools like Daikon. Related papers include [C17]. Available online: http://www.verivital.com/hynger/

[S1] Passel: This software tool is used for parameterized verification (sometimes known as uniform verification) of parameterized networks of hybrid automata, and has been used to verify safety specifications in several distributed cyber-physical systems such as proving safe separation in air traffic control protocols. Related papers include [C13,C12,C7,C6]. Available online: https://publish.illinois.edu/passel-tool/

RESEARCH MENTORING (CURRENT)

POSTDOCTORAL ADVISER

[PD3] 3/2016 – Present: Khaza Anuarul Hoque, Department of Computer Science and Eng., Research Topic: Formal Verification for Aerospace CPS.

[PD2] 1/2016 – Present: Andrew Sogokon, Department of Computer Science and Eng., Research Topic: Liveness Verification for Hybrid Automata.

[PD1] 11/2015 – Present: Weiming Xiang, Department of Computer Science and Eng., Research Topic: Unbounded-Time Reachability Analysis for Switched Systems.

DOCTORAL DISSERTATION ADVISER

[DS4] Fall 2015 – Present: Shafiul Chowdhury, Department of Computer Science and Eng., Dissertation Topic: Randomized Differential Testing for CPS Development Environments. Co-advised with Prof. Christoph Csallner.

[DS3] Spring 2015 – Present: Hoang Dung Tran, Department of Computer Science and Eng., Dissertation Topic: Formal Verification of Distributed Cyber-Physical Systems.

[DS2] Summer 2014 – Present: Omar Beg, Department of Electrical Engineering, Dissertation Topic: Reachability Analysis of Power Electronics and Systems. Co-advised with Prof. Ali Davoudi.

[DS1] Spring 2014 – Present: Luan Viet Nguyen, Department of Computer Science and Eng., Dissertation Topic: Random Generation and Formal Analysis of Hybrid Automata.

MASTER'S THESIS ADVISER, University of Texas at Arlington

[MS1] Summer 2015 – Present: Prajakta Laxane, Electrical Engineering, Thesis Topic: Automating Controller Design for a Continuous-Culture Bioreactor.

RESEARCH MENTORING (PAST / GRADUATED ALUMNI)

MASTER'S THESIS ALUMNI, University of Texas at Arlington

[MA6] Fall 2015 – Summer 2016: Randy Long, Electrical Engineering, Thesis Topic: Time-Triggered Controller Area Network Design for Formula SAE Racecars and Technique for Measuring CPU Usage on Systems with Nested and Non-Nested Interrupts. First position: Engineer at Faraday Future.

[MA5] Fall 2015 – Summer 2016: Rahul Kawadgave, Electrical Engineering, Thesis Topic: Automatic Conflict Classification for Vulnerable Road Users. First position: Engineer at Qualcomm.

[MA4] Fall 2014 – Spring 2016: Nathan Hervey, Computer Science and Eng., Thesis Topic: Distributed Robotics Localization and Control. First position: Software Engineer at Lockheed Martin.

[MA3] Fall 2014 – Spring 2015: Shweta Hardas, Electrical Engineering, Thesis: "Virtual and Hardware Prototyping of a Modular Multilevel Inverter for Photovoltaics". First position: Engineer at Cummins.

[MA2] Fall 2013 – Spring 2015: Ruoshi Zhang, Electrical Engineering, Thesis: "Model-Based Design and Analysis of Automotive Systems using Time-Triggered Controller Area Networks (TTCAN)". First position: PhD student in Electrical Engineering at University of Texas at Arlington.

[MA1] Fall 2013 – May 2015: Amol Vengurlekar, Electrical Engineering, Thesis: "Design of a Real-Time Reconfigurable Bioreactor". First position: Engineer at EchoStar.

MASTER'S PROJECT ALUMNI

[MP2] Spring 2014 – Spring 2015: Zankar Bapat, University of Texas at Arlington, Electrical Engineering, Project: "Robot Localization with Circle Detection". First position: Engineer at Ferro Technologies.

