Email: taylor.johnson@acm.org
Homepage: www.TaylorTJohnson.com
Lab Website: http://www.verivital.com/
Phone: +1-615-875-9057

TAYLOR T. JOHNSON

BRIEF BIOGRAPHY

Dr. Taylor T. Johnson, PE, is A. James and Alice B. Clark Foundation Chancellor Faculty Fellow, Associate Chair, Director of Graduate Studies (DGS), and Associate Professor in the Department of Computer Science (CS) in the Vanderbilt University School of Engineering (VUSE), where he directs the Verification and Validation for Intelligent and Trustworthy Autonomy Laboratory (VeriVITAL) and is a Senior Research Scientist in the Institute for Software Integrated Systems (ISIS). Dr. Johnson is also an Associate Professor of Electrical and Computer Engineering (ECE) and Faculty Affiliate of the Data Science Institute (DSI). Dr. Johnson was previously (September 2013 to August 2016) an Assistant Professor of Computer Science and Engineering (CSE) at the University of Texas at Arlington (UT-Arlington). Dr. Johnson earned a PhD in Electrical and Computer Engineering (ECE) from the University of Illinois at Urbana-Champaign in 2013, where he worked in the Coordinated Science Laboratory with Prof. Sayan Mitra, and earlier earned an MSc in ECE at Illinois in 2010 and a BSEE from Rice University in 2008. Dr. Johnson worked in industry for Schlumberger at various times between 2005 and 2010 developing novel embedded control systems for downhole tools.

Dr. Johnson's research focus is in safe and trustworthy artificial intelligence (AI), specifically developing formal verification techniques and software tools for autonomous-physical systems (CPS), with a focus most recently on AI and machine learning (ML) components in CPS, such as neural networks and neurosymbolic methods, for tasks ranging from sensing/perception through planning/control. Dr. Johnson has published over 140 papers on these methods and their applications across CPS domains, such as power and energy systems, aerospace and avionics systems, automotive systems, transportation systems, biotechnology, and robotics, four of which were recognized with best paper awards from the IEEE and IFIP, and two of which were awarded Best Software Artifact or Repeatability Awards. These publications have appeared in conference venues such as AAAI, CAV, ECAI, EMSOFT, FM, FORMATS, FORTE, HSCC, ICCPS, ICDCS, ICSE, IJCAI, MEMOCODE, NFM, SPIN, RTSS, RV, and UAI and journals such as AIAA JAT, ACM TCPS, ACM TECS, IEEE TAC, IEEE TEC, IEEE TIE, IEEE TII, IEEE TNNLS, IEEE TSG, STTT, TCS, SIAM SICON, and DEDS, among others. Dr. Johnson is a 2018 and 2016 recipient of the AFOSR Young Investigator Program (YIP) award, a 2015 recipient of the National Science Foundation (NSF) Computer and Information Science and Engineering (CISE) Research Initiation Initiative (CRII) award, and his research is / has been supported by AFRL, AFOSR, ARO, DARPA, NSA, NSF (CISE CCF/FMitF, CISE CCF/SHF, CISE CNS/CPS, ENG ECCS/EPCN), the MathWorks, NVIDIA, ONR, Toyota, and USDOT, totaling $\sim \$34.5$ million in sponsored research projects. Dr. Johnson has served on program committees and in different organizational roles for venues such as AAAI, CAV, CVPR, EMSOFT, FORMATS, HSCC, ICCV, NFM, SAIV, SPIN, RTSS, UAI, among many others, is an Associate Editor of Software Tools for Technology Transfer (STTT), is co-founder of the International Symposium on AI Verification (SAIV), and is co-founder of the Verification of Neural Networks Competition (VNN-COMP) and the International Competition on Verifying Continuous and Hybrid Systems (ARCH-COMP) category on Artificial Intelligence and Neural Network Control Systems (AINNCS). Mentees and alumni of Dr. Johnson's research group have received awards such as DoD NDSEG, DOE CSGF, AFOSR YIP, NSF CAREER, NSF CRII, among others, and hold roles in industry (Amazon, Google, Meta, Mathworks, Visa, etc.) and academia (Augusta, Mizzou, U Dayton, UNL, USF, UTPB, etc.). Dr. Johnson is a member of AAAI, AAAS, ACM, AIAA, IEEE, and SAE, and is a registered Professional Engineer (PE) in Tennessee, license number 122259.

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

8/2021 – Present **Associate Professor**, *Vanderbilt University*, Computer Science, Nashville, TN.
- Associate Chair of Computer Science (2024-on)
- Director of Graduate Studies (DGS) in Computer Science (2023-on)
- Director of Master of Engineering (MEng) Program in Cyber-Physical Systems (2021-on)
- A. James and Alice B. Clark Foundation Chancellor Faculty Fellow (2022-on)
- Senior Research Scientist in the Institute for Software Integrated Systems (ISIS)
- Director of VeriVITAL: The Verification and Validation for Intelligent and Trustworthy Autonomy Laboratory

8/2016 – 8/2021 **Assistant Professor**, *Vanderbilt University*, Electrical Eng. and Computer Science, Nashville, TN.
- Appointments in Computer Science (CS), Computer Engineering (CmpE), and Electrical Engineering (EE)

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 [C9,C10,C11,C13,J4] and software tools [S3,S5].

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 [C5].

INDUSTRY AND STARTUP POSITIONS

December 2017 – Present **Founder and Chief Technology Officer (CTO)**, *Verivital, LLC*, Nashville, TN.
- Research, development, commercialization, and consulting activities on verification and validation results arising from our research group, particularly formal verification for autonomous cyber-physical systems.
- Founded as a Tennessee limited liability company (LLC).

May 2017 – Present **Founder and President**, *CelerFama, Inc.*, Nashville, TN.
- Technology and business development for automating data entry for electronic health records (EHRs) and electronic medical records (EMRs) using natural language processing (NLP), based on technology transfer of patent application [P2].
- Founded as a Tennessee class-C corporation.

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 [LC1]—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

11/2024 **Best Paper Award**, 6th International Workshop on Formal Methods for Autonomous Systems (FMAS 2024).
Award corresponding to paper [W31].

10/2023 **Outstanding Reviewer Award**, ACM SIGBED International Conference on Embedded Software (EMSOFT 2023).
Award for outstanding service in the EMSOFT reviewing process.

7/2023 **Distinguished Paper Award**, 9th IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT 2023).
Award corresponding to paper [C39].

9/2022 **Best Artifact Award**, 20th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS 2022).
Award corresponding to artifact and repeatability evaluation for paper [C34].

12/2021 **Trusted AI at Scale Challenge Series Awardee**, Air Force Research Laboratory (AFRL)/Air Force Office of Scientific Research (AFOSR)/Griffiss Institute Innovare Advancement Center.
Received grant award [CG25].

8/2018 **Junior Faculty Teaching Fellow for 2018-2019**.
Vanderbilt University Center for Teaching (CFT)

10/2017 **2018 Young Investigator Research Program (YIP) Award**, Air Force Office of Scientific Research (AFOSR).
Received grant award [CG17].

8/2017 **Southeastern Conference (SEC) Faculty Travel Program Award for 2017-2018**.
Travel support to visit Dr. Dylan Shell at Texas A&M University to collaborate on distributed and swarm robotics.

4/2016 **Best Software Repeatability Evaluation Award for [C14]**, 19th ACM International Conference on Hybrid Systems: Computation and Control (HSCC), Cyber-Physical Systems Week (CPSWeek) 2016, Austria, Vienna.

2/2016 **2016 Young Investigator Research Program (YIP) Award**, Air Force Office of Scientific Research (AFOSR).
Received grant award [CG9].

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 [CG11].

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 [C4]**, *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 [LC1]**, *2nd IEEE Power and Energy Conference at Illinois (PECI)*, Urbana, IL.

12/2009 **Most Interesting Cyber-Physical Systems Research Problem Award for [E1]**, *30th IEEE Real-Time Systems Symposium (RTSS)*, Washington, DC.

2006 **First Place Team, AMD Digital Logic Design Competition**, *Rice University*, Houston, TX.
Teammates: Brent Stephens and Barron Stone

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

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

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

2004 – 2008 **Glaser Family Charitable Foundation Scholarship**.

2004 – 2008 **USA Funds Access to Education Scholarship**.

2004 **Texas Society of Professional Engineers Scholarship**, *Brazos County Chapter, TX*.

2004 **Second Place in Computer Science**, *Texas State Science and Engineering Fair*, Arlington, TX.

2003 **Finalist in Computer Science**, *Intel International Science and Engineering Fair*, Cleveland, OH.

STUDENT AWARDS AND HONORS

1/2025 **SIU Prize, Computer Science Season 1 Gold Prize for "Verification of Learning-Enabled Cyber-Physical Systems," Saigon International University**, *Hoang-Dung Tran (DA4), January 2025*.

5/2024 **DOE CSGF Fellowship Award for Anne Tumlin[†], Department of Energy (DOE) Computational Science Graduate Fellowship (CSGF) Program**, *Anne Tumlin (DS5), May 2024*.

5/2022 **C. F. Chen Best Paper Award Honorable Mention for Tianshu Bao[†] for Paper [C32], Vanderbilt Computer Science**, *May 2022*.

5/2021 **IEEE Outstanding Ph.D. Dissertation Award for "Verification of Learning-Enabled Cyber-Physical Systems," IEEE Technical Committee on Cyber-Physical Systems (TCCPS)**, *Hoang-Dung Tran (DA4), May 2021*.

4/2021 **NDSEG Fellowship Award for "Safe and Robust Reinforcement Learning to Quantify Risk in Intelligent Systems," National Defense Science and Engineering Graduate (NDSEG) Fellowship Program**, *Preston Robinette (DS2), April 2021*.

4/2019 **NDSEG Fellowship Award for "Safe and Robust Reinforcement Learning for Autonomous Distributed Cyber-Physical Systems," National Defense Science and Engineering Graduate (NDSEG) Fellowship Program**, *Nathaniel Hamilton (DA6), April 2019*.

12/2014 **3rd Place in US/India Chamber of Commerce Spirit of Innovation Competition**, *Amol Vengurlekar (MA1), Ruoshi Zhang (MA2), Luan Viet Nguyen (DA2), and Eric Nelson 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 2025 **Automated Verification (CS6315)**, *Instructor*.
32 students

Fall 2024 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
75 students total: 25 first-year students each in 3 one credit hour modules taught over the semester

Spring 2024 **Automated Verification (CS6315)**, *Instructor*.
29 students

Fall 2023 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
75 students total: 25 first-year students each in 3 one credit hour modules taught over the semester

Spring 2023 **Automated Verification (CS6315)**, *Instructor*.
15 students

Spring 2023 **Automated Verification (CS6315)**, *Instructor*.
17 students, online-only course as part of online MSc/PhD programs

Fall 2022 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
75 students total: 25 first-year students each in 3 one credit hour modules taught over the semester

Spring 2022 **Automated Verification (CS6315)**, *Instructor*.
12 students

Spring 2022 **Automated Verification (CS6315)**, *Instructor*.
22 students, online-only course as part of online MSc/PhD programs

Fall 2021 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
75 students total: 25 first-year students each in 3 one credit hour modules taught over the semester

Fall 2021 **Computer Networks (CS5283)**, *Instructor*.
26 students, online-only course as part of online MSc program

Spring 2021 **Automated Verification (CS6315)**, *Instructor*.
10 students

Fall 2020 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
80 students total: 25-30 first-year students each in 3 one credit hour modules taught over the semester

Summer 2020 **Computer Networks (CS5283)**, *Instructor*, Developed asynchronous content for this graduate-level course on computer networks as a part of Vanderbilt's new online MSc in computer science.
7 students, online-only course

Spring 2020 **Machine Learning Verification (CS8395)**, *Instructor*, Developed research seminar course on formal methods, verification, and software engineering for machine learning systems, building on our group's and others' recent results in this growing area.
10 students

Fall 2019 **Digital Systems (EECE2123)**, *Instructor*, Developed curriculum, assignments, lab assignments, and taught the first iteration of this new core undergraduate EECS course that replaced existing Computer Organization (CS2231) and Digital Logic (EECE2116) courses and labs.
33 students in EECE2123-02 section, and 115 students in 9 laboratory sections of EECE2123L

Fall 2019 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
80 students total: 25-30 first-year students each in 3 one credit hour modules taught over the semester

Spring 2019 **Automated Verification (CS6315)**, *Instructor*.
30 students, 25 graduate, 5 undergraduate

Fall 2018 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*, Redesigned curriculum to utilize Python programs to control mobile aerial robots (DJI Tello quadcopter drones), emphasizing cyber-physical and computational thinking.
80 students total: 25-30 first-year students each in 3 one credit hour modules taught over the semester

Spring 2018 **Computer Networks (CS4283/CS5283)**, *Instructor*.
35 students (25 undergraduate, 10 graduate)

Fall 2017 **Discrete Event Systems (CS6375)**, *Instructor*.
9 students

Fall 2017 **Introduction to Engineering, Computer Science Module (ES140x)**, *Instructor*.
75 students total: 25 first-year students each in 3 one credit hour modules taught over the semester

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

Fall 2016 **Computer Organization (CS2231)**, *Instructor*, This course's student results were used in the 2017 Accreditation Board for Engineering and Technology (ABET) Accreditation for the Computer Science (CS) and Computer Engineering (CmpE) program evaluations.
35 students

Courses for Professional Organizations

Fall 2020 **SAE C1876: Formal Methods for Functional Safety and Security in Cyber-Physical Systems**, *Instructor*, SAE International, 3-day course on formal methods, verification, and validation (V&V) in the automotive domain, arranged with feedback from DARPA (Raymond Richards), NSF (Jeremy Epstein), SAE, and the National Motor Freight Traffic Association (NMFTA) as a foundational background course for helping transition the seL4 microkernel into usage in automotive systems.
`https://www.sae.org/learn/content/c1876/`

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 across three continents (North America, Europe, Asia) in industry from UTC through the UTC IASE. 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*, Redeveloped course and also provided course materials for spring 2014 and summer 2014 sections.
47 students

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

Co-authors with a trailing † indicate thesis students formally advised or co-advised, with a trailing $^{\circ}$ are postdocs formally mentored, and co-authors with a trailing * indicate students informally mentored (all at the time of publication). Papers subject to double-blind reviews (both authors and reviewers are anonymous) are indicated by DBR. Papers that have corresponding software artifacts and have passed a repeatability/artifact evaluation are indicated by RAE.

Citation metrics are from Google Scholar, with a total of 5384 citations, h-index of 40, and $i10$-index of 92 as of March 18, 2025.

REFEREED JOURNAL ARTICLES

[J31] Joel Rosenfeld$^{\circ}$, Ben Russo, Rushi Kamalapurkar, ***Taylor T. Johnson***, "The Occupation Kernel Method for Nonlinear System Identification," *SIAM Journal on Control and Optimization*, Vol: 62 (3), 2024. [pdf]
DOI: 10.1137/19M127029X
Impact Factor: 2.2

Summary: This paper describes a system identification approach for nonlinear systems based on occupation kernels.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent
Keywords: reproducing kernel Hilbert spaces,nonlinear system identification,occupation kernels,Liouville operators,inner products,dynamical systems.

[J30] Luan Viet Nguyen, Hoang-Dung Tran†, ***Taylor T. Johnson***, Vijay Gupta, "Decentralized Safe Control for Distributed Cyber-Physical Systems using Real-time Reachability Analysis," *IEEE Transactions on Control of Network Systems (TCNS)*, January 2023. [pdf]
DOI: 10.1109/TCNS.2023.3239562
Impact Factor: 4.0
Summary: This paper presents a decentralized control framework for ensuring safety in distributed cyber-physical systems (CPS).
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[J29] Christopher Brix, Mark Niklas Muller, Stanley Bak, ***Taylor T. Johnson***, Changliu Liu, "First Three Years of the International Verification of Neural Networks Competition (VNN-COMP)," *International Journal on Software Tools for Technology Transfer (STTT)*, January 2023. [pdf]
Impact Factor: 1.1
Summary: This paper describes and summarizes the first three iterations of the International Verification of Neural Networks Competition (VNN-COMP).
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[J28] Diego Manzanas Lopez†, ***Taylor T. Johnson***, Stanley Bak, Hoang-Dung Tran, Kerianne L Hobbs, "Evaluation of Neural Network Verification Methods for Air-to-Air Collision Avoidance," *AIAA Journal of Air Transportation (JAT)*, October 2023. [pdf]
DOI: 10.2514/1.D0255
Impact Factor: 1.2
Summary: This paper presents closed-loop verification results for the ACAS-Xu neural networks as used in air traffic collision avoidance systems.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[J27] Hoang-Dung Tran, Luan Viet Nguyen, Patrick Musau†, Weiming Xiang, ***Taylor T. Johnson***, "Real-Time Verification for Distributed Cyber-Physical Systems," *Leibniz Transactions on Embedded Systems (LITES)*, February 2022. [pdf]
DOI: 10.4230/LITES.8.2.7
Summary: This paper presents a reachability-based distributed verification framework for distributed cyber-physical systems (CPS) that has real-time guarantees.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent. Extension of [C23] invited for special issue on Distributed Hybrid Systems.

[J26] Hoang-Dung Tran†, Weiming Xiang, ***Taylor T. Johnson***, "Verification Approaches for Learning-Enabled Autonomous Cyber-Physical Systems," *IEEE Design and Test (D&T)*, February 2022. [pdf]
DOI: 10.1109/MDAT.2020.3015712
Impact Factor: 2.409
Summary: This paper presents a survey overview of machine learning verification approaches, with a focus on verification methods for autonomous CPS that have machine learning components.
Role: Mentor: formulated research plan, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[J25] Joel A. Rosenfeld, Rushikesh Kamalapurkar, L. Forest Gruss, ***Taylor T. Johnson***, "Dynamic Mode Decomposition for Continuous Time Systems with the Liouville Operator," *Journal of Nonlinear Science*, October 2021. [pdf]
Impact Factor: 3.621
Summary: This paper presents a dynamic mode decomposition framework for system identification.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[J24] Hoang-Dung Tran†, Diego Manzanas Lopez†, Patrick Musau†, Xiaodong Yang†, Luan Nguyen, Weiming Xiang, ***Taylor T. Johnson***, "Verification of piecewise deep neural networks: a star set approach with zonotope pre-filter," *Formal Aspects of Computing*, Vol: 33, p 519-545, August 2021. [pdf]
DOI: 10.1007/s00165-021-00553-4

Impact Factor: 1.4
Summary: This paper builds upon our FM'19 paper that introduced star sets for verification, by combining it with less precise set representations (zonotopes), to allow for balancing precision and scalability.
Role: Mentor: helped formulate research problem, supervised students, helped write paper. Contribution: 15.0 percent. *Special Issue of Formal Aspects of Computing on Formal Methods: Foundations and Practical Applications*, October 2020. Extension of [C25] invited for special issue.

[J23] Xiaodong Yang†, Omar Beg, Matthew Kenigsberg, ***Taylor T. Johnson***, "A Framework for Identification and Validation of Affine Hybrid Automata from Input-Output Traces," *ACM Transactions on Cyber-Physical Systems (TCPS)*, August 2021. [pdf]
Impact Factor: 2.6
Summary: This paper develops a hybrid automata learning framework to learn such models from time series data that incorporate switching behavior (discontinuities).
Role: Mentor: helped formulate research problem, supervised students, helped write paper. Contribution: 25.0 percent.

[J22] Omar Ali Beg, Luan Viet Nguyen, ***Taylor T. Johnson***, Ali Davoudi, "Cyber-Physical Anomaly Detection in Microgrids Using Time-Frequency Logic Formalism," *IEEE Access*, Vol: 9, p 20012-20021, January 2021. [pdf]
DOI: 10.1109/ACCESS.2021.3055229
Impact Factor: 3.745
Summary: This paper develops an anomaly detection approach applied to microgrids building upon time-frequency logic.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[J21] Weiming Xiang, Xiaodong Yang†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Reachable Set Estimation for Neural Network Control Systems: A Simulation-Guided Approach," *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, May 2020. [pdf]
DOI: 10.1109/TNNLS.2020.2991090
Impact Factor: 8.793
Summary: This paper describes a simulation-based method to improve reachability analysis of neural network control systems, specifically by taking into account a safety specification in the analysis and using non-uniform partitions of the state space in the reachability analysis.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[J20] Hoang-Dung Tran†, Feiyang Cei, Diego Manzanas Lopez†, ***Taylor T. Johnson***, Xenofon Koutsoukos, "Safety Verification of Cyber-Physical Systems with Reinforcement Learning Control," *ACM Transactions on Embedded Computing Systems (TECS), Special Issue from EMSOFT'19*, Vol: 18, No: 5s, p 105:1-105:22, October 2019. [pdf]
DOI: 10.1145/3358230
Acceptance Rate: 25.0 percent (25 of 100)
Double-Blind Review (**DBR**)
Impact Factor: 2.609
Summary: This paper shows how to perform safety verification of autonomous CPS with neural network controllers that are created with reinforcement learning, such as through deep deterministic policy gradient (DDPG) policies.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[J19] Ziaur Rahman, Stephen P. Mattingly, Rahul Kawadgave, Dian Nostikasari, Nicole Roeglin, Colleen Casey, ***Taylor T. Johnson***, "Using crowd sourcing to locate and characterize conflicts for vulnerable modes," *Accident Analysis and Prevention*, Vol: 128, p 23-39, July 2019. [pdf]
DOI: 10.1016/j.aap.2019.03.014
Impact Factor: 3.655
Summary: This paper describes a crowd-sourcing framework for reporting and analyzing conflicts between vulnerable road users, such as pedestrians and cyclists, for which my group developed an Android app and corresponding server infrastructure for data collection.
Role: Mentor: formulated research project, wrote prototype software, helped write paper. Contribution: 20.0 percent.