[MP1] Fall 2012–Spring 2013, University of Illinois at Urbana-Champaign, Electrical and Computer Engineering: Shamina Shahrin Hossain (first-year graduate student), Project: Verification of Closed-Loop Switching Power Converters (resulted in paper [C10]).

UNDERGRADUATE PROJECT ALUMNI

[IS3] Summer 2015: Ewin Tang, Major: Mathematics, University of Texas at Austin, Topic: Using the Isabelle Theorem Prover to Prove Some of the Top 100 Formalized Theorems.

[IS2] Fall 2013–Spring 2014, University of Texas at Arlington: Eric Nelson, Project: Xenomai Real-Time Operating System (RTOS) Design for Continuous-Culture Bioreactor (resulted in paper [W2]).

[IS1] Fall 2011, University of Illinois at Urbana-Champaign: Zhongdong Zhu, Project: Simulating Safe and Stabilizing Distributed Cellular Flows (presented in extended version [J3] of paper [C1]).

NSF RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU) PROJECT ALUMNI

[REU2] Summer 2012: Lucas Buccafusca, University of Colorado at Boulder, Project: Safe Distributed Flocking Implemented on the StarL Distributed Robotics Framework. Information Trust Institute, NSF Research Experiences for Undergraduates (REU) Summer Program, University of Illinois at Urbana-Champaign.

[REU1] Summer 2009: Shashank Gupta, Indian Institute of Technology, Kharagpur, Project: Distributed Algorithms for Sensor Networks Implemented on Net-X. Information Trust Institute, NSF Research Experiences for Undergraduates (REU) Summer Program, University of Illinois at Urbana-Champaign.

PROMOTING UNDERGRADUATE RESEARCH IN ENGINEERING (PURE) ALUMNI, University of Illinois at Urbana-Champaign

[PURE10] Spring 2012 (co-advised with Adam Zimmerman): Jordan Kravitz, Project: Distributed Robotics in StarL.

[PURE9] Fall 2011: Akash Kapoor, Project: Reachability Analysis of Power Converters (resulted in paper [C5]).

[PURE8] Spring 2011: Hershed Tilak, Project: Implementation of a Boundary Detection Algorithm.
[PURE7] Spring 2011: Jeffrey Lale, Project: A Randomized Algorithm for Deadlock-Free Robot Routing.
[PURE6] Spring 2011: Zhihao (Ted) Hong: Modeling Parameterized Power Converters using Timed Automata (resulted in paper [C5]).
[PURE5] Fall 2010: Hershed Tilak, Project: Simulating Coupled Inverted Pendulums in Matlab.
[PURE4] Fall 2009: Jerry Sun and Dongeek Shin, Joint Project: Simulating a Planar Conveyor System in Matlab.
[PURE3] Spring 2009: Rohan Bali, Project: Simulating Coupled Inverted Pendulums in Matlab.
[PURE2] Spring 2009: Patrick Gu, Project: Extending Giotto to xGiotto on nxtOSEK for Lego Mindstorms.
[PURE1] Fall 2008: Haeran Lee, Soonwoo (Daniel) Chang, Youngho (Ryan) Park, and Yosub Shin, Joint Project: Reachability Analysis of Switched-Mode Power Converters.

SPONSORED RESEARCH SUPPORT

2013 – present **Funded Research Grants, Contracts, and Fellowships**.
Total Research Funding (PI + Co-PI, active and completed projects): $\$3,020,044$
Research Funding as PI: $\$2,095,043$ (Sole PI Share: $\$1,592,606$). Research Funding as Co-PI: $\$925,001$.
Our research is currently supported by AFOSR, AFRL, ARO, the MathWorks, NSF, ONR, and Toyota, and past research has been supported by AFOSR, AFRL, USDOT, and NVIDIA.