[J18] Andrew Sogokon°, Paul B. Jackson, ***Taylor T. Johnson***, "Verifying Safety and Persistence in Hybrid Systems Using Flowpipes and Continuous Invariants," *Journal of Automated Reasoning (JAR), Springer*,

Vol: 63, No: 4, p 1005-1029, December 2019. [pdf]
DOI: 10.1007/s10817-018-9497-x
Impact Factor: 1.445
Summary: This paper established proof rules for verifying safety and persistence specifications in hybrid systems with automatically computed invariants found through reachability analysis.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 33.0 percent. Extension of [C19].

[J17] Stanley Bak, Omar Beg†, Sergiy Bogomolov, ***Taylor T. Johnson***, Luan Viet Nguyen†, Christian Schilling, "Hybrid automata: from verification to implementation," *International Journal on Software Tools for Technology Transfer (STTT), Springer*, Vol: 21 (1), p 87-104, February 2019. [pdf]
DOI: 10.1007/s10009-017-0458-1
Impact Factor: 1.079
Summary: This paper shows how to transform hybrid automaton models from formal frameworks, such as those used in model checkers like SpaceEx, Flow*, among others, to CPS design environments, such as the MathWorks' Simulink/Stateflow, such that the transformed models are guaranteed to satisfy specifications proved for the formal models.
Role: Mentor: formulated research project, supervised students/postdocs, helped write prototype software, helped write paper. Contribution: 33.0 percent. Software tool: `http://swt.informatik.uni-freiburg.de/tool/spaceex/ha2slsf`

[J16] Omar Beg†, Luan Viet Nguyen†, ***Taylor T. Johnson***, Ali Davoudi, "Signal Temporal Logic-based Attack Detection in DC Microgrids," *IEEE Transactions on Smart Grid (TSG)*, Vol: 10, No: 4, p 3585-3595, July 2018. [pdf]
DOI: 10.1109/TSG.2018.2832544
Impact Factor: 8.267
Summary: This paper describes a framework for detecting attacks in electrical microgrids by monitoring signal temporal logic (STL) specifications.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[J15] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Nonconservative Lifted Convex Conditions for Stability of Discrete-Time Switched Systems under Minimum Dwell-Time Constraint," *IEEE Transactions on Automatic Control (TAC)*, Vol: 64, No: 8, p 3407-3414, August 2018. [pdf]
DOI: 10.1109/TAC.2018.2879585
Impact Factor: 5.625
Summary: This paper develops stability conditions using dwell time constraints for a class of discrete-time switched systems, and illustrates how to use these conditions in controller design.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[J14] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Robust exponential stability and disturbance attenuation for discrete-time switched systems under arbitrary switching," *IEEE Transactions on Automatic Control (TAC)*, Vol: 63, No: 5, p 1450-1456, May 2018. [pdf]
DOI: 10.1109/TAC.2017.2748918
Impact Factor: 5.625
Summary: This paper describes global exponential stability conditions for discrete-time switched systems with arbitrary switching, including how to incorporate robustness in controller design using these conditions.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[J13] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Output reachable set estimation and verification for multilayer neural networks," *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, Vol: 29, No: 11, p 5777-5783, March 2018. [pdf]
DOI: 10.1109/TNNLS.2018.2808470
Impact Factor: 8.793
Summary: This paper presents some of the first results on verification of neural networks with general nonlinear activation functions by exploiting monotonicity of several common activations like sigmoids and hyperbolic tangents, beyond what had been considered with piecewise linear activations, such as rectified linear units (ReLUs).
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[J12] Luan Viet Nguyen†, Khaza Anuaral Hoque°, ***Taylor T. Johnson***, Stanley Bak, Steven Drager, "Cyber-Physical Specification Mismatches," *ACM Transactions on Cyber-Physical Systems (TCPS)*, Vol: 2, No: 4, p 23:1-23:26, July 2018. [pdf]

DOI: 10.1145/3170500
Impact Factor: 2.6
Summary: This paper defined cyber-physical specification mismatches, as well as methods to automatically detect if cyber and physical components in CPS have such mismatches, by utilizing invariant inference and specification inference.
Role: Mentor: formulated research project, wrote prototype software, wrote majority of paper. Contribution: 75.0 percent.

[J11] Andrew Sogokon°, Khalil Ghorbal, ***Taylor T. Johnson***, "Operational Models for Piecewise-Smooth Systems," *ACM Transactions on Embedded Computing Systems (TECS), Special Issue from EMSOFT'17*, Vol: 16, No: 5s, p 185:1-185:19, October 2017. [pdf]
DOI: 10.1145/3126506
Acceptance Rate: 25.6 percent (74 of 289)
Impact Factor: 2.609
Summary: This paper investigates semantics of different forms of hybrid and switched behavior in piecewise-smooth systems, where polynomial vector fields describe dynamics over different semi-algebraic set partitions of the state space. There are several semantics choices in attempting to formalize these systems' behaviors into hybrid automata, which the paper attempts to resolve, including investigations of chattering, non-determinism, and sliding modes.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[J10] Omar Beg†, Houssam Abbas, ***Taylor T. Johnson***, Ali Davoudi, "Model Validation of PWM DC-DC Converters," *IEEE Transactions on Industrial Electronics (TIE)*, Vol: 64, No: 9, p 7049-7059, September 2017. [pdf]
DOI: 10.1109/TIE.2017.2688961
Impact Factor: 7.515
Summary: This paper develops methods for performing model validation using reachability analysis, allowing for parameter variations in plant models, and illustrates how reachability methods can outperform traditional Monte Carlo approaches when considering such parameter variations.
Role: Mentor: formulated research project, supervised students/postdocs, helped write prototype software, helped write paper. Contribution: 40.0 percent.

[J9] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Output Reachable Set Estimation for Switched Linear Systems and Its Application in Safety Verification," *IEEE Transactions on Automatic Control (TAC)*, Vol: 62, No: 10, p 5380-5387, October 2017. [pdf]
DOI: 10.1109/TAC.2017.2692100
Impact Factor: 5.625
Summary: This paper develops reachability analysis methods for a class of switched linear systems, taking advantage of common Lyapunov functions, multiple Lyapunov functions, and dwell time, and shows how to use this for safety verification.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 50.0 percent.

[J8] Weiming Xiang°, ***Taylor T. Johnson***, "Event-triggered control for continuous-time switched linear systems," *IET Control Theory and Applications (CTA)*, Vol: 11, No: 11, p 1694-1703, July 2017. [pdf]
DOI: 10.1049/iet-cta.2016.0672
Impact Factor: 3.526
Summary: This paper introduces asymptotic stability conditions that may be checked computationally for a class of periodically controlled switched linear systems.
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 50.0 percent.

[J7] Hoang-Dung Tran†, Luan Viet Nguyen†, Weiming Xiang°, ***Taylor T. Johnson***, "Order-reduction abstractions for safety verification of high-dimensional linear systems," *Discrete Event Dynamic Systems (DEDS), Springer*, Vol: 27, No: 2, p 443-461, April 2017. [pdf]
DOI: 10.1007/s10626-017-0244-y
Impact Factor: 1.088
Summary: This paper introduces order-reduction abstractions for verification of safety specifications in high-dimensional linear systems, with on the order of thousands of state variables. Order-reduction is typically an approximation technique, but error bounds are used to formalize certain types of reduction into a sound abstraction procedure, and this is implemented as a model transformation within our HyST tool.

Role: Mentor: formulated research problem, supervised students, helped write paper. Contribution: 50.0 percent.

[J6] Omar Beg†, ***Taylor T. Johnson***, Ali Davoudi, "Detection of false-data injection attacks in cyber-physical DC microgrids," *IEEE Transactions on Industrial Informatics (TII)*, Vol: 13, No: 5, p 2693-2703, October 2017. [pdf]
DOI: 10.1109/TII.2017.2656905
Impact Factor: 9.112
Summary: This paper presents a framework for detecting a common form of attack in distributed CPS, specifically false-data injection attacks, as applied to electrical microgrids. The approach is to find candidate invariants using invariant inference and monitor these a priori identified candidates at runtime, where if they are violated, a potential attack or other anomaly has been identified.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 40.0 percent.

[J5] Sergiy Bogomolov, Alexandre Donzé, Goran Frehse, Radu Grosu, ***Taylor T. Johnson***, Hamed Ladan, Andreas Podelski, Martin Wehrle, "Guided Search for Hybrid Systems Based on Coarse-Grained Space Abstractions," *International Journal on Software Tools for Technology Transfer (STTT), Springer*, Vol: 18, No: 4, p 449-467, August 2016. [pdf]
DOI: 10.1007/s10009-015-0393-y
Impact Factor: 1.079
Summary: This paper described an abstraction approach for hybrid systems verification, where an initial highly abstract (overapproximate) verification run is used to guide subsequent refined, less abstract verification runs, to eliminate spurious counterexamples, in a form of counterexample guided abstraction refinement (CEGAR) with the degree of abstraction defined over parameters used in the analysis, such as the sampling time.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 33.0 percent. Software tool: `http://www2.informatik.uni-freiburg.de/~bogom/sttt2015/`

[J4] ***Taylor T. Johnson***, Stanley Bak, Marco Caccamo, Lui Sha, "Real-time reachability for verified simplex design," *ACM Transactions on Embedded Computing Systems (TECS)*, Vol: 15, No: 2, p 26:1-26:27, February 2016. [pdf]
DOI: 10.1145/2723871
Impact Factor: 2.609
Summary: This paper generalized our earlier real-time reachability algorithm (RTSS'14), showing how it can be used on systems with nonlinear dynamics.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 50.0 percent. Extension of [C9]. Software Tool [S4]: `https://github.com/verivital/rtreach`

[J3] ***Taylor T. Johnson***, Sayan Mitra, "Safe and stabilizing distributed multi-path cellular flows," *Theoretical Computer Science (TCS), Elsevier*, Vol: 579, p 9-32, May 2015. [pdf]
DOI: 10.1016/j.tcs.2015.01.023
Impact Factor: 0.895
Summary: This paper develops a self-stabilizing algorithm for routing cellular flows, where geographic partitions move agents uniformly, as in conveyance systems, in spite of temporary or permanent failures of the partitions.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 90.0 percent. Extension of [C1]. Software Tool: `https://github.com/verivital/cell_flows`

[J2] Luan Viet Nguyen†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Virtual Prototyping for Distributed Control of a Fault-Tolerant Modular Multilevel Inverter for Photovoltaics," *IEEE Transactions on Energy Conversion (TEC)*, Vol: 29, No: 4, p 841-850, December 2014. [pdf]
DOI: 10.1109/TEC.2014.2362716
Impact Factor: 4.501
Summary: This paper presents a distributed control framework with fault tolerance properties used in the control of DC-to-AC conversion (inversion) for groups of photovoltaic panels.
Role: Author/Mentor: formulated research project, wrote prototype software, mentored students, helped write paper. Contribution: 80.0 percent.

[J1] ***Taylor T. Johnson***, Sayan Mitra, "Safe Flocking in Spite of Actuator Faults using Directional Failure Detectors," *Journal of Nonlinear Systems and Applications, Watam Press*, Vol: 2, No: 1-2, p 73-95,

2011. [pdf]
Summary: This paper develops failure detectors for distributed CPS to mitigate the impact of failures such as crashes and actuator stuck-at faults, applied in the context of flocking (average consensus) algorithms for shape formation.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 90.0 percent. Extension of [C2]

REFEREED HIGHLY-SELECTIVE CONFERENCE PROCEEDINGS PAPERS

Acceptance based on peer review of full papers.

[C53] Tianshu Bao, Xiaoou Liu, Meiyi Ma, ***Taylor T. Johnson***, Hua Wei, "Uncertainty Quantification for Physics-Informed Traffic Graph Networks," *16th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS'25)*, May 2025. [pdf]
Acceptance Rate: 28.4 percent (29 of 102)
Double-Blind Review (**DBR**)
Summary: This paper presents an uncertainty quantification framework for physics-based machine learning models and applied in the context of traffic modeling and forecasting.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent
Keywords: uncertainty quantification, physics-based machine learning, traffic forecasting.

[C52] Samuel Sasaki†, Preston Robinette†, Diego Manzanas Lopez, ***Taylor T. Johnson***, "Robustness Verification of Video Classification Neural Networks," *13th International Conference on Formal Methods in Software Engineering (FormaliSE'25)*, May 2025. [pdf]
Acceptance Rate: 31.2 percent (15 of 48)
Double-Blind Review (**DBR**)
Summary: This paper develops robustness verification methods for a novel computer vision task not yet considered in neural network verification, specifically video classification.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 25.0 percent
Keywords: neural network verification, video classification, formal verification.

[C51] Lucas Cordeiro, Matthew Daggitt, Julien Girard-Satabin, Omri Isac, ***Taylor T. Johnson***, Guy Katz, Ekaterina Komendantskaya, Augustin Lemesle, Edoardo Manino, Artjoms Sinkarovs, Haoze Wu, "Neural Network Verification is a Programming Language Challenge (Fresh Perspectives)," *34th European Symposium on Programming (ESOP'25)*, May 2025. [pdf]
Acceptance Rate: 32.9 percent (30 of 91)
Double-Blind Review (**DBR**)
Summary: This paper presents a fresh perspective on neural network verification as being a research problem in programming languages.
Role: Co-author: wrote and edited sections on neural network verification, specifically around usage in autonomus systems. Contribution: 10.0 percent
Keywords: programming languages, formal verification, neural networks.

[C50] Dung T. (Judy) Nguyen†, Ngoc N. Tran, ***Taylor T. Johnson***, Kevin Leach, "PBP: Post-training Backdoor Purification for Malware Classifiers," *32nd Network and Distributed System Security Symposium (NDSS'25)*, February 2025. [pdf]
Acceptance Rate: 20.1 percent (140 of 694)
Double-Blind Review (**DBR**)
Summary: This paper presents a machine learning purification method for removing backdoors in the context of malware classifiers.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent
Keywords: malware, purification, machine learning.

[C49] Anne Tumlin†, Diego Manzanas Lopez, Preston Robinette†, Yuying Zhao, Tyler Derr, ***Taylor T. Johnson***, "FairNNV: The Neural Network Verification Tool For Certifying Fairness," *5th ACM International Conference on AI in Finance (ICAIF'24)*, November 2024. [pdf]
DOI: 10.1145/3677052.3698677
Acceptance Rate: 39.2 percent (99 of 252)
Double-Blind Review (**DBR**)
Summary: This paper presents an approach for formal verification of fairness properties of neural

networks, applied on financial domain benchmarks, such as credit scoring.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 15.0 percent
Keywords: Fairness, Formal Verification, Neural Networks. Selected for oral presentation (about half of all accepted papers).

[C48] Preston Robinette†, Daniel Moyer, ***Taylor T. Johnson***, "Sanitizing Hidden Information with Diffusion Models ," *27th European Conference on Artificial Intelligence (ECAI'24)*, October 2024. [pdf]
Acceptance Rate: 23.3 percent (547 of 2344)
Double-Blind Review (**DBR**)
Summary: This paper presents an approach to sanitize hidden information (such as steganographic content) using diffusion models.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 33.0 percent.

[C47] Tianshu Bao†, Hua Wei, Junyi Ji, Daniel Work, ***Taylor T. Johnson***, "Spatial-Temporal PDE Networks for Traffic Flow Forecasting," *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD'24), Applied Data Science Track*, September 2024. [pdf]
DOI: 10.1007/978-3-031-70381-2_11
Acceptance Rate: 25.0 percent (56 of 224)
Double-Blind Review (**DBR**)
Summary: This paper presents a physics-based machine learning model combining neural networks with PDEs for traffic forecasting.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 20.0 percent.

[C46] Tianshu Bao†, ***Taylor T. Johnson***, Xiaowei Jia, "Transfer Learning Using Inaccurate Physics Rule for Streamflow Prediction," *33rd International Joint Conference on Artificial Intelligence (IJCAI'24), AI for Good Track*, August 2024. [pdf]
DOI: 10.24963/ijcai.2024/793
Acceptance Rate: 14.0 percent (643 of 4566)
Double-Blind Review (**DBR**)
Summary: This paper presents a transfer learning approach for physics-based machine learning models as applied to streamflow prediction.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 25.0 percent.

[C45] Preston Robinette†, Diego Manzanas Lopez†, Serena Serbinowska†, Kevin Leach, ***Taylor T. Johnson***, "Case Study: Neural Network Malware Detection Verification for Feature and Image Datasets," *12th International Conference on Formal Methods in Software Engineering (FormaliSE'24)*, April 2024. [pdf]
DOI: 10.1145/3644033.3644372
Acceptance Rate: 34.1 percent (14 of 41)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper analyzes malware classification neural networks for robustness properties.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 25.0 percent.

[C44] Ziyan An, ***Taylor T. Johnson***, Meiyi Ma, "Formal Logic Enabled Personalized Federated Learning Through Property Inference," *38th AAAI Conference on Artificial Intelligence (AAAI'24)*, February 2024. [pdf]
DOI: 10.1609/aaai.v38i10.28962
Acceptance Rate: 23.7 percent (2342 of 9862)
Double-Blind Review (**DBR**)
Summary: This paper presents a federated learning framework
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper.
Contribution: 15.0 percent
Keywords: federated learning,neurosymbolic learning,temporal logic.

[C43] Ziyan An, Xia Wang, ***Taylor T. Johnson***, Jonathan Sprinkle, Meiyi Ma, "Runtime Monitoring of Accidents in Driving Recordings with Multi-Type Logic in Empirical Models," *23rd International Conference on Runtime Verification (RV'23)*, October 2023. [pdf]
DOI: 10.1007/978-3-031-44267-4_21

Acceptance Rate: 51.2 percent (20 of 39)
Summary: This paper presents a runtime monitoring framework from recordings of driving accidents.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[C42] Preston Robinette†, ***Taylor T. Johnson***, David Wang, Nishan Shehadeh, Daniel C Moyer, "SUDS: Sanitizing Universal and Dependent Steganography," *26th European Conference on Artificial Intelligence (ECAI'23)*, October 2023. [pdf]
DOI: 10.3233/FAIA230489
Acceptance Rate: 20.5 percent (390 of 1896)
Double-Blind Review (**DBR**)
Summary: This paper presents a machine learning sanitization framework to remove steganographic content from media.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent
Keywords: steganography,neural networks,sanitization.

[C41] Neelanjana Pal†, Diego Manzanas Lopez†, ***Taylor T. Johnson***, "Robustness verification of deep neural networks using star-based reachability analysis with variable-length time series input," *ERCIM Working Group 28th International Conference on Formal Methods for Industrial Critical Systems (FMICS'23)*, September 2023. [pdf]
DOI: 10.1007/978-3-031-43681-9_10
Acceptance Rate: 58.3 percent (14 of 24)
Summary: This paper presents a formal verification approach for time series regression neural networks.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 30.0 percent
Keywords: predictive maintenance,neural network verification,time-series.

[C40] Diego Manzanas Lopez†, Sung Woo Choi, Hoang-Dung Tran, ***Taylor T. Johnson***, "NNV 2.0: The Neural Network Verification Tool," *35th International Conference on Computer Aided Verification (CAV'23)*, July 2023. [pdf]
Acceptance Rate: 25.6 percent (67 of 261)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This tool paper describes updates to the Neural Network Verification (NNV) software tool since its earlier release in 2020.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper, wrote part of software. Contribution: 25.0 percent
Keywords: neural networks, cyber-physical systems,verification,tool.

[C39] Nathaniel Hamilton†, Kyle Dunlap, ***Taylor T. Johnson***, Kerianne L. Hobbs, "Ablation Study of How Run Time Assurance Impacts the Training and Performance of Reinforcement Learning Agents," *IEEE 9th International Conference on Space Mission Challenges for Information Technology (SMC-IT'23)*, July 2023. [pdf]
Acceptance Rate: 60.0 percent (15 of 25)
Summary: This paper studies runtime assurance methods as utilized as an approach for safe reinforcement learning.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent. Distinguished Paper Award.

[C38] Preston K. Robinette†, Nathaniel Hamilton, ***Taylor T. Johnson***, "Self-Preserving Genetic Algorithms for Safe Learning in Discrete Action Spaces," *14th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS'23)*, May 2023. [pdf]
Acceptance Rate: 25.6 percent (21 of 82)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper presents a machine learning framework based on genetic algorithms for learning safe policies in discrete action spaces.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[C37] Nathaniel Hamilton†, Preston K. Robinette, ***Taylor T. Johnson***, "Training Agents to Satisfy Timed and Untimed Signal Temporal Logic Specifications with Reinforcement Learning," *20th International Conference on Software Engineering and Formal Methods (SEFM'22)*, September 2022. [pdf]
DOI: 10.1007/978-3-031-17108-6_12

Acceptance Rate: 32.3 percent (22 of 68)
Summary: This paper presents a reinforcement learning framework to train policies that satisfy signal temporal logic (STL) specifications, known as STLGym.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[C36] Serena Serbinowska†, ***Taylor T. Johnson***, "BehaVerify: Verifying Temporal Logic Specifications for Behavior Trees," *20th International Conference on Software Engineering and Formal Methods (SEFM'22)*, September 2022. [pdf]
DOI: 10.1007/978-3-031-17108-6_19
Acceptance Rate: 32.3 percent (22 of 68)
Summary: This paper presents a framework and prototype implementation in a software tool called BehaVerify to formally verification temporal logic specifications for behavior trees, as used as a planning approach for robotics systems.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 40.0 percent.

[C35] Diego Manzanas Lopez†, Patrick Musau, Nathaniel Hamilton, ***Taylor T. Johnson***, "Reachability Analysis of a General Class of Neural Ordinary Differential Equations," *20th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'22)*, September 2022. [pdf]
DOI: 10.1007/978-3-031-15839-1_15
Acceptance Rate: 43.7 percent (14 of 32)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper develops a reachability analysis framework for neural ordinary differential equations (ODEs).
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[C34] Xiaodong Yang†, Tom Yamaguchi, Hoang-Dung Tran, ***Taylor T. Johnson***, Danil Prokhorov, "Neural Network Repair with Reachability Analysis," *20th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'22)*, September 2022. [pdf]
DOI: 10.1007/978-3-031-15839-1_13
Acceptance Rate: 43.7 percent (14 of 32)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper presents a framework for repairing (retraining) neural networks until they meet safety specifications.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[C33] Tianshu Bao†, Shengyu Chen, ***Taylor T. Johnson***, Peyman Givi, Shervin Sammak, Xiaowei Jia, "Physics Guided Neural Networks for Spatio-temporal Super-resolution of Turbulent Flows," *38th Conference on Uncertainty in Artificial Intelligence (UAI'22)*, Vol: 180, p 118-128, August 2022. [pdf]
Acceptance Rate: 32.3 percent (230 of 712)
Double-Blind Review (**DBR**)
Summary: This paper presents a physics-based machine learning model for spatio-temporal dynamics in fluid flow problems.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[C32] Tianshu Bao†, Xiaowei Jia, Jacob Zwart, Jeffrey Sadler, Alison Appling, Samantha Oliver, ***Taylor T. Johnson***, "Partial Differential Equation Driven Dynamic Graph Networks for Predicting Stream Water Temperature," *21st IEEE International Conference on Data Mining (ICDM'21)*, December 2021. [pdf]
DOI: 10.1109/ICDM51629.2021.00011
Acceptance Rate: 20.0 percent (198 of 990)
Summary: This paper develops a physics-based machine learning model incorporated with graph neural networks for predicting water tempature in stream networks.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[C31] Hoang-Dung Tran†, Neelanjana Pal†, Patrick Musau†, Xiaodong Yang†, Nathaniel Hamilton†, Diego Manzanas Lopez†, Stanley Bak, ***Taylor T. Johnson***, "Robustness Verification of Semantic Segmentation Neural Networks Using Relaxed Reachability," *33rd International Conference on Computer-Aided Verification (CAV'21)*, Vol: 12759, p 263-283, July 2021. [pdf]
DOI: 10.1007/978-3-030-81685-8_12

Acceptance Rate: 27.2 percent (79 of 290)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper develops neural network verification methods for semantic segmentation problems, specifically to evaluate robustness.
Role: Mentor: helped formulate research problem, supervised students, helped write paper. Contribution: 15.0 percent. Reproducible artifact (functional, available, reusable badges): `https://zenodo.org/record/4726346`)

[C30] Xiaodong Yang†, Tomoya Yamaguchi, Hoang-Dung Tran, Bardh Hoxha, ***Taylor T. Johnson***, Danil Prokhorov, "Reachability Analysis of Deep ReLU Neural Networks using Facet-Vertex Incidence ," *24th ACM International Conference on Hybrid Systems (HSCC'21)*, p 18:1-7, May 2021. [pdf]
DOI: 10.1145/3447928.3456650
Acceptance Rate: 35.0 percent (27 of 77)
Double-Blind Review (**DBR**)
Summary: This paper develops a reachability analysis approach for neural networks with rectified linear unit (ReLU) activations utilizing the facet-vertex incidence as a data structure for representing convex polyhedra.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[C29] Hoang-Dung Tran†, Stanley Bak, Weiming Xiang, ***Taylor T. Johnson***, "Verification of Deep Convolutional Neural Networks Using ImageStars," *32nd International Conference on Computer-Aided Verification (CAV'20)*, Vol: 12224, p 18-42, July 2020. [pdf]
DOI: 10.1007/978-3-030-53288-8_2
Acceptance Rate: 27.3 percent (66 of 241)
Double-Blind Review (**DBR**)
Summary: This paper introduces a new state-space representation called ImageStars that extend star sets, for robustness verification of CNNs that allows verification scaling to realistic image classification CNNs, such as VGG16/VGG19, without significant overapproximation error.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent. Reproducible CodeOcean capsule: `https://doi.org/10.24433/CO.3351375.v1`)

[C28] Stanley Bak, Hoang-Dung Tran†, Kerianne Hobbs, ***Taylor T. Johnson***, "Improved Geometric Path Enumeration for Verifying ReLU Neural Networks," *32nd International Conference on Computer-Aided Verification (CAV'20)*, Vol: 12224, p 66-96, July 2020. [pdf]
DOI: 10.1007/978-3-030-53288-8_4
Acceptance Rate: 27.3 percent (66 of 241)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper introduces several search heuristics to improve scalability of neural network verification, in some cases improving runtime performance 10x to 1000x.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[C27] Hoang-Dung Tran†, Xiaodong Yang†, Diego Manzanas Lopez†, Patrick Musau†, Luan Viet Nguyen, Weiming Xiang, Stanley Bak, ***Taylor T. Johnson***, "NNV: The Neural Network Verification Tool for Deep Neural Networks and Learning-Enabled Cyber-Physical Systems," *32nd International Conference on Computer-Aided Verification (CAV'20)*, Vol: 12224, p 3-17, July 2020. [pdf]
DOI: 10.1007/978-3-030-53288-8_1
Acceptance Rate: 27.3 percent (66 of 241)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper describes our NNV tool for verification of neural networks and their usage within closed-loop control systems and CPS.
Role: Mentor: formulated research agenda, supervised students/postdocs, helped write paper and corresponding software tool. Contribution: 20.0 percent. Reproducible CodeOcean capsule: `https://doi.org/10.24433/CO.0221760.v1`

[C26] Shafiul Azam Chowdhury, Sohil Lal Shrestha, ***Taylor T. Johnson***, Christoph Csallner, "SLEMI: Equivalence Modulo Input (EMI) Based Mutation of CPS Models for Finding Compiler Bugs in Simulink," *42nd International Conference on Software Engineering (ICSE'20)*, p 335-346, June 2020. [pdf]
DOI: 10.1145/3377811.3380381
Acceptance Rate: 20.9 percent (129 of 617)

Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper describes an equivalence modulo input (EMI) mutation approach for finding bugs in commercial CPS design environments, such as the MathWorks' Simulink/Stateflow, and found several unknown bugs, as confirmed by the MathWorks.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[C25] Hoang-Dung Tran†, Patrick Musau†, Diego Manzanas Lopez†, Xiaodong Yang†, Luan Viet Nguyen, Weiming Xiang°, ***Taylor T. Johnson***, "Star-Based Reachability Analysis of Deep Neural Networks," *23rd International Symposium on Formal Methods (FM'19)*, Vol: 11800, p 670-686, September 2019. [pdf]
DOI: 10.1007/978-3-030-30942-8_39
Acceptance Rate: 34.1 percent (44 of 129)
Summary: This paper introduces a new state-space representation for verification of neural networks, known as star sets, which has been effective in balancing scalability and overapproximation error, improving performance on benchmarks such as ACAS-Xu without increasing overapproximation error significantly.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[C24] Hoang-Dung Tran†, Luan Viet Nguyen, Nathaniel Hamilton†, Weiming Xiang°, ***Taylor T. Johnson***, "Reachability Analysis for High-Index Linear Differential Algebraic Equations," *17th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'19)*, Vol: 11750, p 160-177, August 2019. [pdf]
DOI: 10.1007/978-3-030-29662-9_10
Acceptance Rate: 40.4 percent (17 of 42)
Summary: This paper describes reachability analysis methods for linear DAEs with index 2 or greater, which are handled through an abstraction process.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[C23] Hoang-Dung Tran†, Luan Viet Nguyen, Patrick Musau†, Weiming Xiang°, ***Taylor T. Johnson***, "Decentralized Real-Time Safety Verification for Distributed Cyber-Physical Systems," *39th International Conference on Formal Techniques for Distributed Objects (FORTE'19)*, Vol: 11535, p 261-277, June 2019. [pdf]
DOI: 10.1007/978-3-030-21759-4_15
Acceptance Rate: 42.8 percent (18 of 42)
Summary: This paper introduces a runtime verification technique for distributed CPS, where each agent locally computes its reachable states up-to some time horizon using real-time reachability (with WCET) guarantees. These are subsequently exchanged by the agents and global safety of all agents up-to the time horizon is established incorporating clock synchronization issues, such as skew and drift.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[C22] Stanley Bak, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Numerical verification of affine systems with up to a billion dimensions," *22nd ACM International Conference on Hybrid Systems (HSCC'19)*, p 23-32, April 2019. [pdf]
DOI: 10.1145/3302504.3311792
Acceptance Rate: 23.5 percent (21 of 89)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper uses several techniques to address the state-space explosion problem in reachability analysis of very high dimensional ($\mathbb{R}^{10^9}$) linear systems.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[C21] Shafiul Chowdhury†, Soumik Mohian, Sidharth Mehra, Siddhant Gawsane, ***Taylor T. Johnson***, Christoph Csallner, "Automatically Finding Bugs in a Commercial Cyber-Physical System Development Tool Chain With SLforge," *40th International Conference on Software Engineering (ICSE'18)*, p 981-992, May 2018. [pdf]
DOI: 10.1145/3180155.3180231
Acceptance Rate: 20.9 percent (105 of 502)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)

Summary: This paper presents a randomized differential testing framework for finding bugs in CPS design frameworks, such as the MathWorks' Simulink/Stateflow, which successfully found several novel bugs, as confirmed by the MathWorks.
Role: Mentor: formulated research project, wrote prototype software, helped write paper. Contribution: 25.0 percent. Related software tools SLForge and CyFuzz [S6]

[C20] Luan Viet Nguyen†, James Kapinski, Xiaoqing Jin, Jyotirmoy Deshmukh, ***Taylor T. Johnson***, "Hyperproperties of real-valued signals," *15th ACM-IEEE International Conference on Formal Methods (MEMOCODE'17)*, p 104-113, September 2017. [pdf]
DOI: 10.1145/3127041.3127058
Acceptance Rate: 31.2 percent (15 of 48)
Summary: This paper introduced hyperproperties for real-valued signals, generalizing signal temporal logic (STL) into a variant supporting hyperproperties, known as HyperSTL. The semantics are defined so that different traces are synchronized in continuous (real) time, which has led to some debate in the community, but subsequent generalizations define asynchronous semantics. Of note, this paper is one of the top 5 most cited publications in MEMOCODE'15 to MEMOCODE'19 according to Google Scholar.
Role: Mentor: formulated research project, supervised students, helped write paper. Contribution: 40.0 percent.

[C19] Andrew Sogokon°, Paul Jackson, ***Taylor T. Johnson***, "Verifying safety and persistence properties of hybrid systems using flowpipes and continuous invariants," *9th NASA Formal Methods Symposium (NFM'17)*, Vol: 10227, p 194-211, May 2017. [pdf]
DOI: 10.1007/978-3-319-57288-8_14
Acceptance Rate: 38.3 percent (23 of 60)
Summary: This paper established proof rules for verifying safety and persistence specifications in hybrid systems with automatically computed invariants found through reachability analysis.
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[C18] Luan Viet Nguyen†, James Kapinski, Xiaoqing Jin, Jyotirmoy Deshmukh, Ken Butts, ***Taylor T. Johnson***, "Abnormal data classification using time-frequency temporal logic," *20th International Conference on Hybrid Systems: Computation and Control (HSCC'17)*, p 237-242, April 2017. [pdf]
DOI: 10.1145/3049797.3049809
Acceptance Rate: 38.1 percent (29 of 76)
Double-Blind Review (**DBR**)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper introduces a data classification approach with a novel form of time-frequency temporal logic, allowing for specifications over both time and frequency domains, and was applied to control system specifications in the automotive domain.
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[C17] Umair Siddique, Khaza Anuaral Hoque°, ***Taylor T. Johnson***, "Formal Specification and Dependability Analysis of Optical Communication Networks," *Design, Automation, and Test in Europe (DATE'17)*, p 1564-1569, March 2017. [pdf]
DOI: 10.23919/DATE.2017.7927239
Acceptance Rate: 24.3 percent (193 of 794)
Summary: This paper describes dependability specifications for a type of optical communication networks, and analyzes these specifications using PRISM.
Role: Mentor: supervised postdocs, helped write paper. Contribution: 33.0 percent.

[C16] Andrew Sogokon°, Khalil Ghorbal, ***Taylor T. Johnson***, "Decoupling Abstractions of Non-linear Ordinary Differential Equations," *International Symposium on Formal Methods (FM'16)*, Vol: 9995, p 628-644, November 2016. [pdf]
DOI: 10.1007/978-3-319-48989-6_38
Acceptance Rate: 28.4 percent (43 of 151)
Summary: This paper introduces an abstraction framework to decouple dependent variables in nonlinear ODEs, so that verification can be performed separately on these decoupled and smaller dimensional ODEs, which typically is easier than trying to verify the original coupled, higher-dimensional system.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[C15] Muhammad Usama Sardar, Nida Afaq, Khaza Anuaral Hoque°, ***Taylor T. Johnson***, Osman Hasan, "Probabilistic formal verification of the SATS concept of operation," *8th NASA Formal Methods Symposium (NFM'16)*, Vol: 9690, p 191-205, June 2016. [pdf]
DOI: 10.1007/978-3-319-40648-0_15
Acceptance Rate: 37.2 percent (19 of 51)
Summary: This paper described a probabilistic model and its verification using PRISM for the Small Aircraft Transportation System (SATS) landing protocol.
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[C14] Stanley Bak, Sergiy Bogomolov, Thomas A. Henzinger, ***Taylor T. Johnson***, Pradyot Prakash, "Scalable Static Hybridization Methods for Analysis of Nonlinear Systems," *19th ACM International Conference on Hybrid Systems: Computation and Control (HSCC'16)*, p 155-164, April 2016. [pdf]
DOI: 10.1145/2883817.2883837
Acceptance Rate: 43.0 percent (28 of 65)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper develops hybridization methods for reachability analysis of nonlinear dynamical systems, which transform nonlinear ODEs into a simpler class of ODEs (such as linear ones) at either different regions in time or space. Of note, this paper is one of the 24 most cited papers published in HSCC'15 to HSCC'19, according to Google Scholar.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 33.0 percent. **Best Software Repeatability Evaluation Award**

[C13] Stanley Bak, ***Taylor T. Johnson***, "Periodically-Scheduled Controller Analysis using Hybrid Systems Reachability and Continuization," *36th IEEE Real-Time Systems Symposium (RTSS'15)*, p 195-205, December 2015. [pdf]
DOI: 10.1109/RTSS.2015.26
Acceptance Rate: 22.5 percent (34 of 151)
Summary: This paper develops continuization abstractions that transform certain hybrid or switched systems with periodic, time-dependent switching, into purely continuous systems.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 50.0 percent.

[C12] Luan Viet Nguyen†, Christian Schilling, Sergiy Bogomolov, ***Taylor T. Johnson***, "Runtime Verification for Hybrid Analysis Tools," *15th International Conference on Runtime Verification (RV'15)*, Vol: 9333, p 281-286, November 2015. [pdf]
DOI: 10.1007/978-3-319-23820-3_19
Acceptance Rate: 46.6 percent (21 of 45)
Summary: This paper introduced a randomized differential testing approach for hybrid systems verification tools, by randomly generating hybrid automata and comparing the results of several tools including SpaceEx, Flow*, and dReach.
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 50.0 percent.

[C11] ***Taylor T. Johnson***, Stanley Bak, Steven Drager, "Cyber-Physical Specification Mismatch Identification with Dynamic Analysis," *ACM/IEEE 6th International Conference on Cyber-Physical Systems (ICCPS'15)*, p 208-217, April 2015. [pdf]
DOI: 10.1145/2735960.2735979
Acceptance Rate: 27.4 percent (25 of 91)
Summary: This paper introduced cyber-physical specification mismatches, where specifications defined for cyber and physical components may be more or less expressive than those in the other domain, and developed invariant invariance and specification inference techniques to automatically find specifications and check if there are mismatches, using the Hynger tool we developed.
Role: Mentor: formulated research project, wrote prototype software, wrote majority of paper. Contribution: 90.0 percent. Software Tool [S3]: `http://verivital.com/hynger/`

[C10] Stanley Bak, Sergiy Bogomolov, ***Taylor T. Johnson***, "HyST: A Source Transformation and Translation Tool for Hybrid Automaton Models," *18th International Conference on Hybrid Systems: Computation and Control (HSCC'15)*, p 128-133, April 2015. [pdf]
DOI: 10.1145/2728606.2728630
Acceptance Rate: 39.4 percent (30 of 76)
Repeatability/Artifact Evaluation Passed (**RAE**)
Summary: This paper describes our HyST tool, which implements source-to-source model transformation

passes, such as abstractions, and aimed to help the community shift toward using standardized representations of hybrid automaton models. Of note, this paper is one of the top 4 most cited papers from HSCC'15 to HSCC'19, according to Google Scholar.
Role: Author/Collaborator: formulated research project, wrote prototype software, helped write paper. Contribution: 50.0 percent. Software Tool [S5]: `http://verivital.com/hyst/`

[C9] Stanley Bak, ***Taylor T. Johnson***, Marco Caccamo, Lui Sha, "Real-Time Reachability for Verified Simplex Design," *35th IEEE Real-Time Systems Symposium (RTSS'14)*, p 138-148, December 2014. [pdf]
DOI: 10.1109/RTSS.2014.21
Acceptance Rate: 21.4 percent (33 of 154)
Summary: This paper presents the first real-time reachability algorithm for hybrid systems, which can be implemented with WCET guarantees. It is used in a Simplex architecture context to reduce the conservatism of the guaranteed safe Simplex controller.
Role: Collaborator: wrote prototype software, helped write paper. Contribution: 45.0 percent. Software Tool [S4]: `https://github.com/verivital/rtreach`

[C8] ***Taylor T. Johnson***, Sayan Mitra, "Anonymized Reachability of Hybrid Automata Networks," *12th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'14)*, Vol: 8711, p 130-145, September 2014. [pdf]
DOI: 10.1007/978-3-319-10512-3_10
Acceptance Rate: 47.2 percent (17 of 36)
Summary: This paper presents reachability analysis methods for networks of hybrid automata, exploiting symmetries by symbolically abstracting agent identifiers, making individual agents anonymous.
Role: Author/Collaborator: formulated research project, wrote prototype software, wrote paper. Contribution: 90.0 percent.

[C7] Sergiy Bogomolov, Alexandre Donzé, Goran Frehse, Radu Grosu, ***Taylor T. Johnson***, Hamed Ladan, Andreas Podelski, Martin Wehrle, "Abstraction-based guided search for hybrid systems," *20th International SPIN Symposium on Model Checking of Software (SPIN'13)*, p 117-134, 2013. [pdf]
Acceptance Rate: 50.0 percent (20 of 40)
Summary: This paper described an abstraction approach for hybrid systems verification, where an initial highly abstract (overapproximate) verification run is used to guide subsequent refined, less abstract verification runs, to eliminate spurious counterexamples, in a form of counterexample guided abstraction refinement (CEGAR) with the degree of abstraction defined over parameters used in the analysis, such as the sampling time.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 33.0 percent.

[C6] Parasara Sridhar Duggirala, ***Taylor T. Johnson***, Adam Zimmerman, Sayan Mitra, "Static and dynamic analysis of timed distributed traces," *33rd IEEE Real-Time Systems Symposium (RTSS'12)*, p 173-182, December 2012. [pdf]
DOI: 10.1109/RTSS.2012.69
Acceptance Rate: 22.2 percent (35 of 157)
Summary: This paper describes static and dynamic trace analysis approaches to determine whether global predicates are satisfying from observations of individual agents that have imperfectly synchronized clocks.
Role: Author/Collaborator: helped write prototype software, performed data analysis, helped write paper. Contribution: 40.0 percent.

[C5] ***Taylor T. Johnson***, Jeremy Green, Sayan Mitra, Rachel Dudley, R. Scott Erwin, "Satellite rendezvous and conjunction avoidance: Case studies in verification of nonlinear hybrid systems," *International Symposium on Formal Methods (FM'12)*, Vol: 7436, p 252-266, August 2012. [pdf]
DOI: 10.1007/978-3-642-32759-9_22
Acceptance Rate: 21.2 percent (28 of 132)
Summary: This paper introduced hybridization-based abstractions for the verification of nonlinear hybrid systems, particularly applied to satellite aerospace problems, such as rendezvous and collision (conjunction) avoidance.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 80.0 percent.

[C4] ***Taylor T. Johnson***, Sayan Mitra, "A small model theorem for rectangular hybrid automata networks," *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'12), Vol: 7273, p 18-34, June 2012. [pdf]
DOI: 10.1007/978-3-642-30793-5_2
Acceptance Rate: 38.0 percent (16 of 42)
Summary: This paper introduced a small model theorem for networks of hybrid automata with rectangular (interval) dynamics, allowing automatic verification of arbitrarily large networks of automata using an SMT-based approach within our Passel verification tool.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 75.0 percent. **Best Paper Award**. Top 1 of 155 Submissions Across Three Conferences

[C3] ***Taylor T. Johnson***, Sayan Mitra, "Parameterized verification of distributed cyber-physical systems: An aircraft landing protocol case study," *3rd ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS'12)*, p 161-170, April 2012. [pdf]
DOI: 10.1109/ICCPS.2012.24
Acceptance Rate: 34.1 percent (14 of 41)
Summary: In this paper, we performed parameterized verification of the Small Aircraft Transportation System (SATS) aircraft landing protocol, modeling individual aircraft as timed automata.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 90.0 percent.

[C2] ***Taylor T. Johnson***, Sayan Mitra, "Safe flocking in spite of actuator faults," *Stabilization, Safety, and Security of Distributed Systems (SSS'10)*, Vol: 6366, p 588-602, September 2010. [pdf]
DOI: 10.1007/978-3-642-16023-3_45
Acceptance Rate: 43.3 percent (39 of 90)
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 90.0 percent.