ACTIVE RESEARCH SUPPORT

[AG9] Taylor T. Johnson (Sole PI), "'Safely and Securely Controlling Large Swarms of Unmanned Aerial Vehicles (UAVs) with the STAbilizing Robot Language (StarL),"' Wright Brothers Institute (WBI) Summer of Innovation, Wright-Patterson Air Force Base (WPAFB), Aerospace Systems Directorate (AFRL/RQ), Air Force Research Laboratory (AFRL), $\$91,500$, May 8, 2017 to August 18, 2017, Award Number: FA8650-12-3-7255, Role: Sole PI, Duration: 3 Months.

[AG8] Ali Davoudi (PI), Taylor T. Johnson (Co-PI), Frank Lewis (Co-PI), and Hamidreza Modares (Co-PI), "Testbed Acquisition for Resilient Self-Organizing Microgrids," Defense University Research Instrumentation Program (DURIP), Office of Naval Research (ONR), $\$220,000$, September 15, 2016 to September 14, 2017, Award Number: N0014-16-1-3180 , Duration: 1 Year.

[AG7] Ali Davoudi (PI), Taylor T. Johnson (Co-PI), Frank Lewis (Co-PI), and Hamidreza Modares (Co-PI), "Realizing Resilient Self-Organizing Microgrids," Department of Defense (DoD) Research and Education Program for Historically Black Colleges and Universities and Minority-Serving Institutions (HBCU/MI), Army Research Office (ARO), $\$300,000$, August 26, 2016 to August 25, 2017, Award Number: W911NF-16-1-0534, Duration: 1 Year.

[AG6] Taylor T. Johnson (Sole PI), "Reusable Formal Verification for Cyber-Physical Systems", Young Investigator Program (YIP), Air Force Office of Scientific Research (AFOSR), $\$357,562$, August 15, 2016 to August 14, 2019, Award Number: FA9550-16-1-0246, Duration: 3 Years. Incrementally funded, year one amount of $\$114,808$ committed to date.

[AG5] Taylor T. Johnson (PI) and Christoph Csallner (Co-PI), "SHF: Small: Automating Improvement of Development Environments for Cyber-Physical Systems (AIDE-CPS)", Software and Hardware Foundations (SHF), Division of Computing and Communication Foundations (CCF), Directorate for Computer and Information Science (CISE), National Science Foundation (NSF), $\$498,437$, September 1, 2015 to August 31, 2018, Award Number: 1527398, Duration: 3 Years.

[AG4] Taylor T. Johnson (Sole PI), "Cyber-Physical Systems Specification Mismatch and Safe Upgrades", Systems and Software Program, Air Force Office of Scientific Research (AFOSR), $\$397,806$, August 15, 2015 to August 14, 2018, Award Number: FA9550-15-1-0258, Duration: 3 Years. Incrementally funded, year one amount of $\$127,404$ committed to date.

[AG3] Ali Davoudi (PI), Taylor T. Johnson (Co-PI), David Levine (Senior Personnel), "EPCN: Real-time Ab Initio Modeling of Electric Machines", Energy, Power, Control and Networks (EPCN), Division of Electrical, Communications and Cyber Systems (ECCS), Directorate for Engineering (ENG), National Science Foundation (NSF), $\$285,000$, August 1, 2015 to July 31, 2018, Award Number: 1509804, Duration: 3 Years.

[AG2] Taylor T. Johnson (Sole PI), "CRII: CPS: Safe Cyber-Physical Systems Upgrades", Cyber-Physical Systems (CPS), Division of Computer and Network Systems (CNS), Directorate for Computer and Information Science (CISE), National Science Foundation (NSF), $\$174,634$, June 14, 2015 to June 13, 2017, Award Number: 1464311, Duration: 2 Years.