[C1] ***Taylor T. Johnson***, Sayan Mitra, Karthik Manamcheri, "Safe and stabilizing distributed cellular flows," *30th IEEE International Distributed Computing Systems (ICDCS'10)*, p 577-586, June 2010. [pdf]
DOI: 10.1109/ICDCS.2010.49
Acceptance Rate: 14.3 percent (84 of 585)
Summary: This paper introduces self-stabilizing distributed algorithms for ensuring safety and progress in cellular flows, where fixed partitions of a geometric workspace (such as conveyors) move agents from sources to destinations.
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 80.0 percent.

BOOK CHAPTERS

Acceptance based on peer review of full papers.

[BC2] Xiaodong Yang, Tomoya Yamaguchi, Bardh Hoxha, Danil Prokhorov, ***Taylor T. Johnson***, "Metacognition with Neural Network Verification and Repair using Veritex," *Metacognitive Artificial Intelligence*, February 2025. [pdf]
Summary: This paper presents a neural network verification and framework from the perspective of metacognitive AI, namely that violating specifications and repairing policies to satisfy them is an error-correcting approach to learning.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent
Keywords: neural network verification, neural network repair, metacognitive AI.

[BC1] Weiming Xiang°, Diego Manzanas Lopez†, Patrick Musau†, ***Taylor T. Johnson***, "Reachable Set Estimation and Verification for Neural Network Models of Nonlinear Dynamic Systems," *Safe, Autonomous and Intelligent Vehicles, Series on Unmanned Systems Technologies, Springer*, p 123-144, 2019. [pdf]
DOI: 10.1007/978-3-319-97301-2_7
Summary: This paper describes reachability analysis methods for neural network models of nonlinear dynamical systems, using an early layer-by-layer propagation approach we developed for verification of neural networks.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent. Editors: Huafeng Yu, Xin Li, Richard Murray, Claire J. Tomlin, Ramesh S

OTHER FULLY REFEREED CONFERENCE PROCEEDINGS PAPERS

Acceptance based on peer review of full papers.

[OC18] Alessandro Abate, Matthias Althoff, Lei Bu, Gidon Ernst, Goran Frehse, Luca Geretti, ***Taylor T. Johnson***, Claudio Menghi, Stefan Mitsch, Stefan Schupp, Sadegh Soudjani , "The ARCH-COMP Friendly Verification Competition for Continuous and Hybrid Systems," *TOOLympics Challenge 2023 and TOOLympics 2024*, Vol: 14550, p 1-37, October 2024. [pdf]
DOI: 10.1007/978-3-031-67695-6_1
Summary: This paper summarizes the status of the ARCH-COMP competition for verification of hybrid and continuous systems since its creation in 2017.
Role: Author: helped formulate research objectives, wrote portion of paper. Contribution: 10.0 percent
Keywords: formal verification, hybrid systems, competition.

[OC17] Neelanjana Pal, Seojin Lee, Taylor T Johnson, "Benchmark: formal verification of semantic segmentation neural networks," *1st International Conference on Bridging the Gap between AI and Reality (AISoLA'23)*, October 2023. [pdf]
DOI: 10.1007/978-3-031-46002-9_20
Summary: This paper describes a semantic segmentation benchmark for neural network verification.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent
Keywords: Semantic Segmentation,Adversarial Attack,Benchmark,Reachability,Robustness.

[OC16] Preston K Robinette, Diego Manzanas Lopez, Taylor T Johnson, "Benchmark: neural network malware classification," *1st International Conference on Bridging the Gap between AI and Reality (AISoLA'23)*, October 2023. [pdf]
DOI: 10.1007/978-3-031-46002-9_17
Summary: This paper presents a benchmark for neural network verification on malware classifiers.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent
Keywords: malware,verification,benchmark.

[OC15] Diego Manzanas Lopez, Taylor T Johnson, "Empirical analysis of benchmark generation for the verification of neural network image classifiers," *1st International Conference on Bridging the Gap between AI and Reality (AISoLA'23)*, October 2023. [pdf]
DOI: 10.1007/978-3-031-46002-9_21
Summary: This paper presents benchmarks and benchmark generation approaches for medical imaging datasets to be used for characterizing neural network verification.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent
Keywords: Formal Verification,Medical Imaging,Deep Learning,Reachability Analysis.

[OC14] Preston Robinette†, Benjamin Heiner, Umberto Ravaioli, Nathaniel Hamilton†, ***Taylor T. Johnson***, Kerianne Hobbs, "Reinforcement Learning Heuristics for Aerospace Control Systems," *IEEE Aerospace Conference*, March 2022. [pdf]
DOI: 10.1109/AERO53065.2022.9843224
Summary: This paper studies reinforcement learning methods for different aerospace control systems problems, such as satellite rendezvous and aircraft rejoin.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[OC13] Patrick Musau†, Nathaniel Hamilton†, Diego Manzanas Lopez†, ***Taylor T. Johnson***, "Zero-Shot Policy Transfer in Autonomous Racing: Reinforcement Learning versus Imitation Learning," *IEEE International Conference on Assured Autonomy (ICAA'22)*, March 2022. [pdf]
DOI: 10.1109/ICAA52185.2022.00011
Acceptance Rate: 57.1 percent (16 of 28)
Summary: This paper investigates transfer learning in the context of autonomous racing, specifically comparing reinforcement learning and imitation learning from experts.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[OC12] Patrick Musau†, Nathaniel Hamilton†, Diego Manzanas Lopez†, Preston Robinette†, ***Taylor T. Johnson***, "On Using Real-Time Reachability for the Safety Assurance of Machine Learning Controllers," *IEEE International Conference on Assured Autonomy (ICAA'22)*, March 2022. [pdf]
DOI: 10.1109/ICAA52185.2022.00010
Acceptance Rate: 57.1 percent (16 of 28)
Summary: This paper studies real-time reachability for assuring safety in autonomous cyber-physical systems (CPS).

Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[OC11] Joel A. Rosenfeld, Rushikesh Kamalapurkar, L. Forest Gruss, ***Taylor T. Johnson***, "On Occupation Kernels, Liouville Operators, and Dynamic Mode Decomposition," *2021 American Control Conference (ACC)*, May 2021. [pdf]
DOI: 10.23919/ACC50511.2021.9483121
Summary: This paper develops a dynamic mode decomposition (DMD) approach based on the Liouville operator.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[OC10] Omar Ali Beg, Ajay P. Yadav, ***Taylor T. Johnson***, Ali Davoudi, "Formal Online Resiliency Monitoring in Microgrids," *IEEE 2020 Resilience Week (RWS)*, p 99-105, October 2020. [pdf]
DOI: 10.1109/RWS50334.2020.9241272
Summary: This paper develops a formal logic approach for monitoring resiliency specifications in microgrids.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[OC9] Joel Rosenfeld°, Rushi Kamalapurkar, Ben Russo, ***Taylor T. Johnson***, "Occupation Kernels and Densely Defined Liouville Operators for System Identification," *IEEE 58th Conference on Decision and Control (CDC'19)*, p 6455-6460, December 2019. [pdf]
DOI: 10.1109/CDC40024.2019.9029337
Acceptance Rate: 59.5 percent (1155 of 1938)
Summary: This paper presents a system identification framework using occupation kernels and Liouville operators.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[OC8] Weiming Xiang°, Hoang-Dung Tran†, Joel Rosenfeld°, ***Taylor T. Johnson***, "Reachable Set Estimation and Safety Verification for Piecewise Linear Systems with Neural Network Controllers," *American Control Conference (ACC'18)*, p 1574-1579, June 2018. [pdf]
DOI: 10.23919/ACC.2018.8431048
Acceptance Rate: 66.9 percent (1087 of 1623)
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[OC7] Luan Viet Nguyen†, Bardh Hoxha, ***Taylor T. Johnson***, Georgios Fainekos, "Mission Planning for Multiple Vehicles with Temporal Specifications using UxAS," *6th IFAC Analysis and Design of Hybrid Systems (ADHS'18)*, Vol: 51, No: 16, p 67-72, July 2018. [pdf]
DOI: 10.1016/j.ifacol.2018.08.012
Acceptance Rate: 69.4 percent (50 of 72)
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[OC6] Hoang-Dung Tran†, Stanley Bak, ***Taylor T. Johnson***, "Reachability Analysis for One Dimensional Linear Parabolic Equations," *6th IFAC Analysis and Design of Hybrid Systems (ADHS'18)*, Vol: 51, No: 16, p 133-138, July 2018. [pdf]
DOI: 10.1016/j.ifacol.2018.08.023
Acceptance Rate: 69.4 percent (50 of 72)
Summary: This paper introduces reachability analysis methods for a special class of partial differential equations (PDEs), specifically one-dimensional parabolic equations.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[OC5] Omar Beg†, Luan Viet Nguyen†, Ali Davoudi, ***Taylor T. Johnson***, "Computer-Aided Formal Verification of Power Electronics Circuits," *VDE Frontiers in Analog Computer Aided Design (FAC'17)*, p 21-26, July 2017. [pdf]
Role: Mentor: formulated research problem, supervised students, helped write paper. Contribution: 33.0 percent.

[OC4] Weiming Xiang°, ***Taylor T. Johnson***, Hoang-Dung Tran†, "On reachable set estimation for discrete-time switched linear systems under arbitrary switching," *American Control Conference (ACC'17)*, p 4534-4539, May 2017. [pdf]
DOI: 10.23919/ACC.2017.7963654
Acceptance Rate: 64.2 percent (944 of 1469)
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[OC3] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Reachable set estimation and control for switched linear systems with dwell-time restriction," *55th IEEE Conference on Decision and Control*

(CDC'16), p 7246-7251, December 2016. [pdf]
DOI: 10.1109/CDC.2016.7799387
Acceptance Rate: 59.5 percent (1242 of 2086)
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[OC2] 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 Conference on Control Applications (CCA'16)*, p 1024-1029, September 2016. [pdf]
DOI: 10.1109/CCA.2016.7587948
Role: Author: data analysis, wrote majority of paper. Contribution: 50.0 percent.

[OC1] ***Taylor T. Johnson***, Sayan Mitra, Cédric Langbort, "Stability of Digitally Interconnected Linear Systems," *50th IEEE Conference on Decision and Control (CDC'11)*, p 2687-2692, December 2011. [pdf]
DOI: 10.1109/CDC.2011.6161264
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 75.0 percent.

LIGHTLY REFEREED CONFERENCE PROCEEDINGS PAPERS

Acceptance based on peer review of abstracts or short papers.

[LC9] Krishna Muvva, Justin M. Bradley, Marilyn Wolf, ***Taylor T. Johnson***, "Assuring Learning-Enabled Components in Small Unmanned Aircraft Systems," *AIAA Scitech 2021 Forum*, January 2021. [pdf]
DOI: 10.2514/6.2021-0994
Summary: This paper presents a case study of assurance on unmanned aerial vehicles with various machine learning components.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[LC8] Diego Manzanas Lopez†, ***Taylor T. Johnson***, Hoang-Dung Tran, Stanley Bak, Xin Chen, Kerianne L. Hobbs, "Verification of Neural Network Compression of ACAS Xu Lookup Tables with Star Set Reachability," *AIAA Scitech 2021 Forum*, January 2021. [pdf]
DOI: 10.2514/6.2021-0995
Summary: This paper studies ACAS Xu neural network compression methods, particularly aiming to get torward closed-loop verification.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[LC7] Nathaniel Hamilton†, Lena Schlemmer, Christopher Menart, Chad Waddington, Todd Jenkins, ***Taylor T. Johnson***, "Sonic to knuckles: evaluations on transfer reinforcement learning," *SPIE Defense + Commercial Sensing - Unmanned Systems Technology XXII*, Vol: 11425, April 2020. [pdf]
DOI: 10.1117/12.2559546
Summary: This paper presents an empirical evaluation of transfer reinforcement learning approaches.
Role: Mentor: supervised students, helped write paper. Contribution: 5.0 percent.

[LC6] ***Taylor T. Johnson***, Raghunath Gannamaraju, and Sebastian Fischmeister, "A survey of electrical and electronic (e/e) notifications for motor vehicles," *24th International Technical Conference on the Enhanced Safety of Vehicles (ESV'15)*, p 1-15, 2015. [pdf]
Role: Author/Collaborator: formulated research project, wrote prototype software, helped write paper. Contribution: 75.0 percent.

[LC5] Leonardo Bobadilla, ***Taylor T. Johnson***, Amy LaViers, Umer Huzaifa, "Verified Planar Formation Control Algorithms by Composition of Primitives," *AIAA Science and Technology Forum and Exposition (SciTech'15)*, January 2015. [pdf]
DOI: 10.2514/6.2015-1541
Role: Author/Collaborator: formulated research project, wrote prototype software, helped write paper. Contribution: 50.0 percent.

[LC4] ***Taylor T. Johnson***, Sayan Mitra, "Invariant Synthesis for Verification of Parameterized Cyber-Physical Systems with Applications to Aerospace Systems," *AIAA Infotech at Aerospace*, p 1-16, August 2013. [pdf]
DOI: 10.2514/6.2013-4811
Role: Author. Contribution: 90.0 percent.

[LC3] Shamina Shahrin Hossain*, Sairaj Dhople, ***Taylor T. Johnson***, "Reachability Analysis of Closed Loop Switching Power Converters," *IEEE Power and Energy Conference at Illinois (PECI'13)*, p 130-134, February 2013. [pdf]
DOI: 10.1109/PECI.2013.6506047
Role: Author/Mentor: formulated research project, wrote prototype software, mentored students, helped write paper. Contribution: 80.0 percent.

[LC2] ***Taylor T. Johnson***, Zhihao Hong*, Akash Kapoor*, "Design Verification Methods for Switching Power Converters," *IEEE Power and Energy Conference at Illinois (PECI'12)*, p 1-6, February 2012. [pdf]
DOI: 10.1109/PECI.2012.6184587
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 80.0 percent.

[LC1] ***Taylor T. Johnson***, Albert E. Hoefel, "Turbo-alternator stalling protection using available-power estimate," *IEEE Power and Energy Conference at Illinois (PECI'11)*, p 1-6, February 2011. [pdf]
DOI: 10.1109/PECI.2011.5740501
Role: Author: primary author, wrote prototype software, performed analysis, wrote majority of paper. Contribution: 90.0 percent. **Best Paper Award**

REFEREED WORKSHOP PROCEEDINGS PAPERS

Acceptance based on peer review of full papers.

[W31] Serena Serbinowska†, Preston Robinette†, Gabor Karsai, ***Taylor T. Johnson***, "Formalizing Stateful Behavior Trees," *6th International Workshop on Formal Methods for Autonomous Systems (FMAS'24)*, November 2024. [pdf]
DOI: 10.4204/EPTCS.411.14
Acceptance Rate: 73.6 percent (14 of 19)
Summary: This paper formalizes the syntax and semantics of a class of behavior trees we call stateful behavior trees, and presents formal verification results.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent
Keywords: behavior trees, syntax and semantics, formal verification. Best paper award.

[W30] Serena Serbinowska†, Nicholas Potteiger, Anne Tumlin†, ***Taylor T. Johnson***, "Verification of Behavior Trees with Contingency Monitors," *6th International Workshop on Formal Methods for Autonomous Systems (FMAS'24)*, November 2024. [pdf]
DOI: 10.4204/EPTCS.411.4
Acceptance Rate: 73.6 percent (14 of 19)
Summary: This paper presents a formal verification approach for behavior trees with applications in robotics, particularly for runtime verification.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent
Keywords: runtime verification, behavior trees, formal verification.

[W29] Neelanjana Pal†, ***Taylor T. Johnson***, "Formal Verification of Long Short-Term Memory based Audio Classifiers: A Star based Approach," *5th International Workshop on Formal Methods for Autonomous Systems (FMAS'23)*, November 2023. [pdf]
DOI: 10.4204/EPTCS.395.12
Acceptance Rate: 60.0 percent (15 of 25)
Summary: This paper presents verification for LSTM models as applied on audio using our NNV software tool.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent
Keywords: formal verification,lstm,robustness.

[W28] Sergiy Bogomolov, ***Taylor T. Johnson***, Diego Manzanas Lopez, Patrick Musau, Paulius Stankaitis, "Online Reachability Analysis and Space Convexification for Autonomous Racing," *5th International Workshop on Formal Methods for Autonomous Systems (FMAS'23)*, November 2023. [pdf]
DOI: 10.4204/EPTCS.395.7
Acceptance Rate: 60.0 percent (15 of 25)
Summary: This paper presents a runtime verification framework using online reachability, as applied in autonomous driving scenarios.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 15.0 percent.

[W27] Diego Manzanas Lopez†, Patrick Musau†, Nathaniel Hamilton†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Case Study: Safety Verification of an Unmanned Underwater Vehicle," *IEEE Workshop on Assured Autonomous Systems (WAAS'20), Co-located with the 41st IEEE Symposium on Security and Privacy (Oakland)*, 2020. [pdf]
Summary: This paper presents safety verification approaches for uncrewed underwater vehicles.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[W26] Charles Hartsell, Nagabhushan Mahadevan, Shreyas Ramakrishna, Abhishek Dubey, Theodore Bapty, ***Taylor T. Johnson***, Xenofon Koutsoukos, Janos Sztipanovits, and Gabor Karsai, "CPS Design with Learning-Enabled Components: A Case Study," *30th International Workshop on Rapid System Prototyping (RSP'19)*, p 57-63, October 2019. [pdf]
DOI: 10.1145/3339985.3358491
Summary: This paper presents an overview of the application of the ALC toolchain for design and assurance of autonomous cyber-physical systems.
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[W25] Hoang-Dung Tran†, Luan V. Nguyen, Patrick Musau†, Weiming Xiang°, ***Taylor T. Johnson***, "Decentralized real-time safety verification for distributed cyber-physical systems," *3rd International Workshop on Methods and Tools for Distributed Hybrid Systems (DHS'19)*, 2019. [pdf]
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W24] Hoang-Dung Tran†, Feiyang Cai, Diego Manzanas Lopez†, Patrick Musau†, ***Taylor T. Johnson***, Xenofon Koutsoukos, "Safety Verification in Reinforcement Learning Control," *2nd Workshop on Formal Methods for ML-Enabled Autonomous Systems (FoMLAS'19)*, 2019. [pdf]
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W23] Hoang-Dung Tran†, Patrick Musau†, Diego Manzanas Lopez†, Xiaodong Yang†, Luan Viet Nguyen, Weiming Xiang, ***Taylor T. Johnson***, "Parallelizable reachability analysis algorithms for feed-forward neural networks," *7th IEEE/ACM International Conference on Formal Methods in Software Engineering (FormaliSE'19)*, p 31-40, May 2019. [pdf]
DOI: 10.1109/FormaliSE.2019.00012
Acceptance Rate: 32.5 percent (13 of 40)
Summary: This paper shows how to parallelize reachability analysis methods used in the verification of neural networks, enabling runtime performance improvements of 10x to 100x.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W22] Diego Manzanas Lopez†, Patrick Musau†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Verification of closed-loop systems with neural network controllers," *EPiC Series in Computing 61, 6th Applied Verification for Continuous and Hybrid Systems (ARCH'19)*, Vol: 61, p 201-210, May 2019. [pdf]
DOI: 10.29007/btv1
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W21] Tamas Kecskes, Patrik Meijer, ***Taylor T. Johnson***, Marcus Lucas, "Demo: A Design Studio for Verification Tools," *1st Workshop on Design Automation for CPS and IoT (DESTION'19)*, p 60-61, April 2019. [pdf]
DOI: 10.1145/3313151.3314057
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[W20] Charles Hartsell, Nagabhushan Mahadevan, Shreyas Ramakrishna, Abhishek Dubey, Theodore Bapty, ***Taylor T. Johnson***, Xenofon Koutsoukos, Janos Sztipanovits, Gabor Karsai, "Model-based design for CPS with learning-enabled components," *1st Workshop on Design Automation for CPS and IoT (DESTION'19)*, p 1-9, April 2019. [pdf]
DOI: 10.1145/3313151.3313166
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 10.0 percent.

[W19] Weiming Xiang°, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Specification-Guided Safety Verification for Feedforward Neural Networks," *2nd Verification of Neural Networks (VNN'19), AAAI 2019 Spring Symposium*, 2019. [pdf]
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W18] Weiming Xiang°, Xiaodong Yang†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Reachability Analysis and Safety Verification for Neural Network Control Systems," *2nd Verification of Neural Networks*

(VNN'19), AAAI 2019 Spring Symposium, 2019. [pdf]
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W17] Patrick Musau†, Diego Manzanas Lopez†, Hoang-Dung Tran†, ***Taylor T. Johnson***, "Differential Algebraic Equations (DAEs) with Varying Index (Benchmark Proposal)," *5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'18)*, Vol: 54, p 174-184, September 2018. [pdf]
DOI: 10.29007/4gj7
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W16] Patrick Musau†, ***Taylor T. Johnson***, "Continuous-Time Recurrent Neural Networks (CTRNNs) (Benchmark Proposal)," *5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'18)*, Vol: 54, p 196-207, September 2018. [pdf]
DOI: 10.29007/6czp
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W15] Hoang-Dung Tran†, Tianshu Bao†, ***Taylor T. Johnson***, "Discrete-Space Analysis of Partial Differential Equations (PDEs) (Benchmark Proposal)," *5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'18)*, Vol: 54, p 185-195, September 2018. [pdf]
DOI: 10.29007/fvpp
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[W14] Shafiul Chowdhury†, Lina Sera Varghese, Soumik Mohian, ***Taylor T. Johnson***, Christoph Csallner, "A Curated Corpus of Simulink Models for Model-based Empirical Studies," *4th International Workshop on Software Engineering for Smart Cyber-Physical Systems (SEsCPS '18)*, p 45-48, May 2018. [pdf]
DOI: 10.1145/3196478.3196484
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[W13] ***Taylor T. Johnson***, "Reusable and Understandable Formal Verification for Cyber-Physical Systems," *1st International Workshop on Formal Approaches to Explainable VERification (FEVER'17)*, 2017. [pdf]
Role: Author: wrote paper. Contribution: 100.0 percent.