[AG1] Taylor T. Johnson (Sole PI), "Formal Modeling of Emergence in Distributed Cyber-Physical Systems", Air Force Research Laboratory (AFRL), Trusted Autonomy and Verification and Validation (V&V), Integrated Command and Control, $\$499,546$, April 16, 2015 to April 15, 2017, BAA-10-01-RIKA,

Award Number: FA8750-15-1-0105, Duration: 2 Years. Incrementally funded, $\$387,974.00$ committed to date.

COMPLETED RESEARCH SUPPORT

[CG4] Stephen Mattingly (PI), Colleen Casey (Co-PI), Taylor T. Johnson (Co-PI), "App-Based Crowd Sourcing of Bicycle and Pedestrian Conflict Data", Western Michigan University, University Transportation Center for Livable Communities (TRCLC), US Department of Transportation (USDOT), $\$120,001$ (including $\$40,001$ cost sharing), August 1, 2015 to July 31, 2016, Award Number: DTRT13-G-UTC60, Subaward Number: 8823-UTA-1, Duration: 1 Year.

[CG3] Taylor T. Johnson (Sole PI), "Detecting and Mitigating Cyber-Physical Attacks with Invariant Inference and Runtime Assurance", Air Force Office of Scientific Research (AFOSR) Summer Faculty Fellowship Program (SFFP), Information Directorate, Rome, NY, $\sim \$43,575$ (Includes support for summer salary for PI and one student to visit AFRL Rome), May 18, 2015 to July 31, 2015, Duration: 2 Months.

[CG2] Taylor T. Johnson (PI), Ali Davoudi (co-PI), and David Levine (co-PI), "Real-time Ab Initio Modeling of Electric Machines", NVIDIA Hardware Donation Program, Tesla K40 Donation, $\sim \$4,000$, November 2014.

[CG1] Taylor T. Johnson (Sole PI), "Inferring Physical System Specifications from Embedded Software Tests", Visiting Faculty Research Program, Information Directorate, Air Force Research Laboratory, $\$27,980$, May 19, 2014 to August 31, 2014, Award Number: FA8750-13-2-0115, Duration: 3 Months.

2009 – 2015 **Conference Travel Grants**.

- NSF CISE CAREER Workshop 2015, March 16, 2015 (NSF).
- CPS Verification and Validation: Industrial Challenges and Foundations Workshop (CPS V&V I&F Workshop 2014), Carnegie Mellon University, December 10-12, 2014 (NSF).
- IEEE Real-Time Systems Symposium (RTSS), December 2012 (University of Illinois at Urbana-Champaign Graduate College and NSF).
- IEEE Conference on Decision and Control (CDC), December 2011 (University of Illinois at Urbana-Champaign Graduate College and Rockwell Collins).
- International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS), September 2010 (NSF).
- IEEE Real-Time Systems Symposium (RTSS), December 2009 (NSF).
- IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 2009 (NSF).

OUTREACH

2014 – Present **Rice Association of Volunteer Alumni (RAVA)**.

- Interviewed prospective Rice students and presented during high school college fairs.

2012 – Present **StackExchange and StackOverflow Contributor**.

- Answered over fifty questions related to computer science and programming.
- Contributed extensively to Microsoft Research's Z3 satisfiability modulo theories (SMT) solver questions, and ranked as the top user not employed by Microsoft.

2012 **Demonstrator, Engineering Open House**, *University of Illinois at Urbana-Champaign*, Urbana, IL.

- Spring 2012: Adam Zimmerman, Matt Johnson, ***Taylor T. Johnson***, and Sayan Mitra. Demonstration: Drawing Pictures with Mobile Robots. [video]

2014 – Present **Judge**.

- January 2016: Congressional STEM Competition Mobile App Contest Judge, El Centro College, Dallas County Community College District, Dallas, TX, sponsored by US Congressman Marc Veasey (`http://www.house.gov/content/educate/app_challenge/`).
- May 2014: Congressional STEM Competition Mobile App Contest Judge, El Centro College West Campus, Dallas County Community College District, Dallas, TX, sponsored by US Congressman Marc Veasey (`http://www.house.gov/content/educate/app_challenge/`).
- 2014-2015: Computer Science Area Judge, Fort Worth Regional Science and Engineering Fair, University of Texas at Arlington, Arlington, TX.