[W12] Hoang-Dung Tran†, Luan Viet Nguyen†, Weiming Xiang°, ***Taylor T. Johnson***, "Distributed Autonomous Systems (Benchmark Proposal)," *4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'17)*, Vol: 48, p 33-43, June 2017. [pdf]
DOI: 10.29007/slz2
Role: Mentor: formulated research problem, supervised students, helped write paper. Contribution: 33.0 percent.

[W11] Omar Beg†, Ali Davoudi, ***Taylor T. Johnson***, "Reachability Analysis of Transformer-Isolated DC-DC Converters (Benchmark Proposal)," *4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'17)*, Vol: 48, p 52-64, June 2017. [pdf]
DOI: 10.29007/8xk7
Role: Mentor: formulated research problem, supervised students, helped write paper. Contribution: 33.0 percent.

[W10] Shafiul Chowdhury†, ***Taylor T. Johnson***, Christoph Csallner, "CyFuzz: A Differential Testing Framework for Cyber-Physical Systems Development Environments," *6th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems (CyPhy'16)*, Vol: 10107, p 46-60, October 2016. [pdf]
DOI: 10.1007/978-3-319-51738-4_4
Acceptance Rate: 60.0 percent (9 of 15)
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[W9] Hoang-Dung Tran†, Luan Viet Nguyen†, ***Taylor T. Johnson***, "Large-Scale Linear Systems from Order-Reduction (Benchmark Proposal)," *3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'16)*, Vol: 43, p 60-67, 2016. [pdf]
DOI: 10.29007/xk7x
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 40.0 percent.

[W8] Andrew Sogokon°, Khalil Ghorbal, ***Taylor T. Johnson***, "Non-linear Continuous Systems for Safety Verification (Benchmark Proposal)," *3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'16)*, Vol: 43, p 42-51, 2016. [pdf]
DOI: 10.29007/w94n
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[W7] Omar Beg†, Ali Davoudi, ***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'16)*, Vol: 43, p 27-35, 2016. [pdf]
DOI: 10.29007/x211
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 33.0 percent.

[W6] Luan Viet Nguyen†, Djordje Maksimovic, ***Taylor T. Johnson***, Andreas Veneris, "Quantified Bounded Model Checking for Rectangular Hybrid Automata," *9th International Workshop on Constraints in Formal Verification (CFV'15)*, 2015. [pdf]
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 75.0 percent.

[W5] Stanley Bak, Sergiy Bogomolov, ***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'15)*, 2015. [pdf]
Role: Author/Collaborator: formulated research project, wrote prototype software, helped write paper. Contribution: 50.0 percent.

[W4] Hoang-Dung Tran†, Luan Viet Nguyen†, ***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'15)*, Vol: 34, p 89-97, 2015. [pdf]
DOI: 10.29007/6dcf
Role: Mentor: formulated research problem, supervised students/postdocs, helped write paper. Contribution: 66.0 percent.

[W3] Stanley Bak, Sergiy Bogomolov, Marius Greitschus, ***Taylor T. Johnson***, "Benchmark: Stratified Controllers of Tank Networks," *2nd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'15)*, Vol: 34, p 73-79, 2015. [pdf]
DOI: 10.29007/2ljt
Role: Collaborator: wrote prototype software, helped write paper. Contribution: 20.0 percent.

[W2] Luan Viet Nguyen†, Eric Nelson⋆, Amol Vengurlekar†, Ruoshi Zhang†, Kristopher I. White, Victor Salinas, ***Taylor T. Johnson***, "Model-based design and analysis of a reconfigurable continuous-culture bioreactor," *4th ACM SIGBED International Workshop on Design, Modeling (CyPhy'14)*, p 48-51, April 2014. [pdf]
DOI: 10.1145/2593458.2593469
Acceptance Rate: 50.0 percent (14 of 28)
Role: Author/Mentor: formulated research project, wrote prototype software, mentored students, helped write paper. Contribution: 75.0 percent.

[W1] Luan Viet Nguyen†, ***Taylor T. Johnson***, "Benchmark: DC-to-DC Switched-Mode Power Converters (Buck Converters, Boost Converters, and Buck-Boost Converters).," *1st International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'14)*, p 19-24, 2014. [pdf]
DOI: 10.29007/23pm
Role: Author/Mentor: formulated research project, wrote prototype software, mentored students, helped write paper. Contribution: 80.0 percent.

OTHER WORKSHOP PROCEEDINGS PAPERS

Other workshop proceedings papers, not fully refereed, such as competition reports.

[OW13] Diego Manzanas Lopez, Matthias Althoff, Luis Benet, Clemens Blab, Marcelo Forets, Yuhao Jia, ***Taylor T. Johnson***, Manuel Kranzl, Tobias Ladner, Lukas Linauer, Philipp Neubauer, Sophie Neubauer, Christian Schilling, Huan Zhang, Xiangru Zhong, "ARCH-COMP24 Category Report: Artificial Intelligence and Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 103, 11th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH'24)*, Vol: 103, p 64-121, October 2024. [pdf]
DOI: 10.29007/mxld
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2024 iteration.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 20.0 percent
Keywords: formal verification, Neural Network Control Systems, Neural Network Verification, neural networks, verification.

[OW12] Diego Manzanas Lopez, Matthias Althoff, Marcelo Forets, ***Taylor T. Johnson***, Tobias Ladner, Christian Schilling, "ARCH-COMP23 Category Report: Artificial Intelligence and Neural Network Control Systems

(AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 96, 10th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH'23)*, October 2023. [pdf]
DOI: 10.29007/x38n
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2023 iteration.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 30.0 percent
Keywords: formal verification, Neural Network Control Systems, Neural Network Verification, neural networks, verification.

[OW11] ***Taylor T. Johnson***, "ARCH-COMP23 Repeatability Evaluation Report," *EPiC Series in Computing 96, 10th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH'23)*, October 2023. [pdf]
DOI: 10.29007/q313
Summary: This paper summarizes the repeatability evaluation for ARCH-COMP 2023.
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent
Keywords: Artifact Evaluation, formal methods, hybrid systems, Repeatability Evaluation, verification.

[OW10] Diego Manzanas Lopez, Matthias Althoff, Luis Benet, Xin Chen, Jiameng Fan, Marcelo Forets, Chao Huang, Taylor T Johnson, Tobias Ladner, Wenchao Li, Christian Schilling, Qi Zhu, "ARCH-COMP22 Category Report: Artificial Intelligence and Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 90, 9th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH22)*, September 2022. [pdf]
DOI: 10.29007/wfgr
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2022 iteration.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 30.0 percent.

[OW9] ***Taylor T. Johnson***, "ARCH-COMP22 Repeatability Evaluation Report," *EPiC Series in Computing 90, 9th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH22)*, September 2022. [pdf]
DOI: 10.29007/djqx
Summary: This paper summarizes the repeatability evaluation for ARCH-COMP 2022.
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent.

[OW8] ***Taylor T. Johnson***, Diego Manzanas Lopez†, Luis Benet, Marcelo Forets, Sebastián Guadalupe, Christian Schilling, Radoslav Ivanov, Taylor J. Carpenter, James Weimer, Insup Lee, "ARCH-COMP21 Category Report: Artificial Intelligence and Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 80, 8th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH21)*, Vol: 80, p 90-119, December 2021. [pdf]
DOI: 10.29007/kfk9
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2021 iteration.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[OW7] ***Taylor T. Johnson***, "ARCH-COMP21 Repeatability Evaluation Report," *EPiC Series in Computing 80, 8th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH21)*, Vol: 80, p 153-160, December 2021. [pdf]
DOI: 10.29007/zqdx
Summary: This paper summarizes the repeatability evaluation for ARCH-COMP 2021.
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent.

[OW6] ***Taylor T. Johnson***, Diego Manzanas Lopez†, Patrick Musau†, Hoang-Dung Tran†, Elena Botoeva, Francesco Leofante, Amir Maleki, Chelsea Sidrane, Jiameng Fan and Chao Huang, "ARCH-COMP20 Category Report: Artificial Intelligence and Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 74, 7th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH'20)*, Vol: 74, p 107-139, September 2020. [pdf]
DOI: 10.29007/9xgv
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2020 iteration.
Role: Mentor: supervised students, helped write paper. Contribution: 20.0 percent.

[OW5] ***Taylor T. Johnson***, "ARCH-COMP20 Repeatability Evaluation Report," *EPiC Series in Computing 74, 7th International Workshop on Applied Verification of Continuous and Hybrid Systems (ARCH'20)*, Vol: 74, p 175-183, September 2020. [pdf]
DOI: 10.29007/8dp4

Summary: This paper summarizes the repeatability evaluation for ARCH-COMP 2020.
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent.

[OW4] Diego Manzanas Lopez†, Patrick Musau†, Hoang-Dung Tran†, Souradeep Dutta, Taylor J. Carpenter, Radoslav Ivanov, ***Taylor T. Johnson***, "ARCH-COMP19 Category Report: Artificial Intelligence/Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants," *EPiC Series in Computing 61, 6th Applied Verification for Continuous and Hybrid Systems (ARCH'19)*, Vol: 61, p 103-119, May 2019. [pdf]
DOI: 10.29007/rgv8
Summary: This paper summarizes the AINNCS category of ARCH-COMP for the 2019 iteration.
Role: Mentor: formulated research project, supervised students/postdocs, helped write paper. Contribution: 25.0 percent.

[OW3] ***Taylor T. Johnson***, "ARCH-COMP19 Repeatability Evaluation Report," *EPiC Series in Computing 61, 6th Applied Verification for Continuous and Hybrid Systems (ARCH'19)*, Vol: 61, p 162-169, May 2019. [pdf]
DOI: 10.29007/wbl3
Summary: This paper summarizes the repeatability evaluation for ARCH-COMP 2019.
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent.

[OW2] ***Taylor T. Johnson***, "ARCH-COMP18 Repeatability Evaluation Report," *5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'18)*, Vol: 54, p 128-134, September 2018. [pdf]
DOI: 10.29007/n9t3
Role: Author: wrote paper. Contribution: 100.0 percent.

[OW1] ***Taylor T. Johnson***, "ARCH-COMP17 Repeatability Evaluation Report," *4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH'17)*, Vol: 48, p 175-180, June 2017. [pdf]
DOI: 10.29007/7hvk
Role: Author: data analysis; wrote paper. Contribution: 100.0 percent.

POSITION/EDITORIAL/OPINION PAPERS

Acceptance based on peer review of abstracts or short papers.

[E2] Daniel Neider, ***Taylor T. Johnson***, "Track C1: Safety Verification of Deep Neural Networks (DNNs)," *1st International Conference on Bridging the Gap between AI and Reality (AISoLA'23)*, October 2023. [pdf]
DOI: 10.1007/978-3-031-46002-9_12
Role: Author: co-wrote paper. Contribution: 50.0 percent
Keywords: Formal Verification, Formal Methods, Neural Networks,Safety of Autonomy.

[E1] ***Taylor T. Johnson***, Sayan Mitra, "Handling Failures in Cyber-Physical Systems: Potential Directions," *Real-Time Systems Symposium (RTSS'09)*, 2009. [pdf]
Role: Author: wrote paper. Contribution: 90.0 percent. **Award for *Most Interesting Cyber-Physical Systems Research Problem***

PATENTS AND PATENT APPLICATIONS

[P2] "Systems and Methods for Providing Speech-to-Text Recognition and Autosummarization," ***Taylor T. Johnson***. VU 17131, MCC Docket Number 10644-043PV1, Patent Application, February 1, 2018.

[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 [LC1]. [pdf]

PRESENTATIONS

KEYNOTE/PLENARY PRESENTATIONS

[KT12] Invited keynote presentation, "From Neural Network Verification to Formally Verifying Neuro-Symbolic Artificial Intelligence (AI) ," at the 25th High Confidence Software and Systems Conference (HCSS'25), Annapolis, MD, May 12, 2025.

[KT11] Invited plenary tutorial presentation, "Neural Network Verification for Medical Imaging Analysis," at the SPIE Medical Imaging 2025, San Diego, CA, February 18, 2025.

[KT10] Invited keynote presentation, "From Neural Network Verification to Formal Verification for Neuro-Symbolic Artificial Intelligence (AI)," at the 22nd ACM-IEEE International Symposium on Formal Methods and Models for System Design (MEMOCODE 2024), Raleigh, NC, October 4, 2024.

[KT9] Invited keynote presentation, "From Neural Network Verification to Formal Verification for Neuro-Symbolic Artificial Intelligence (AI)," at the 7th International Workshop on Dependable and Secure Machine Learning (DSML 2024), Brisbane, Australia, June 24, 2024.

[KT8] Invited plenary presentation, "From Neural Network Verification to Verification for Neuro-Symbolic Systems: Verifying Safety and Liveness in Neuro-Symbolic Behavior Trees (NSBTs)," at the Lorentz Center Workshop Engineering Reliable Autonomous Systems (ERAS 2024), Leiden, the Netherlands, June 12, 2024.

[KT7] Invited plenary presentation, "Formal Verification of Neural Networks in Autonomous Systems," Los Alamas National Laboratory (LANL) AI Forum, Los Alamos, New Mexico, April 22, 2024.

[KT6] Invited keynote presentation, "Formal Verification of Neural Networks in Autonomous Cyber-Physical Systems," at the International Workshop on Perception for Safety-Critical Cyber-Physical Systems (PerCPS 2023), San Antonio, TX, May 9, 2023.

[KT5] Invited keynote presentation, "Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems," at the 4th Workshop on Formal Methods for Autonomous Systems (FMAS 2022), Berlin, Germany, September 26, 2022.

[KT4] Invited plenary presentation, "Repeatability, CPS-VO Design Studios, ARCH Benchmarks, and ARCH-COMP Repository," at the 7th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2020), at IFAC World Congress, Berlin, Germany, July 12, 2020.

[KT3] Invited keynote presentation, "Verification for Autonomous Cyber-Physical Systems with Machine Learning Components," at the 6th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2019), at Cyber-Physical Systems and Internet of Things (CPS-IoT) Week 2019, Montreal, Canada, April 15, 2019.

[KT2] Plenary presentation, "Verification of Neural Networks," at the AAAI Spring Symposium, Stanford University, Stanford, CA, March 26, 2019.

[KT1] Keynote presentation, based on paper [C9], "Real-Time Reachability for Verified Simplex Design," at the *8th International Workshop on Numerical Software Verification 2015* (NSV 2015) at Cyber-Physical Systems Week (CPS Week 2015), Seattle, WA, April 13, 2015.

INVITED PRESENTATIONS

[IT52] Presented "Formal Verification for Neuro-Symbolic Systems: Verifying Safety and Liveness in Neuro-Symbolic Behavior Trees (NSBTs)," 1st International Conference on Neuro-symbolic Systems (NeuS), University of California, Berkeley, California, May 22, 2024.

[IT51] Presented "Formal Verification of Neural Networks: From Autonomous Systems to Security and Beyond," Electrical and Computer Engineering Department Seminar, University of New Mexico, Albuquerque, New Mexico, April 23, 2024.

[IT50] Presented " Metacognition in Autonomous Cyber-Physical Systems with Neural Network Verification, Repair, and Monitoring," ARO Workshop on Metacognitive Prediction of AI Behavior, Arizona State University, Tempe, AZ, November 15, 2023.

[IT49] Presented "Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems," Lero SFI Research Centre for Software and University of Limerick, Limerick, Ireland, June 7, 2023.

[IT48] Presented "Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems," Oxford University Computer Science Department, Oxford, UK, January 25, 2023.

[IT47] Presented "Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems," IMDEA Software Institute, Madrid, Spain, December 15, 2022.

[IT46] Presented "Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems," Formal Methods meet Machine Learning Track, 11th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation (ISoLA 2022), Rhodes, Greece, October 25, 2022.

[IT45] Presented (virtually, alongside Stanley Bak and Changliu Liu) "How Good are Current Neural Network Formal Verification Methods," AI in Aviation Standard Committee (SAE G-34/EUROCAE WG-114), Technical Talks: Regular Sessions, December 2, 2021.

[IT44] Presented (virtually) "Semantic Segmentation Neural Network Verification," Stony Brook University, CSE-643: Cyber-Physical Systems & Verification Seminar, September 23, 2021.

[IT43] Presented (virtually) "Verification and assurance tools for Cyber-physical Systems with Learning-Enabled Components," IEEE Real Time Systems Symposium (RTSS), Application of DARPA Assured Autonomy

Program Technologies to Autonomous Learning-Enabled Real-Time Systems Hot Topics Day Workshop, December 1, 2020.

[IT42] Presented (virtually) "Verifying Deep Neural Networks in Autonomous Cyber-Physical Systems," University of Southern California, Center for Cyber-Physical Systems and the Internet of Things (CCI) and Ming Hsieh Institute for Electrical Engineering (MHI) Seminar, November 18, 2020.

[IT41] Presented "Verifying Deep Neural Networks in Autonomous Cyber-Physical Systems," University of Memphis, Computer Science Colloquium, March 16, 2020.

[IT40] Presented "Challenges for Perception Verification in Autonomy," at the CPS Verification & Validation: Industrial Challenges & Foundations: Safe Learning and Optimization, Carnegie Mellon University, Pittsburgh, PA, December 11, 2019.

[IT39] Presented "Verifying Deep Neural Networks in Autonomous Cyber-Physical Systems," Georgetown University, Computer Science Colloquium, November 14, 2019.

[IT38] Presented "Formal Verification: An Introduction," DARPA seL4 Summit, September 23, 2019.

[IT37] Presented "Verifying Neural Networks in Autonomous Cyber-Physical Systems," Stony Brook University, Computer Science Seminar, July 12, 2019.

[IT36] Presented "Verifying Neural Networks in Autonomous Cyber-Physical Systems," Waterloo University, Electrical and Computer Engineering Seminar, June 3, 2019.

[IT35] Presented "Verifying Neural Networks in Autonomous Cyber-Physical Systems," McGill University, Computer Science Seminar, May 28, 2019.

[IT34] Presented "Safety Assurance in Autonomous Cyber-Physical Systems," University of Nebraska Lincoln, Computer Science and Engineering Colloquium, April 2, 2019.

[IT33] Presented "Safety and Security Assurance in Autonomous Cyber-Physical Systems," University of Illinois at Urbana-Champaign, Information Trust Institute (ITI) Seminar, March 11, 2019.

[IT32] Presented "Safety Assurance in Cyber-Physical Systems built with Learning-Enabled Components," at the CPS Verification & Validation: Industrial Challenges & Foundations: Safe Implementation of CPS, Carnegie Mellon University, Pittsburgh, PA, December 12, 2018.

[IT31] Presented "Safety and Security Assurance in Autonomous Cyber-Physical Systems with Hyperproperties & Hybrid Automata," SimCenter Center of Excellence in Applied Computational Science and Engineering, University of Tennessee at Chattanooga, SimCenter Research Seminar, October 19, 2018.

[IT30] Presented three invited lectures on "Design-Time and Runtime Verification for Safe Autonomous Cyber-Physical Systems," at the Summer School on Cyber-Physical Systems, Halmstad University, Halmstad, Sweden, June 11-15, 2018.

[IT29] Presented "SEC Faculty Travel Program Award Presentation: Formal Specification, Verification, & Falsification for Autonomous Cyber-Physical Systems with Hyperproperties & Hybrid Automata," at the Computer Science and Engineering Graduate Seminar (CSCE 681), Texas A&M University, College Station, TX, March 5, 2018.

[IT28] Presented "Software Defects in Medical Devices," in conjunction with Prof. Pampee Young's presentation "Software Error in Blood Bank Systems," Vanderbilt University Medical Center (VUMC), Department of Medicine, Division of Hematology and Oncology, Laboratory Medicine Rounds, November 10, 2017.

[IT27] Presented "Real-Time Reachability for Safety Verification of Autonomous Cyber-Physical Systems," at the CPS Verification & Validation: Industrial Challenges & Foundations: Safe Implementation of CPS, Carnegie Mellon University, Pittsburgh, PA, May 12, 2017.

[IT26] 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.

[IT25] 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.

[IT24] Presented "Real-Time Reachability for Verification of Autonomous Systems," at the Computer Science Seminar, University of Houston, Houston, TX, February 20, 2017.

[IT23] 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.

[IT22] Invited Presentation, "Hybrid automata: from verification to implementation," at the MathWorks Faculty Research Summit, Natick, MA, June 4, 2016.

[IT21] 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.

[IT20] Invited Presentation, "Automated Formal Verification for Cyber-Physical Systems," at the Electrical Engineering and Computer Science Department, Vanderbilt University, Nashville, TN, March 14, 2016.

[IT19] 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.

[IT18] 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.

[IT17] 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.

[IT16] 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.

[IT15] 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.

[IT14] 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.

[IT13] Invited presentation, "Software Verification and Validation Methods: Automated Formal Verification of Distributed Cyber-Physical Systems," at the IEEE Metrocon, Arlington, TX, October 2, 2014.

[IT12] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at School of Computer Science Colloquium, McGill University, Montreal, Quebec, Canada, August 12, 2014.

[IT11] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at Electrical and Computer Engineering Colloquium, University of Waterloo, Waterloo, Ontario, Canada, July 25, 2014.

[IT10] 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.

[IT9] 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.

[IT8] Presented "Automated Formal Verification for Reliable Cyber-Physical Systems," Computer Science and Engineering Colloquium, Southern Methodist University, Dallas, TX, April 2, 2014.

[IT7] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," University of Pennsylvania, Philadelphia, TX, April 3, 2013.

[IT6] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," Sandia National Laboratory, Livermore, CA, March 20, 2013.

[IT5] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," University of Texas at San Antonio, San Antonio, TX, March 17, 2013.

[IT4] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," Texas State University, San Marcos, TX, March 5, 2013.

[IT3] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," University of Texas at Arlington, Arlington, TX, March 4, 2013.

[IT2] Invited presentation, "Verification Techniques and Tools for Reliable Cyber-Physical Systems," Old Dominion University, Norfolk, VA, March 1, 2013.

[IT1] 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.

CONFERENCE/WORKSHOP PAPER PRESENTATIONS

[CT26] Presented paper [C25], "Star-Based Reachability Analysis for Deep Neural Networks", 23rd International Symposium on Formal Methods (FM'19), Porto, Portugal, October 2019.

[CT25] Presented paper [C24], "Reachability Analysis for High-Index Linear Differential Algebraic Equations (DAEs)", 17th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'19), Amsterdam, the Netherlands, August 2019.

[CT24] Presented paper [C23], "Decentralized Real-Time Safety Verification for Distributed Cyber-Physical Systems", Formal Techniques for Distributed Objects, Components, and Systems (FORTE'19), Copenhagen, Denmark, June 2019.

[CT23] Presented paper [W25], Decentralized real-time safety verification for distributed cyber-physical systems, 3rd International Workshop on Methods and Tools for Distributed Hybrid Systems (DHS 2019), Associated with CONCUR 2019, Amsterdam, The Netherlands, 26 August 2019.

[CT22] Presented paper [W23], "Parallelizable Reachability Analysis Algorithms for Feed-forward Neural Networks", In Proceedings of the 7th International Workshop on Formal Methods in Software Engineering (FormaliSE'19), 2019, May.

[CT21] Presented paper [OW4], "ARCH-COMP19 Category Report: Artificial Intelligence and Neural Network Control Systems (AINNCS) for Continuous and Hybrid Systems Plants", In ARCH19. 6th International Workshop on Applied Verification of Continuous and Hybrid Systems, April 2019.

[CT20] Presented paper [OW3], "ARCH-COMP19 Repeatability Evaluation Report", In ARCH19. 6th International Workshop on Applied Verification of Continuous and Hybrid Systems, 2019, April.

[CT19] Presented paper [W18], Reachability Analysis and Safety Verification for Neural Network Control Systems, Verification of Neural Networks (VNN19), AAAI 2019 Spring Symposium, March 2019.

[CT18] Presented paper [OC6], "Reachability Analysis for One Dimensional Linear Parabolic Equation," at the IFAC Conference on Analysis and Design of Hybrid Systems (ADHS 2018), Oxford, United Kingdom, July 12, 2018.

[CT17] Presented paper [W16], "Benchmark: Continuous-Time Recurrent Neural Networks," at the 5th Applied Verification for Continuous and Hybrid Systems (ARCH 2018), Oxford, United Kingdom, July 13, 2018.

[CT16] Presented paper [W17], "Benchmark: Differential Algebraic Equations (DAEs) with Varying Index," at the 5th Applied Verification for Continuous and Hybrid Systems (ARCH 2018), Oxford, United Kingdom, July 13, 2018.

[CT15] Presented paper [W15], "Benchmark: Discrete-Space Analysis of Partial Differential Equations," at the 5th Applied Verification for Continuous and Hybrid Systems (ARCH 2018), Oxford, United Kingdom, July 13, 2018.

[CT14] Presented paper [C15], "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.

[CT13] 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.

[CT12] 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.

[CT11] 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.

[CT10] Presented paper [LC6], "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.

[CT9] Presented paper [C11], "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.

[CT8] Presented paper [LC5], "Verified Planar Formation Control Algorithms by Composition of Primitives," at *AIAA SciTech*, Kissimmee, FL, January 8, 2015.

[CT7] Presented paper [C8], "Anonymized Reachability of Hybrid Automata Networks," at *12th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS)*, Florence, Italy, September 9, 2014.

[CT6] 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.

[CT5] 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.

[CT4] Presented paper [C4], "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**).

[CT3] Presented paper [LC2], "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.

[CT2] Presented paper [LC1], "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**).

[CT1] 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.

OTHER PRESENTATIONS

[OT14] Panel presentation with Matthias Hein (University of Tubingen), Cho-Jui Hsieh (UCLA), ***Taylor T. Johnson*** (Vanderbilt University), Wan-Yi Lin (Bosch Center for AI), Aditi Raghunathan (Stanford University), Florian Tramer (Stanford University), Workshop on Security and Reliability of Machine Learning (SRML'21), Affiliated with the 19th International Symposium on Automated Technology for Verification and Analysis (ATVA'21), October 18, 2021.

[OT13] Panel presentation, "Panel discussion: Formal Methods and Machine Learning: Progress and Future directions," with Clark Barrett, ***Taylor T. Johnson***, Alessio Lomuscio, and Luca Pulina, 2nd Workshop on Formal Methods for ML-Enabled Autonomous Systems (FoMLAS'19), Affiliated with CAV'19, July 2019.

[OT12] 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.

[OT11] 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.

[OT10] Presented, "Automated Formal Verification of Distributed Cyber-Physical Systems," at the Air Force Research Laboratory's Information Directorate, Rome, NY, August 5, 2014.

[OT9] 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.

[OT8] Presented "Automatic Safety Verification of Distributed Cyber-Physical Systems," Texas Systems Day, Texas A&M University, College Station, TX, March 28, 2014.

[OT7] Presented "Verification and Validation for Reliable Cyber-Physical Systems," at the Computer Science Colloquium, University of Texas at Arlington, Arlington, TX, November 11, 2013.

[OT6] 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.

[OT5] Presented paper [OC1], "Stability of Digitally Interconnected Linear Systems" at the 7th CSL Student Conference, January 27, 2012, Urbana, IL.

[OT4] Presented "Fault-Tolerant Distributed Cyber-Physical Systems" to the Control Systems Group, University of New Mexico, Albuquerque, NM, June 16, 2011.

[OT3] Presented "Automatic Parameterized Verification of Distributed Algorithms" at 6th CSL Student Conference, Urbana, IL, January 28, 2011.

[OT2] Presented paper [C1], "Safe and Stabilizing Distributed Cellular Flows" to the Multi-Robot Systems Lab, Rice University, Houston, TX, July 15, 2010.

[OT1] Presented paper [C1], "Safe and Stabilizing Distributed Cellular Flows" at the 5th CSL Student Conference, Urbana, IL, January 29, 2010.

DEMONSTRATION AND TUTORIAL PRESENTATIONS

Acceptance based on peer review of abstracts or short papers.

[D9] ***Taylor T. Johnson***, Hoang-Dung Tran, Diego Manzanas Lopez, "Tutorial: Safe, Secure, and Trustworthy Artificial Intelligence (AI) via Formal Verification of Neural Networks and Autonomous Cyber-Physical Systems (CPS) with NNV," *54th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'24)*, June 2024. [pdf]
DOI: 10.1109/DSN-S60304.2024.00027
Summary: This paper presents a tutorial on our NNV software tool with applications in safety, security, and broader trustworthiness for machine learning models.
Role: Author: helped create tutorial material, wrote paper. Contribution: 30.0 percent
Keywords: tutorial,trustworthy AI,verification.

[D8] Hoang-Dung Tran, Diego Manzanas Lopez, ***Taylor T. Johnson***, "Tutorial: Verification and Validation of Neural Networks in Automated Vehicles using the Neural Network Verification (NNV) Tool," *IEEE International Automated Vehicle Validation Conference (IAVVC'23)*, October 2023. [pdf]
Summary: This paper presents an overview of a tutorial on the Neural Network Verification (NNV) software tool in the context of autonomous motor vehicle verification and validation.
Role: Author: helped create tutorial material, wrote paper. Contribution: 30.0 percent.

[D7] Hoang-Dung Tran, Diego Manzanas Lopez, ***Taylor T. Johnson***, "Tutorial: Neural Network and Autonomous Cyber-Physical Systems Formal Verification for Trustworthy AI and Safe Autonomy," *International Conference on Embedded Software (EMSOFT'23)*, September 2023. [pdf]
DOI: 10.1145/3607890.3608454
Summary: This paper describes a tutorial on the Neural Network Verification (NNV) software tool in the context of autonomous cyber-physical systems (CPS).
Role: Author: helped create tutorial material, wrote paper. Contribution: 30.0 percent
Keywords: tutorial,trustworthy AI,verification.

[D6] Shafiul Azam Chowdhury, Sohil Lal Shrestha, ***Taylor T. Johnson***, Christoph Csallner, "Demo: SLEMI: Finding Simulink Compiler Bugs through Equivalence Modulo Input (EMI)," *42nd International Conference on Software Engineering (ICSE'20)*, p 1-4, June 2020. [pdf]
DOI: 10.1145/3377812.3382147
Acceptance Rate: 33.3 percent (25 of 75)
Double-Blind Review (**DBR**)
Role: Mentor: supervised students/postdocs, helped write paper. Contribution: 20.0 percent.

[D5] Stephen A. Rees, Tamas Kecskes, Patrik Meijer, ***Taylor T. Johnson***, Katie Dey, Paulo Tabuada, Marcus Lucas, "Cyber-physical Systems Virtual Organization: Active Resources: Enabling Reproducibility, Improving Accessibility, and Lowering the Barrier to Entry", In Proceedings of the 10th ACM/IEEE International Conference on Cyber-Physical Systems, ACM, New York, NY, USA, pp. 340–341, 2019, April.

[D4] Shafiul Chowdhury[†], ***Taylor T. Johnson***, and Christoph Csallner, "Fuzzing Cyber-Physical System Development Environments With CyFuzz," Demo Session, 20th International Conference on Hybrid Systems: Computation and Control (HSCC 2017), CPSWeek 2017, Pittsburgh, PA, April 2017.

[D3] Presented demo, "Hybrid Systems Model Transformations with HyST," at the 8th NASA International Symposium on Formal Methods (NFM 2016), Minneapolis, MN, June 7, 2016.

[D2] 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.

[D1] ***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.

POSTER PRESENTATIONS

Acceptance based on peer review of abstracts, short papers, or posters.

[Po13] Jonathan Andreasen, Diego Manzanas Lopez, ***Taylor T. Johnson***, Yatis Dodia, "Parallel Verification of Neural Networks Applied to Medical Imaging (Research Poster)," *36th International Conference for High Performance Computing, Networking, Storage, and Analysis / Supercomputing Conference (SC'24)*, November 2024. [pdf]
Summary: This paper describes neural network verification in medical imaging analysis, particularly parallelization for analysis on ORNL's Frontier supercomputer.
Role: Mentor: helped formulate research problem, supervised students/postdocs, helped write paper. Contribution: 10.0 percent
Keywords: medical imaging, neural network verification, high-performance computing.

[Po12] Nathaniel Hamilton[†] and ***Taylor T. Johnson***, "Architecture for an Indoor Distributed Cyber-Physical System Composed of Mobile Robots and Fog Computing Nodes," Poster Session, Safe and Secure Systems and Software Symposium (S5 2017), Dayton, Ohio, August 2017.

[Po11] Christina Wang[†] and ***Taylor T. Johnson***, "Moving Target Tracking with Formation Control by Groups of UAVs," Poster Session, Safe and Secure Systems and Software Symposium (S5 2017), Dayton, Ohio, August 2017.

[Po10] Luan Viet Nguyen†, James Kapinski, Xiaoqing Jin, Jyotirmoy V. Deskmukh, and ***Taylor T. Johnson***, "Hyperproperties of Real-Valued Signals," Poster Session, 20th International Conference on Hybrid Systems: Computation and Control (HSCC 2017), CPSWeek 2017, Pittsburgh, PA, April 2017.

[Po9] 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.

[Po8] 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.

[Po7] 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. Software Tool: `http://verivital.com/hyrg/`

[Po6] 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.

[Po5] 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]

[Po4] 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]

[Po3] ***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]

[Po2] ***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]

[Po1] ***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]

SOFTWARE TOOLS AND ARTIFACTS

We develop a large amount of research software, particularly verification software tool prototypes, some of which is peer-reviewed through activities such as software repeatability evaluations. Source code for each major artifact is indicated below, and is maintained on the following accounts (Git/Mercurial): `https://github.com/verivital`, `https://bitbucket.org/verivital/`, `https://bitbucket.org/ttj/`, `https://github.com/ttj`.

[S11] Behavior Tree Verification Tool (BehaVerify): This software tool implements methods to formally verify behavior trees. Development timeframe: 2020-present. Related papers include [C36,W31,W30].
https://github.com/verivital/behaverify

[S10] NNV and nnmt: Neural network verification and neural network model transformation tools. These software tools implement methods for formally verifying properties of systems incorporating neural networks, as well as for interchange with other neural network verification tools and related software, such as ONNX, PyTorch, Keras, Tensorflow, etc. Development timeframe: 2018-present. Related papers include [C52,C49,C40,C35,C31,C27,C29,J21,W27,C25,J20,W23,W22,OW4,J13]. Available online: https://github.com/verivital/nnv/ and https://github.com/verivital/nnmt. Reproducible CodeOcean capsules are also available (CAV'20 Tool [C27]: `https://doi.org/10.24433/CO.0221760.v1`, CAV'20 ImageStar Paper [C29]: `https://doi.org/10.24433/CO.3351375.v1`).

[S9] Hybrid Automata Learning Toolkit (HAutLearn): This software tool implements methods to infer hybrid automaton models from time-series data. Development timeframe: 2018-present. Related papers include [J23].
https://github.com/verivital/hautlearn

[S8] daev: Differential algebraic equation (DAE) verification tool. This software tool implements methods to formally verify safety properties of systems incorporating DAEs, specifically targeted for DAEs with index greater than one, for which it is impossible to represent as classical hybrid automata without model transformations. Development timeframe: 2017-present. Related papers include [C24]. https://github.com/verivital/daev

[S7] pdev: Partial differential equation (PDE) verification tool. This software tool implements numerical reachability analysis methods for systems incorporating PDEs. Development timeframe: 2017-present. Related papers include [OC6]. https://github.com/verivital/pdev

[S6] SLForge and CyFuzz: Random differential testing for CPS Development Toolchains. This software tool randomly generates CPS model artifacts, currently targeting the MathWorks' Simulink/Stateflow (SLSF). Development timeframe: 2015-present. Related papers include [C26,D6,C21,D4,W10]. https://github.com/verivital/slsf_randgen

[S5] 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). Development timeframe: 2014-present. Related papers include [C27,J17,C14,C13,C12,C10,D2]. *Best repeatability evaluation award [C14]*. Available online: http://www.verivital.com/hyst/

[S4] rtreach: Real-time reachability algorithms for hybrid systems with linear and nonlinear dynamics: This software implements reachability analysis algorithms based on face-lifting that have worst-case execution time (WCET) guarantees. Related papers include [C23,J4,C9]. Development timeframe: 2014-present. Available online: https://github.com/verivital/rtreach/

[S3] 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 [J16,J6,J12,C11]. Development timeframe: 2014-present. Available online: http://www.verivital.com/hynger/

[S2] HyRG: Hybrid Random Generator. This software tool randomly generates hybrid automaton models, and is integrated within HyST [S5] to generate models in output formats compatible with several different formal verification tools for hybrid systems. Development timeframe: 2014-2016. Related papers include [C12,Po7]. Available online: http://www.verivital.com/hyrg/

[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. Development timeframe: 2011-2014. Related papers include [C8,LC4,C4,C3]. Available online: https://publish.illinois.edu/passel-tool/

RESEARCH MENTORING (CURRENT)

POSTDOCTORAL RESEARCH SCHOLAR AND RESEARCH SCIENTIST ADVISER

[PD3] Navid Hashemi, Spring 2025 – Present.

[PD2] Tianshu Bao, Fall 2023 – Present.

[PD1] Diego Manzanas Lopez, Fall 2022 – Present.

DOCTORAL DISSERTATION ADVISER

[DS5] Fall 2023 – Present: Anne Tumlin, Computer Science, Vanderbilt University, Dissertation Topic: Fairness verification in graph neural networks. Co-advised with Prof. Tyler Derr. Major awards: 2024 DOE CSGF ($\$500k$).

[DS4] Fall 2023 – Present: Samuel Sasaki, Computer Science, Vanderbilt University, Dissertation Topic: Runtime verification in machine learning.

[DS3] Fall 2023 – Present: Thuy Dung (Judy) Nguyen, Computer Science, Vanderbilt University, Dissertation Topic: Robust federated and adversarial machine learning. Co-advised with Prof. Kevin Leach.

[DS2] Fall 2020 – Present: Preston Robinette, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Topic: Robustness verification in steganography and watermarking neural networks. Major awards: 2021 NDSEG Fellowship ($\$500k$).

[DS1] Summer 2019 – Present: Serena Serbinowska, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Topic: Hyperproperties in adversarial machine learning and cyber-physical systems.

MASTER'S THESIS ADVISER

[MS1] None currently.

UNDERGRADUATE RESEARCHERS

Spring 2025 **Grant Petrosky**, *Vanderbilt BSc ECE, Project: "Autonomous systems development," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

RESEARCH MENTORING (PAST / GRADUATED ALUMNI)

POSTDOCTORAL RESEARCH SCHOLAR ALUMNI

[PDA4] 8/2017 – 8/2019: Joel Rosenfeld, Electrical Eng. and Computer Science, Research Topic: Optimization-Based Verification for Cyber-Physical Systems. Next/current position: Assistant Professor, Mathematics and Statistics, University of South Florida. Website: `http://joel.rosenfeldresearch.com/`

[PDA3] 11/2015 – 8/2019: Weiming Xiang, Electrical Eng. and Computer Science, Research Topic: Unbounded-Time Reachability Analysis for Switched Systems. Research results: [J21,OC6,J15,OC8,J13,BC1,J14,J9,J7,OC4,W12,OC3,OC2]. Next/current position: Assistant Professor, School of Computer and Cyber Sciences, Augusta University. Website: `https://xiangweiming.github.io/`

[PDA2] 1/2016 – 5/2017: Andrew Sogokon, Electrical Eng. and Computer Science, Vanderbilt University, Research Topic: Liveness Verification for Hybrid Automata. Research results: [J11,C19,C16,OC2,W8]. Next position: Postdoc at Carnegie Mellon University. Current position: Lecturer at the University of Southampton, UK. Website: `https://sites.google.com/site/andrewsogokon/`

[PDA1] 3/2016 – 8/2016: Khaza Anuarul Hoque, Department of Computer Science and Eng., University of Texas at Arlington, Research Topic: Formal Verification for Aerospace CPS. Research results: [J12,C17,C15]. Next position: Research Fellow at Oxford University. Current position: Assistant Professor, Electrical Engineering and Computer Science (EECS) at University of Missouri Columbia. Website: `https://www.kahoque.com/`

DOCTORAL DISSERTATION ALUMNI

[DA10] Summer 2019 – Fall 2023: Neelanjana Pal, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Topic: Robustness verification in time-series neural networks.

[DA9] Fall 2017 – Summer 2023: Tianshu Bao, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Topic: Partial differential equation for physics-informed machine learning.

[DA8] Fall 2017 – Summer 2022: Diego Manzanas Lopez, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Title: Learning and Verification of Dynamical Systems with Neural Network Components. Research results: [BC1].

[DA7] Fall 2017 – Summer 2022: Xiaodong Yang, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Title: Reachability Analysis and Repair of Deep Neural Networks in Autonomous Systems. Next position: Research Scientist at Visa Research.

[DA6] Summer 2017 – Summer 2022: Nathaniel (Nate) Hamilton, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Title: Safe and Robust Reinforcement Learning for Autonomous Cyber-Physical Systems. Major awards: 2019 NDSEG Fellowship.

[DA5] Fall 2017 – Spring 2022: Patrick Musau, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Title: Safety Assurance of Autonomous Learning-Enabled Cyber Physical Systems. Research results: [BC1].

[DA4] Spring 2015 – Summer 2020: Hoang-Dung Tran, Electrical Eng. and Computer Science, Vanderbilt University, Dissertation Topic: Formal Verification of Distributed Cyber-Physical Systems. Research results: [C25,C23,C24,W23,OC6,J14,J15,J9,J7,W12,OC3,OC2,W9,W4,J2]. Next position: Assistant Professor, Computer Science and Engineering, University of Nebraska Lincoln. Website: `https://sites.google.com/site/trhoangdung/`

[DA3] Fall 2015 – Fall 2019: Shafiul Chowdhury, Department of Computer Science and Eng., University of Texas at Arlington, Dissertation Topic: Randomized Differential Testing for CPS Development Environments. Co-advised with Prof. Christoph Csallner. Research results: [C21,W10]. Next position: Research Scientist, Facebook. Website: `https://shafiul.github.io/`

[DA2] Spring 2014 – Summer 2018: Luan Viet Nguyen, Department of Computer Science and Eng., University of Texas at Arlington, Dissertation Topic: Specifications for Cyber-Physical Systems. Research results: [J12,C20,J17,C18,W11,W12,J7,OC2,W9,W6,C12,W4,W1,W2,J2]. Next position: Postdoc at University

of Pennsylvania, then Postdoc at University of Notre Dame; Current position: Assistant Professor at University of Dayton. Website: `https://luanvietnguyen.github.io/`

[DA1] Summer 2014 – Summer 2017: Omar Beg, Department of Electrical Engineering, University of Texas at Arlington, Dissertation Topic: Reachability Analysis of Power Electronics and Systems. Co-advised with Prof. Ali Davoudi. Research results: [J16,J17,J10,J6,OC5,W11,W7]. Next position: Assistant Professor at University of Texas at Permian Basin. Website: `https://sites.google.com/site/omaralibeg/`

OTHER FORMER GRADUATE STUDENTS

[FS2] Fall 2017 – Fall 2018: Yuanqi Xie, Electrical Eng. and Computer Science, Vanderbilt University, Research Topic: Auto-scribing electronic health records with natural language processing and autosummarization.

[FS1] Fall 2017 – Spring 2018: Ran Hao, Electrical Eng. and Computer Science, Vanderbilt University, Research Topic: Safe reinforcement learning for distributed autonomous robots.

MASTER'S THESIS ALUMNI

[MA8] Summer 2017 – Fall 2021: Ayana Wild, Electrical Eng. and Computer Science, Vanderbilt University, Thesis Topic: Examining the Impact of Curricular and Robotic Interventions.