2007 – 2008 **Mentor for High School Students, DREAM Program**, *Rice University*, Houston, TX.

- Mentored several underrepresented high school students on science and engineering fair projects.

PROFESSIONAL ACTIVITIES AND SERVICE

PROFESSIONAL ORGANIZATIONS

2015 – Present **Member**, *Society of Automotive Engineers (SAE International)*.

2014 – Present **Member**, *American Institute of Aeronautics and Astronautics (AIAA)*.

2005 – Present **Member**, *Institute of Electrical and Electronics Engineers (IEEE)*.

2003 – Present **Member**, *Association for Computing Machinery (ACM)*.

UNIVERSITY AND DEPARTMENTAL SERVICE

2016 – Present **Vanderbilt University, Graduate Faculty Delegate Assembly (GFDA), Computer Science Representative**.

2015 – 2016 **College of Engineering, University of Texas at Arlington, Service and Committees**.
- 2015-2016: Engineering Freshman Interest Group (FIG) Mentor.

2013 – 2016 **Department of Computer Science and Eng., University of Texas at Arlington, Committees**.
- 2015 – 2016: Computer Science and Eng. Faculty Search for Three Tenure-Track Positions, Search Committee.
- 2015 – 2016: Computer Science and Eng. CSE2100: Practical Computer Hardware/Software Systems, Curriculum Committee.
- 2013 – 2016: Computer Science and Eng., Computer Engineering Curriculum Committee.
- 2013 – 2016: Computer Science and Eng. PhD Admissions Committee.
- 2013 – 2016: Computer Science and Eng. Graduate Studies Committee (GSC).
- 2013 – 2016: Computer Science and Eng. Colloquium: invited speakers for over eight invited talks.

2010–2013 **Electrical and Computer Engineering, University of Illinois at Urbana-Champaign**.
- 2010–2013: Incoming Graduate Student Orientation Program Volunteer and Panelist.

2013 – Present **Doctoral Dissertation Committee Membership**.
- 2016 – Present: Fardin Abdi, Electrical and Computer Engineering, University of Illinois at Urbana-Champaign . Adviser: Marco Caccamo. External Committee Member.
- 2016 – Present: Fangzhou Sun, Electrical Eng. and Computer Science. Adviser: Jules White.
- 2016 – Present: Brian Cook, Computer Science and Eng.. Adviser: Manfred Huber.
- 2015 – Present: John Podolanko, Computer Science and Eng.. Adviser: Matthew Wright.
- 2014 – Present: Nicholas Brent Burns, Computer Science and Eng.. Adviser: Gergely Zaruba.
- 2014 – 2015: Seyedali Moayedi, Electrical Engineering. Adviser: Ali Davoudi. First position:
- 2014 – 2015: Vahidreza Nasirian, Electrical Engineering. Adviser: Ali Davoudi. First position: High-Power Electrical Engineer at TeraDiode, Inc.
- 2013 – Present: Minh Nguyen, Computer Science and Eng.. Adviser: Hao Che.

REVIEWING AND ORGANIZATIONAL SERVICE

2015 – Present **Research Proposal Reviewer**.
- Air Force Office of Scientific Research (AFOSR), External Reviewer, 2016.
- National Science Foundation (NSF), Review Panels (2015, 2016).
- ASEE Science, Mathematics And Research for Transformation (SMART) Scholarship for Service Program, Department of Defense (DoD), Reviewer (2016).