[MA7] Fall 2019 – Summer 2020: Ulysses Yu, Electrical Eng. and Computer Science, Vanderbilt University, Thesis Topic: Combining Reachable Set Computation with Neuron Coverage.

[MA6] Fall 2015 – Summer 2016: Randy Long, Electrical Engineering, University of Texas at Arlington, 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. Next position: Engineer at Faraday Future.

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

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

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

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

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

MASTER'S PROJECT ALUMNI

[MP4] Fall 2018 – Summer 2019: Ronald Picard, Vanderbilt University, Master of Engineering: Cyber-Physical Systems, Project: "Action Schema Neural Networks: Generalized Policies for Stochastic Planning Problems in the Wargaming Domain". Next position: Computer Engineer at Air Force Research Laboratory, Aerospace Systems Directorate, Autonomous Controls Branch.

[MP3] Summer 2018 – Fall 2018: Ruohan Wang, Vanderbilt University, Computer Science, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization". Next position: Software Engineer at Google.

[MP2] Spring 2014 – Spring 2015: Zankar Bapat, University of Texas at Arlington, Electrical Engineering, Project: "Robot Localization with Circle Detection". Next 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 [LC3]).

UNDERGRADUATE RESEARCH PROJECT ALUMNI

Summer 2024 **Lana Cartailler** , *Vanderbilt BSc CS, Project: "Malware Detection Graph Neural Network Verification," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2023 **Seojin Lee**, *Johns Hopkins University BSc CS, Project: "Semantic Segmentation Neural Network Verification," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2023 **Jingyu (Gloria) Zhang**, *Vanderbilt BSc CS, Project: "Semantic Segmentation Neural Network Verification," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2022 **Amanda Zhou**, *Vanderbilt BSc CS, Project: "Trustworthy Artificial Intelligence (AI)," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2020 **Yi Li**, *Vanderbilt BSc CS, Project: "Neural Network and Machine Learning Verification," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2020 **Siqi (Christine) Zhao**, *Vanderbilt BSc CS, Project: "Neural Network and Machine Learning Verification," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2019–Spring 2020 **Diandry A Rutayisire**, *Vanderbilt BSc CS, Project: "Autonomous F1/10 Race Car," Vanderbilt University School of Engineering (VUSE) Summer Research Program and Independent Research*.

Summer 2019 **Luke Bhan**, *Vanderbilt BSc CS, Project: "Autonomous F1/10 Race Car," Vanderbilt University School of Engineering (VUSE) Research Volunteer*.

Summer 2019 **Jiuke Huang**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2019 **Rong Wang**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2019 **Julie Truong**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2019 **Angela R Maliakal**, *Tufts University BSc CS, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Spring 2019, Fall 2018 **Arda Turkmen**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE), Individual Study*.

Spring 2019, Fall 2018 **Harsha Vankayalapati**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE), Individual Study*.

Spring 2019 **Matthew Kenigsberg**, *Vanderbilt BSc CS, Project: "Learning Hybrid Automata from Data," Vanderbilt University School of Engineering (VUSE), Individual Study*.

Fall 2018 **Teo Lee**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Individual Study*.

Fall 2018 **Joshua Wilson**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Individual Study*.

Summer 2018 **Daniel Hong**, *Johns Hopkins BSc ME, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Joshua Wilson**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Jackson Brewer**, *Vanderbilt BSc ME, Project: "Controlling Groups of Swarm Robots," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Yufei Yan**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Arda Turkmen**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Xueqing Zhao**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Teo Lee**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Sally Kwok**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2018 **Xue Zou**, *Vanderbilt BSc CS, Project: "Auto-Scribing Electronic Health Records (EHRs) with Natural Language Processing (NLP) and Autosummarization," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Daniel Hong**, *Johns Hopkins BSc ME, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Christina Wang**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Timothy Liang**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Anissa Alexander**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Austin Wilms**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Stirling Carter**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

Summer 2017 **Yinghui Yang**, *Vanderbilt BSc CS, Project: "Controlling Groups of Swarm Robots with Android Studio and Microsoft Kinect," Vanderbilt University School of Engineering (VUSE) Summer Research Program*.

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*.

Fall 2013–Spring 2014 **Eric Nelson**, *Computer Science, University of Texas at Arlington, Project: Xenomai Real-Time Operating System (RTOS) Design for Continuous-Culture Bioreactor*.

Fall 2011 **Zhongdong Zhu**, *University of Illinois at Urbana-Champaign, Project: Simulating Safe and Stabilizing Distributed Cellular Flows*.

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 [LC2]).

[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 [LC2]).

[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): $\sim \$34.45$M
Research Funding as PI: $\sim \$4.5$M (Sole PI Share: $\sim \$2.5$M). Research Funding as Co-PI: $\sim \$29.95$M.
Our research is currently supported by AFOSR, DARPA, NSA/DoD, and NSF, and past research has been supported by AFOSR, AFRL, ARO, NSF, ONR, USDOT, the MathWorks, NVIDIA, and Toyota.

ACTIVE RESEARCH SUPPORT

[AG4] Taylor T. Johnson (Co-PI), with Kevin Leach (PI), "Improving Malware Classifiers with Plausible Novel Samples," Science of Security (SoS), National Security Agency (NSA), Award Amount: $750,000, 2023-10-01 to 2026-09-30, Duration: 3.0 years.

[AG3] Taylor T. Johnson (Co-PI), with Gabor Karsai (PI), Xenofon Koutsoukos (Co-PI), Abhishek Dubey (Co-PI), Janos Sztipanovits, "Assured Neuro Symbolic Components and Systems (ANSCS)," Assured Neuro Symbolic Learning and Reasoning (ANSR), Defense Advanced Research Projects Agency (DARPA), Award Amount: $5,673,000, 2023-03-01 to 2027-02-28, Duration: 4.0 years.

[AG2] Taylor T. Johnson (PI), with Ipek Oguz (Co-PI), Meiyi Ma (Co-PI), "FMitF: Track I: Generative Neural Network Verification in Medical Imaging Analysis," Formal Methods in the Field (FMitF), Directorate for Computer and Information Science and Engineering (FMitF), National Science Foundation (NSF), Award Amount: $750,000, 2022-10-01 to 2025-09-30, Award Number: 2220401, Duration: 3.0 years.

[AG1] Taylor T. Johnson (PI), with Hoang-Dung Tran (PI, UNL), "Collaborative Research: FMitF: Track II: Enhancing the Neural Network Verification (NNV) Tool for Industrial Applications," Formal Methods in the Field (FMitF), Directorate for Computer and Information Science and Engineering (FMitF), National Science Foundation (NSF), Award Amount: $100,000, 2022-10-01 to 2025-03-30, Award Number: 2220426, Duration: 2.5 years.

COMPLETED RESEARCH SUPPORT

[CG26] Taylor T. Johnson (PI), "High-Performance Computing for Neural Network Verification," Georgia Tech Research Institute (GTRI), National Security Agency (NSA), Award Amount: $25,000, 2023-09-01 to 2024-08-31, Duration: 1.0 years.

[CG25] Taylor T. Johnson (PI (Sole)), "Verification of Autonomous Systems: Hyperproperties in Machine Learning," Trusted AI Challenge (TAI), Air Force Office of Scientific Research (AFOSR), Award Amount: $200,000, 2021-12-15 to 2023-12-14, Duration: 2.0 years.

[CG24] Taylor T. Johnson (PI), with Joel Rosenfeld (PI), Rushikesh Kamalapurkar (PI), "Collaborative Research: Operator Theoretic Methods for Identification and Verification of Dynamical Systems," Energy, Power, Control, and Networks Program, Division of Electrical, Communications and Cyber Systems, Directorate for Engineering (ENG:ECCS:EPCN), National Science Foundation (NSF), Award Amount: $229,935, 2020-10-01 to 2024-09-30, Duration: 4.0 years.

[CG23] Taylor T. Johnson (PI), with Jerry Zhu, Kate Saenko, "NSF Workshop on Safety and Trust in Artificial Intelligence Enabled Systems," Software and Hardware Foundations, Division of Computing and Communication Foundations, Directorate for Computer and Information Science and Engineering (SHF), National Science Foundation (NSF), Award Amount: $50,000, 2022-08-01 to 2023-01-31, Award Number: 2231543, Duration: 0.5 years.

[CG22] Taylor T. Johnson (PI), with Christoph Csallner (PI), "SHF: Small: Collaborative Research: Fuzzing Cyber-Physical System Development Tool Chains with Deep Learning (DeepFuzz-CPS)," Software and Hardware Foundations, Division of Computing and Communication Foundations, Directorate for Computer and Information Science and Engineering (CISE:CCF:SHF), National Science Foundation (NSF), Award Amount: $248,473, 2019-10-01 to 2022-09-30, Duration: 3.0 years.

[CG21] Taylor T. Johnson (Co-PI), with Gabor Karsai, Xenofon Koutsoukos (Co-PI), Ted Bapty (Co-PI), Janos Sztipanovits (Oversight), "Assurance-Based Learning-Enabled Cyber-Physical Systems (ALC)," Assured Autonomy (AA), Defense Advanced Research Projects Agency (DARPA), Award Amount: $7,200,000, 4/2/2018 to 2023-01-31, Duration: 4.8 years.

[CG20] Taylor T. Johnson (Co-PI), with Xenofon Koutsoukos (PI), Janos Sztipanovits (Vanderbilt/EECS), Gabor Karsai (Vanderbilt/EECS), Aniruddha Gokhale (Vanderbilt/EECS), Yevgeniy Vorobeychik (Vanderbilt/EECS), Abhishek Dubey (Vanderbilt/EECS), Maithilee Kunda (Vanderbilt/EECS), Peter Volgyesi

(Vanderbilt/EECS), Jennifer Trueblood (Vanderbilt/Psychology), S. Shankar Sastry (Berkeley/EECS), Claire Tomlin (Berkeley/EECS), Anthony Joseph (Berkeley/EECS), Saurabh Amin (MIT/CEE), Nazli Choucri (MIT/Political Science), Alvaro Cardenas (UT Dallas/CS), Bhavani Thuraisingham (UT Dallas/CS), "Science of Security for Cyber-Physical Systems Lablet," Science of Security Lablet (SoSL), Department of Defense (DoD), Award Amount: $14,750,000, 9/1/2017 to 8/31/2022, Duration: 5.0 years.

[CG19] Taylor T. Johnson (PI), with Joel Rosenfeld (Co-PI), "FMitF: Track II: Hybrid and Dynamical Systems Verification on the CPS-VO," Formal Methods in the Field (FMitF), Directorate for Computer and Information Science and Engineering (CISE:FMitF), National Science Foundation (NSF), Award Amount: $98,311, 2019-10-01 to 2021-03-30, Duration: 1.5 years.

[CG18] Taylor T. Johnson (Co-PI), with Ali Davoudi (PI, UT-Arlington), "Scalable Formal Verification of Resilient Converter-dominated MVDC Networks," Sea and Warfare Weapons (Code 33), Office of Naval Research (ONR), Award Amount: $640,000, 2018-03-01 to 2021-02-28, Award Number: N00014-18-1-2184, Duration: 3.0 years.

[CG17] Taylor T. Johnson (PI (Sole)), "Understandable and Reusable Formal Verification for Cyber-Physical Systems," Young Investigator Research Program (YIP), Air Force Office of Scientific Research (AFOSR), Award Amount: $437,469, 2018-02-01 to 2021-01-31, Award Number: FA9550-18-1-0122, Duration: 3.0 years. Due to contractual issues, I had to re-apply and compete for the AFOSR YIP again, which previously was awarded at UT-Arlington [CG9].

[CG16] Taylor T. Johnson (PI (Sole)), "Hyperproperties for Generative AI Models," Artificial Intelligence Hardware (AIHW), Semiconductor Research Corporation (SRC), Award Amount: $240,000, 2021-01-01 to 2023-12-31, Duration: 3.0 years. Recommended for award, but declined by Vanderbilt due to intellectual property (IP) contractual concerns.

[CG15] Taylor T. Johnson (PI), with Christoph Csallner (Co-PI), "SHF: Small: Automating Improvement of Development Environments for Cyber-Physical Systems (AIDE-CPS)," Software and Hardware Foundations, Division of Computing and Communication Foundations, Directorate for Computer and Information Science and Engineering (CISE:CCF:SHF), National Science Foundation (NSF), Award Amount: $498,437, 2015-09-01 to 2019-08-31, Award Number: 1736323, 1527398, Duration: 4.0 years.

[CG14] Taylor T. Johnson (Co-PI), with Ali Davoudi (PI), David Levine (Senior Personnel), "Real-time Ab Initio Modeling of Electric Machines," Energy, Power, Control, and Networks Program, Division of Electrical, Communications and Cyber Systems, Directorate for Engineering (ENG:ECCS:EPCN), National Science Foundation (NSF), Award Amount: $285,000, 2015-08-01 to 2018-07-31, Award Number: 1509804, Duration: 3.0 years.

[CG13] Taylor T. Johnson (Co-PI), with Christoph Csallner (PI), "Equivalence Modulo Input (EMI)-Based Validation of CPS Tool Chains," Development Collaboration Research Grant (DCRG), The MathWorks (MathWorks), Award Amount: $32,000, 2018-09-01 to 2019-08-31, Duration: 1.0 years.

[CG12] Taylor T. Johnson (PI (Sole)), "Cyber-Physical Systems Specification Mismatch and Safe Upgrades," Systems and Software Program (SS), Air Force Office of Scientific Research (AFOSR), Award Amount: $397,806, 2015-08-15 to 2018-08-14, Award Number: FA9550-15-1-0258, Duration: 3.0 years.

[CG11] Taylor T. Johnson (PI (Sole)), "CRII: CPS: Safe Cyber-Physical Systems Upgrades," CISE Research Initiation Initiative, Cyber-Physical Systems Program, Division of Computer and Network Systems, Directorate for Computer and Information Science and Engineering (CISE:CNS:CRII:CPS), National Science Foundation (NSF), Award Amount: $174,634, 2015-06-15 to 2017-06-14, Award Number: 1713253, 1464311, Duration: 2.0 years.

[CG10] Taylor T. Johnson (PI), with Gautam Biswas (Co-PI), Clare McCabe (Co-PI), Julie Johnson (Co-PI), "Improving Participation of Female Computer Science Majors and Professionals through Digital Learning with Groups of Mobile Robots Controlled by Android Apps," MacroGrant, Vanderbilt Institute for Digital Learning (VIDL), Award Amount: $10,000, 2017-07-01 to 2018-06-30, Duration: 1.0 years.

[CG9] Taylor T. Johnson (PI (Sole)), "Reusable Formal Verification for Cyber-Physical Systems," Young Investigator Research Program (YIP), Air Force Office of Scientific Research (AFOSR), Award Amount: $357,564, 2016-08-01 to 2019-07-31, Award Number: FA9550-16-1-0246, Duration: 3.0 years.

[CG8] Taylor T. Johnson (Co-PI), with Ali Davoudi (PI, UT-Arlington), Frank Lewis (Co-PI, UT-Arlington), Hamidreza Modares (Co-PI, UT-Arlington), "Testbed Acquisition for Resilient Self-Organizing Microgrids," Defense University Research Instrumentation Program (DURIP), Office of Naval Research (ONR), Award Amount: $220,000, 2016-09-15 to 2017-09-14, Award Number: N0014-16-1-3180, Duration: 1.0 years.

[CG7] Taylor T. Johnson (Co-PI), with Ali Davoudi (PI, UT-Arlington), Frank Lewis (Co-PI, UT-Arlington), Hamidreza Modares (Co-PI, UT-Arlington), "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) (REP:HBCU/MSI), Army Research Office (ARO), Award Amount: $300,000, 2016-09-15 to 2017-09-14, Award Number: W911NF-16-1-0534, Duration: 1.0 years.

[CG6] Taylor T. Johnson (PI (Sole)), "Safely and Securely Controlling Large Swarms of Unmanned Aerial Vehicles (UAVs) with the STAbilizing Robot Language (StarL)," Summer of Innovation (SoI), Air Force Research Laboratory (AFRL), Award Amount: $90,000, 2017-05-01 to 2017-08-31, Award Number: FA8650-12-3-7255, Duration: 0.3 years.

[CG5] Taylor T. Johnson (PI (Sole)), "Formal Modeling of Emergence in Distributed Cyber-Physical Systems," Trusted Autonomy and Verification and Validation (VV), Integrated Command and Control (TAVV), Air Force Research Laboratory (AFRL), Award Amount: $499,546, 2015-04-16 to 2017-04-15, Award Number: FA8750-15-1-0105, Duration: 2.0 years.

[CG4] Taylor T. Johnson (Co-PI), with Stephen Mattingly (PI), Colleen Casey (Co-PI), "App-Based Crowd Sourcing of Bicycle and Pedestrian Conflict Data," University Transportation Center for Livable Communities (TRCLC), United States Department of Transportation (USDOT), Award Amount: $120,001, 2015-08-01 to 2016-07-31, Award Number: DTRT13-G-UTC60, Duration: 1.0 years.

[CG3] Taylor T. Johnson (PI (Sole)), "Detecting and Mitigating Cyber-Physical Attacks with Invariant Inference and Runtime Assurance," Summer Faculty Fellowship Program (SFFP), Air Force Office of Scientific Research (AFOSR), Award Amount: $43,575, 2015-05-18 to 2015-07-31, Duration: 0.2 years.

[CG2] Taylor T. Johnson (PI), with Ali Davoudi (Co-PI), David Levine (Senior Personnel), "Real-time Ab Initio Modeling of Electric Machines," Hardware Donation Program (HDP), NVIDIA (NVIDIA), Award Amount: $4,000, 2014-11-12 to 2014-11-12.

[CG1] Taylor T. Johnson (PI (Sole)), "Inferring Physical System Specifications from Embedded Software Tests," Visiting Faculty Research Program (VFRP), Air Force Research Laboratory (AFRL), Award Amount: $27,980, 2014-05-19 to 2014-08-08, Award Number: FA8750-13-2-0115, Duration: 0.2 years.

CONFERENCE AND OTHER TRAVEL GRANTS

August 2017 **Southeastern Conference (SEC) Faculty Travel Program Award**.

May 2017 **CPS Verification and Validation: Industrial Challenges and Foundations Workshop (CPS V&V I&F Workshop 2017), Carnegie Mellon University (NSF)**.

March 2015 **NSF CISE CAREER Workshop 2015 (NSF)**.

December 2014 **CPS Verification and Validation: Industrial Challenges and Foundations Workshop (CPS V&V I&F Workshop 2014), Carnegie Mellon University (NSF)**.

December 2012 **IEEE Real-Time Systems Symposium (RTSS), (University of Illinois at Urbana-Champaign Graduate College and NSF)**.

December 2011 **IEEE Conference on Decision and Control (CDC) (University of Illinois at Urbana-Champaign Graduate College and Rockwell Collins)**.

September 2010 **International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS) (NSF)**.

December 2009 **IEEE Real-Time Systems Symposium (RTSS) (NSF)**.

April 2009 **IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) (NSF)**.

OUTREACH

2014 – Present **Rice Alumni Volunteers for Admission (RAVA)**.

- Interviewed prospective Rice University undergraduate students in-person and via teleconference (around 5 annually), 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.

2017 – 2018 **MNPS K-12 Computer Science Curriculum Development**.

- Developed a mobile phone for computer science curriculum and demonstrations using the Raspberry Pi in conjunction with Chaz Carothers, M.Ed., Encore K-4 Teacher in Metro Nashville Public Schools (MNPS), Advanced Academics Resource Teacher (AART), Henry C. Maxwell Elementary School.

2014 – 2016 **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.

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]

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 LICENSURE

2019 – Present **Professional Engineer (PE), License Number 122259**, *Tennessee Board of Architectural and Engineer Examiners*, Passed the National Council of Examiners for Engineering and Surveying (NCEES) PE exam (Software Engineering) in April 2019, fully licensed since June 2019.

2018 – 2019 **Engineer-in-Training (EiT) / Engineer Intern, License Number 33711**, *Tennessee Board of Architectural and Engineer Examiners*.

PROFESSIONAL ORGANIZATIONS

2019 – Present **Member**, *Association for the Advancement of Artificial Intelligence (AAAI)*.

2018 – Present **Member**, *National Society of Professional Engineers (NSPE)*.

2016 – Present **Member**, *American Association for the Advancement of Science (AAAS)*.

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 SERVICE

2021 – Present **Vanderbilt University, Graduate Faculty Council**.
Elected member advising the Graduate School from the School of Engineering. Participated as a panelist in Graduate Student Orientation

2017 – Present **Vanderbilt University, Ingram Commons, Vanderbilt Visions / VUcept, Faculty VUceptor for a cohort of $17-20$ first-year undergraduates.**, *Fall 2024, Fall 2023, Fall 2022, Fall 2021, Fall 2020, Fall 2019, Fall 2018, Fall 2017.*

2021 – 2024 **Vanderbilt University, Graduate Faculty Council, Executive Committee**.
Invited member of executive committee advising the Graduate School from the School of Engineering

2021 – 2022 **Vanderbilt University, Graduate School Search Committee**.
Search committee member for Associate Dean for Academic Affairs of the Graduate School

2020 **Vanderbilt University, Online Course Design Institute (OCDI), Center for Teaching**.
Participated in an online course design institute to better prepare for online and blended online-and-in-person teaching

2019 **Vanderbilt University, Ingram Commons, Vanderbilt Visions / VUcept, Student VUceptor Interviewer**.
Interviewed six prospective student VUceptor candidates for the 2019-2020 academic year

2018 – 2019 **Vanderbilt University, Ingram Commons, Vanderbilt Visions / VUcept, Commons Reading Selection Committee**.
Evaluated five potential Commons reading book prospects and made recommendations for the 2019 Commons reading

2017 – 2019 **Vanderbilt University, VU Women in Science and Engineering and VU Center for Integration of Research, Teaching, and Learning (VU-WiSE and VU-CIRTL) Tiered Mentorship Program (TMP)**, *Participated as a faculty mentor*, 2018-2019, 2017-2018.