2014 – Present **Technical Program Committee Membership**.
- 20th International Conference on Hybrid Systems: Computation and Control (HSCC 2017), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Pittsburgh, Pennsylvania, April 11-14, 2017.
- 37th IEEE Real-Time Systems Symposium (RTSS), Technical Program Committee, Cyber-Physical Systems Track, Porto, Portugal, December 2016.
- 16th ACM International Conference on Embedded Software (EMSOFT 2016), Technical Program Committee, Pittsburgh, PA, October 2-7, 2016.
- 45th International Conference on Parallel Processing (ICPP 2016), Cyber-Physical Systems Track, Technical Program Committee, Philadelphia, PA, August 16-19, 2016.
- 19th International Conference on Hybrid Systems: Computation and Control (HSCC 2016), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 11-14, 2016.
- 2nd International Workshop on Symbolic and Numerical Methods for Reachability Analysis (SNR 2016), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 11, 2016.
- 36th IEEE Real-Time Systems Symposium (RTSS), Technical Program Committee, Cyber-Physical Systems Track, San Antonio, TX, December 1-4, 2015.
- 16th IEEE Workshop on Control and Modeling for Power Electronics (Compel), Technical Program Committee, Vancouver, BC, Canada, July 12-15, 2015.
- 14th International Conference on Runtime Verification (RV), Toronto, Canada, September 22-25, 2014.

2011 – Present **Conference Organizational Service**.

- 4th International Workshop on Symbolic and Numerical Methods for Reachability Analysis (SNR), Co-Chair with Prof. Dr. Martin Fränzle, European Joint Conferences on Theory and Practice of Software (ETAPS), Thessaloniki, Greece, April 14-21, 2018.
- 4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH), Hybrid Systems Verification Competition (HSVC) Repeatability Evaluation Chair and Experimental Evaluation Chair, Cyber-Physical Systems Week (CPSWeek), Pittsburgh, PA, April 17, 2017.
- 19th International Conference on Hybrid Systems: Computation and Control (HSCC 2016), Repeatability Evaluation Program Committee, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 11-14, 2016.
- 7th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), Work-in-Progress, Demo, and Poster Co-Chair, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 12, 2016.
- 3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH), Experimental Evaluation Chair, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 11, 2016.
- 2nd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH), Experimental Evaluation Co-Chair, Cyber-Physical Systems Week (CPSWeek), Seattle, WA, April 13, 2015.
- 4th Annual Symposium on Emerging Topics in Control and Modeling: Networked Systems, Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL, October 15-16, 2012. Organizing committee chair.
- Cyber Physical Systems Week (CPSWeek) 2011, Chicago, IL. Designed program booklet, which was reused for CPSWeek 2012, Beijing, China.

2009 – Present **External Reviewer for Journals**.

- IEEE Control Systems Magazine (CSM), 2016.
- IEEE Transactions on Power Electronics (TPEL), 2016.
- ACM Transactions on Embedded Computing Systems (TECS), 2015-2016.
- IEEE Systems Journal, 2014-2016.
- IET Control Theory and Applications (CTA), 2015.
- Journal of Systems Science and Systems Engineering (JSSSE), Springer, 2015.
- IEEE Transactions on Automatic Control, 2013.
- ACM Transactions on Autonomous and Adaptive Systems (TAAS), 2012, 2014.
- IEEE Journal on Selected Areas in Communications (JSAC), 2012.
- IEEE Transactions on Computers, 2009.

2009 – Present **External Reviewer for Conferences**.

- American Control Conference (ACC), 2016.
- IEEE International Conference on Software Testing, Verification and Validation (ICST), 2015 Tools Track.
- IEEE Multi-Conference on Systems and Control, 2014.
- ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2013.
- ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2010, 2011, 2012, 2013.
- IEEE Power and Energy Conference at Illinois (PECI), 2013, 2014.
- NASA Formal Methods Symposium (NFM), 2011.
- International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS), 2012.
- Robotics: Science and Systems Conference (RSS), 2012.

MISCELLANEOUS

Citizenship **US Citizen**.