COLLEGE/SCHOOL AND DEPARTMENTAL SERVICE

2024 – Present **Vanderbilt University, Computer Science Faculty Search Committee Member**.

2024 – Present **Vanderbilt University, College of Connected Computing (CCC), Faculty Advisory Committee**.
Provide feedback and guidance for formation of College of Connected Computing (CCC)

2024 – Present **Vanderbilt University, School of Engineering, Associate Chair for Computer Science**.
Provide strategic guidance for department, handle duties of chair when in absentia

2023 – Present **Vanderbilt University, School of Engineering, Director of Graduate Studies (DGS) for Computer Science PhD Program**.
Responsible for all aspects of the computer science PhD degree, covering recruitment, advising, program progression, staff/Graduate Program Coordinator (GPC) staff hiring and management, funding and budget management (teaching assistantship assignments, etc., totaling about $\$2.5$ million annually), etc. for over 150 PhD students

2021 – Present **Vanderbilt University, School of Engineering, Director for Master of Engineering (MEng) in Cyber-Physical Systems (CPS)**.
Responsible for all aspects of this professional graduate degree, covering recruitment, advising, program progression (serving as the Director of Graduate Studies [DGS] for the program), marketing, etc

2021 – Present **Vanderbilt University, Vanderbilt University School of Engineering, Digital Fabrication Minor, CS Faculty Delegate**.
Provided feedback on CS courses to be included in digital fabrication minor

2021 – 2023 **Vanderbilt University, Electrical Eng. and Computer Science, Destination CS / Destination Vanderbilt Faculty Search Committee Member**.

2017 – 2023 **Vanderbilt University, Electrical Eng. and Computer Science, Academic Advisor for a cohort of 35 undergraduates in Computer Science (CS) and Computer Engineering (CmpE) for the classes of 2021 and 2025**.

2017 – 2022 **Vanderbilt University, Electrical Eng. and Computer Science, WithIT Computer Science Seminar Organizer**.

2019 – 2022 **Vanderbilt University, Electrical Eng. and Computer Science, Adviser for Student Team in two F1/10 Autonomous Racecar Competitions held at events such as the Cyber-Physical Systems and Internet-of-Things Week (CPS-IoT Week) 2019 and Embedded Systems Week (ESWeek) 2019 and IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2021**.

2018 – 2021 **Vanderbilt University, Electrical Eng. and Computer Science, Director of Graduate Recruiting (DGR), Computer Science**.
Helped ACM-W/Women-in-Computing raise funds totaling around $12.5k for Vanderbilt to server as a platinum sponsor and for Vanderbilt CS students to attend the Grace Hopper Celebration of Women in Computing in 2019, and again for around a dozen and a half Vanderbilt CS students to attend the 2020 virtual edition. In total, around three dozen Vanderbilt CS students attended through our sponsorship efforts, and myself as CS DGR to help with CS graduate recruiting.

2018 – 2019 **Vanderbilt University, Electrical Eng. and Computer Science, Digital Systems (EECE2123) Revision Committee**.
Committee to determine future plans for digital systems introduction to computer systems and engineering across the CS and ECE departments, with recommendation to create a new required Computer Architecture course in CS and cross-list with ECE.

2018 – 2020 **Vanderbilt University, Electrical Eng. and Computer Science, Adviser for Student Team in 2018, 2019, and 2020 NSF Cyber-Physical Systems (CPS) Challenges**.

2019 **Vanderbilt University, School of Engineering, Profs in the House, Spoke with about 40 first year students about their transition to Vanderbilt**.

2019 **Vanderbilt University, Data Science Institute (DSI), Electrical Eng. and Computer Science, Postdoctoral Fellow Selection Committee**.

2018 **Vanderbilt University, VandyHacks, Electrical Eng. and Computer Science, Judge for Award Selection**.

2016 – Present **Vanderbilt University, Accreditation Board for Engineering and Technology (ABET) Accreditation, Computer Science (CS) and Computer Engineering (CmpE) evaluation development**.

2018 – 2019 **Vanderbilt University, Electrical Eng. and Computer Science, Digital Systems (EECE2123) Curriculum Creation Committee**.

Primary contributor to make a core undergraduate curriculum change for our Computer Science (CS), Computer Engineering (CmpE), and Electrical Engineering (EE) degrees, eliminating two required undergraduate courses (Computer Organization (CS2231) and Digital Logic (EECE2216)) and creating one new required undergraduate course (Digital Systems (EECE2123), then teaching the first iteration of EECE2123 in fall 2019.

2016 – 2018 **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**.

- 2024: Abdelrahman Waleed Elsayed Aly Hekal, "'Safety of Cyber-Physical Systems: Verification, Falsification, and Adversarial Attacks"', Computer Science, Newcastle University. Advisers: Sergiy Bogomolov and Sadegh Soudjani. Role: External examiner.
- 2023 – 2024: Nham Le, "'Verifying Neural Networks Explanation"', Electrical and Computer Engineering, University of Waterloo. Advisers: Arie Gurfinkel. Role: External examiner and committee member.
- 2022 – 2023: Florian Jaeckle, "'Towards Robust Machine Learning with Graph Neural Network"', Engineering Science, Oxford University. Advisers: Philip Torr and M. Pawan Kumar. Internal Examiner: Victor A. Prisacariu. Role: External examiner.
- 2021 – 2022: Dario Guidotti, "'Verification and Repair of Machine Learning Models"', Computer Science and Systems Engineering, University of Genova. Adviser: Armando Tacchella. Role: External examiner and committee member.
- 2020 – 2021: Niveditha Manjunath, "'Fault-Based Analysis of Cyber-Physical Systems"', Informatics, Technical University of Vienna (TU Wien). Adviser: Ezio Bartocci. Role: Reviewer and External Committee Member.
- 2017 – 2020: Ritwika Ghosh, "'Separation of distributed coordination and control for programming reliable robotics"', Computer Science, University of Illinois at Urbana-Champaign . Adviser: Sayan Mitra. Role: External Committee Member.
- 2016 – 2019: Fardin Abdi, "'Safety and security of cyber-physical systems"', Electrical and Computer Engineering, University of Illinois at Urbana-Champaign . Adviser: Marco Caccamo. Role: External Committee Member.
- 2015 – 2016: John Podolanko, Computer Science and Eng., University of Texas at Arlington. Adviser: Matthew Wright.
- 2014 – 2016: Brian Cook, Computer Science and Eng., University of Texas at Arlington. Adviser: Manfred Huber.
- 2014 – 2016: Nicholas Brent Burns, Computer Science and Eng., University of Texas at Arlington. Adviser: Gergely Zaruba.
- 2014 – 2015: Seyedali Moayedi, Electrical Engineering, University of Texas at Arlington. Adviser: Ali Davoudi.
- 2014 – 2015: Vahidreza Nasirian, Electrical Engineering, University of Texas at Arlington. Adviser: Ali Davoudi.
- 2013 – 2016: Minh Nguyen, Computer Science and Eng., University of Texas at Arlington. Adviser: Hao Che.

2013 – Present **Doctoral Preliminary Exam Committee Membership**.

Served on dozens of preliminary exam committees

REVIEWING AND SCHOLARLY COMMUNITY SERVICE

RESEARCH PROPOSAL REVIEWING

NSF **National Science Foundation (NSF), CISE Review Panels**, *2015, 2016, 2017, 2018, 2019, 2020, 2022, 2023 (3), 2024, 2025*.

ISF **Israel Science Foundation**, *2024*.

EU **European Union EUTOPIA Science and Innovation Fellowships (SIF) Programme**, *2024*.

ANR **Agence Nationale de la Recherche**, *2023*.

NDSEG **Department of Defense National Defense Science and Engineering Graduate Fellowship Program (NDSEG)**, *2021*.

SMART **Science, Mathematics And Research for Transformation (SMART) Scholarship for Service Program, Department of Defense (DoD), Reviewer**, *2016, 2018, 2019, 2020*.

NSF-EPSCoR **National Science Foundation (NSF), Ad Hoc Reviewer**, *2020*.

NSF-GRFP **National Science Foundation (NSF), Graduate Research Fellowship Program (GRFP) Panel**, *2020*.

Mitacs **Mitacs Canada Accelerate Program, External Reviewer**, *2017, 2019*.

Nebraska **University of Nebraska, Faculty Grants System Science Request for Applications**, *2018*.

NSERC **Natural Sciences and Engineering Research Council of Canada (NSERC), External Reviewer**, *2017, 2018*.

AFOSR **Air Force Office of Scientific Research (AFOSR), External Reviewer**, *2015, 2016*.

ORAU **Oak Ridge Associated Universities (ORAU), NASA Postdoctoral Program (NPP)**, *2014*.

RESEARCH REVIEWING AND ORGANIZATIONAL SERVICE

2009 – Present **Reviewing Service Overview and Verified Publons Record**.
My reviewing service for journals and conferences is verified through Publons, and a summary may be seen below with details at: `https://publons.com/author/522170/taylor-johnson` .

JOURNAL EDITORSHIP

NAHS **International Federation of Automatic Control (IFAC) Nonlinear Analysis: Hybrid Systems (NAHS)**, *2024-on*, Guest Associate Editor.

AMAI **Springer Annals of Mathematics and Artificial Intelligence (AMAI)**, *2024-on*, Associate Editor.

STTT **Springer International Journal on Software Tools for Technology Transfer (STTT)**, *2022-on*, Associate Editor.

IET-CTA **IET Control Theory & Applications, Guest Editor for Special Issue on Recent Advances in Control and Verification for Hybrid Systems**, *2018-2019*.

CONFERENCE/WORKSHOP STEERING COMMITTEE MEMBERSHIP

SAIV **Symposium on Artificial Intelligence (AI) Verification (SAIV), Steering Committee Member**, *2023-present*.

DHS **Methods and Tools for Distributed Hybrid Systems (DHS), Steering Committee Member**, *2019-present*.

SNR **International Workshop on Symbolic-Numeric Methods for Reasoning about CPS and IoT (SNR, Steering Committee Member)**, *2018-present*.

TECHNICAL PROGRAM COMMITTEE MEMBERSHIP

QEST-FORMATS'25 **2nd Joint Conference of the 22nd International Conference on Quantitative Evaluation of SysTems (QEST) and 23rd International Conference on Formal Modeling and Analysis of Timed Systems (QEST-FORMATS 2025), Technical Program Committee, Aarhus, Denmark, August**, *2025*.

HotSoS'25 **Hot Topics in the Science of Security 2025 (HotSoS 2025), Technical Program Committee, Virtual, April 2025**.

ICCPS'25 **16th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2025), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), Irvine, California, May 2025**.

FMAS'24 **Formal Methods for Autonomous Systems Workshop (FMAS'24), Technical Program Committee, Manchester, England, November 2024**.

EMSOFT'24 **24rd ACM International Conference on Embedded Software (EMSOFT 2024), Technical Program Committee, Raleigh, North Carolina, USA, September 2024**.

QEST-FORMATS'24 **1st Joint Conference of the 21st International Conference on Quantitative Evaluation of SysTems (QEST) and 22nd International Conference on Formal Modeling and Analysis of Timed Systems (QEST-FORMATS 2024), Technical Program Committee, Calgary, Canada, September**, *2024*.

SMC-IT/SCC'24 **IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT) and Space Computing Conference (SCC) (SMC-IT/SCC'24), Technical Program Committee, Mountain View, CA, July 2024**.

ADHS'24 **8th IFAC Conference Analysis and Design of Hybrid Systems (ADHS 2024), Technical Program Committee, Boulder, Colorado, July 2024**.

HSCC'24 **27th ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2024), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), Hong Kong, May 2023**.

ICCPS'24 **15th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2024), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), Hong Kong, May 2024**.

NFM'24 **16th NASA Formal Methods Symposium (NFM 2024), Technical Program Committee, Moffett Field, California, May 2024**.

AAAI'24 **38th AAAI Conference on Artificial Intelligence (AAAI 2024), Senior Program Committee for Safe and Robust AI (SRAI) Track, February 2024**.

FMAS'23 **Formal Methods for Autonomous Systems Workshop (FMAS'23), Technical Program Committee, Leiden, Netherlands, November 2023**.

EMSOFT'23 **23rd ACM International Conference on Embedded Software (EMSOFT 2023), Technical Program Committee, Hamburg, Germany, September 2023**, *Outstanding Reviewer Award*.

FORMATS'23 **21st International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS 2023), Technical Program Committee, September 2023**.

WFVML'23 **2nd Workshop on Formal Verification of Machine Learning (WFVML 2023), Technical Program Committee, Honolulu, Hawaii, July 2023**.

SMC-IT/SCC'23 **IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT) and Space Computing Conference (SCC) (SMC-IT/SCC'23), Technical Program Committee, Pasadena, CA, July 2023**.

SPIN'23 **29th International Symposium on Model Checking of Software (SPIN 2023), Technical Program Committee, April 2023**.

HSCC'23 **26th ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2023), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), May 2023**.

ICCPS'23 **14th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2023), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), May 2023**.

AAAI'23 **37th AAAI Conference on Artificial Intelligence (AAAI 2023), Senior Program Committee for Safe and Robust AI (SRAI) Track, February 2023**.

FMAS'22 **Formal Methods for Autonomous Systems Workshop (FMAS'22), Technical Program Committee, Berlin, Germany, October 2022**.

NSV'22 **15th International Workshop on Numerical Software Verification (NSV'22), Technical Program Committee, Haifa, Israel, August 2022**.

FORMATS'22 **20th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS 2022), Technical Program Committee, September 2022**.

CAV'22 **34th International Conference on Computer Aided Verification (CAV 2022), Technical Program Committee, August 2022**.

CVPR'22 **IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2022), Technical Program Committee, June 2022**.

AAAI'22 **36th AAAI Conference on Artificial Intelligence (AAAI 2022), Technical Program Committee, February 2022**.

HSCC'22 **25th ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2022), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), May 2022**.

ICCPS'22 **13th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2022), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), May 2022**.

ICCV'21 **IEEE International Conference on Computer Vision (ICCV 2021), Technical Program Committee, October 2021**.

CVPR'21 **IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2021), Technical Program Committee, June 2021**.

AAAI'21 **35th AAAI Conference on Artificial Intelligence (AAAI 2021), Technical Program Committee, February 2021**.

SNR'21 **7th International Workshop on Symbolic-Numeric Methods for Reasoning about CPS and IoT (SNR 2021), Technical Program Committee, August 2021**.

FMAS'21 **Formal Methods for Autonomous Systems Workshop (FMAS'21), Technical Program Committee, Virtual, October 2021**.

ADHS'21 **7th IFAC Conference Analysis and Design of Hybrid Systems (ADHS 2021), Technical Program Committee, July 2021**.

SNR'20 **6th International Workshop on Symbolic-Numeric Methods for Reasoning about CPS and IoT (SNR 2020), Technical Program Committee, August 2020**.

FMAS'20 **Formal Methods for Autonomous Systems Workshop (FMAS'20), Technical Program Committee, Virtual, October 2020**.

NFM'20 **12th NASA Formal Methods Symposium (NFM 2020), Technical Program Committee, May 2020**.

HSCC'20 **23rd ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2020), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), April 2020**.

ICCPS'20 **11th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2020), Technical Program Committee, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), April 2020**.

FMAS'19 **Formal Methods for Autonomous Systems Workshop (FMAS'19), Technical Program Committee, Porto, Portugal, October 2019**.

F4TDAS'19 **1st International Workshop on Formal Techniques for Dependable Autonomous Systems (F4TDAS'19), Technical Program Committee, Turku, Finland, September 2019**.

FoMLAS'19 **2nd Workshop on Formal Methods for ML-Enabled Autonomous Systems (FoMLAS'19), Technical Program Committee, New York, NY, July 2019**.

GHC'19 **Anita Borg Institute Grace Hopper Celebration (GHC'19), Technical Program Committee, Orlando, FL, October 2019**.

ISORC'19 **22nd IEEE International Symposium on Real-Time Distributed Computing (ISORC'19), Technical Program Committee, Valencia, Spain, May 2019**.

ICCPS'19 **10th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2019), Technical Program Committee, Cyber-Physical Systems and Internet-of-Things Week (CPS-IoTWeek), April 2019**.

ICCPS-WiP'19 **10th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2019), Poster/Demo/Work-in-Progress Sessions, Technical Program Committee, Cyber-Physical Systems and Internet-of-Things Week (CPS-IoTWeek), April 2019**.

HSCC'19 **22nd ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2019), Technical Program Committee, Cyber-Physical Systems and Internet-of-Things Week (CPS-IoTWeek), April 2019**.

RTSS-AE'18 **39th IEEE Real-Time Systems Symposium (RTSS), Artifact Evaluation Committee, Nashville, TN, December 2018**.

TREC4CPS'18 **1st International Workshop on Trustworthy and Real-time Edge Computing for Cyber-Physical Systems (TREC4CPS), Technical Program Committee, Real-Time Systems Symposium (RTSS), Nashville, TN, December 2018**.

SNR'19 **5th International Workshop on Symbolic and Numerical Methods for Reachability Analysis (SNR 2019), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Montreal, Canada 2019**.

CPS-SR'19 **2nd Workshop on Cyber-Physical Systems Security and Resilience (CPS-SR 2019), collocated with CPSWeek 2019, Technical Program Committee, Montreal, Canada, April 2019**.

EMSOFT'18 **18th ACM International Conference on Embedded Software (EMSOFT 2018), Technical Program Committee, Torino, Italy, September-October 2018**.

FAC'18 **9th International Workshop on Frontiers in Analog CAD (FAC 2018), Technical Program Committee, Vienna, Austria, May 2018**.

ICCPS'18 **9th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2018), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), April 2018**.

HSCC'18 **21st ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2018), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), April 2018**.

CPS-SR'18 **1st Workshop on Cyber-Physical Systems Security and Resilience (CPS-SR 2018), collocated with CPSWeek 2018, Technical Program Committee, Porto, Portugal, April 2018**.

RTSS-AE'17 **38th IEEE Real-Time Systems Symposium (RTSS), Artifact Evaluation Committee, Paris, France, December 2017**.

EMSOFT'17 **17th ACM International Conference on Embedded Software (EMSOFT 2017), Technical Program Committee, South Korea, 2017**.

V2CPS'17 **2nd International Workshop on Verification and Validation of Cyber-Physical Systems (V2CPS), co-located with the Integrated Formal Methods Conference (iFM 2017), 2017**.

HSCC'17 **20th ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2017), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Pittsburgh, Pennsylvania, April 11-14, 2017**.

RTSS'16 **37th IEEE Real-Time Systems Symposium (RTSS), Technical Program Committee, Cyber-Physical Systems Track, Porto, Portugal, December 2016**.

EMSOFT'16 **16th ACM International Conference on Embedded Software (EMSOFT 2016), Technical Program Committee, Pittsburgh, PA, October 2-7, 2016**.

ICPP'16 **45th International Conference on Parallel Processing (ICPP 2016), Cyber-Physical Systems Track, Technical Program Committee, Philadelphia, PA, August 16-19, 2016**.

HSCC'16 **19th ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2016), Technical Program Committee, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 11-14, 2016**.

SNR'16 **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**.

RTSS'15 **36th IEEE Real-Time Systems Symposium (RTSS), Technical Program Committee, Cyber-Physical Systems Track, San Antonio, TX, December 1-4, 2015**.

RSWeek'15 **Distributed Control Paradigms to Enable Resilient Microgrids, Special Session at IEEE Resilience Week 2015, Co-Organizer, Philadelphia, PA, August 18-20, 2015**.

Compel'15 **16th IEEE Workshop on Control and Modeling for Power Electronics (Compel), Technical Program Committee, Vancouver, BC, Canada, July 12-15, 2015**.

RV'14 **14th International Conference on Runtime Verification (RV), Toronto, Canada, September 22-25, 2014**.

CONFERENCE ORGANIZATIONAL SERVICE

VNN'25 **6th International Verification of Neural Networks Competition (VNN-COMP'25), Co-Chair with Changliu Liu, Stanley Bak, Christopher Brix, and Haoze (Andrew) Wu, Affiliated with CAV and SAIV 2025**.

AISoLA'24 **2nd International Conference on Bridging the Gap Between AI and Reality (AISoLA'24), Verification of Neuro-Symbolic Artificial Intelligence (VNSAI) Track, Co-Chair with Daniel Neider, Crete, Greece, October 30-November 3, 2024**.

VNN'24 **5th International Verification of Neural Networks Competition (VNN-COMP'24), Co-Chair with Changliu Liu, Stanley Bak, Christopher Brix, and Haoze (Andrew) Wu, Affiliated with CAV and SAIV 2024**.

ARCH'24 **11th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 8th Hybrid Systems Verification Competition (ARCH-COMP), Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, September 2024, 2024**.

AISoLA'23 **1st International Conference on Bridging the Gap Between AI and Reality (AISoLA'23), Track C1: Safety Verification of DNNs, Co-Chair with Daniel Neider, Crete, Greece, October 23–28, 2023**.

FORMATS'23 **21st International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'23), Special Session in Memory of Sergiy Bogomolov, Co-Chair with Martin Franzle, Antwerp, Belgium, September 19-21, 2023**.

VNN'23 **4th International Verification of Neural Networks Competition (VNN-COMP'23), Co-Chair with Changliu Liu and Stanley Bak, Affiliated with CAV 2023**.

ARCH'23 **10th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 7th Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair, Experimental Evaluation Chair, and Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, September 2023, 2023**.

VNN'22 **3rd International Verification of Neural Networks Competition (VNN-COMP'22), Co-Chair with Changliu Liu and Stanley Bak, Affiliated with CAV 2022**.

ARCH'22 **9th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 6th Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair, Experimental Evaluation Chair, and Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, September 2022, 2022**.

VNN'21 **2nd International Verification of Neural Networks Competition (VNN-COMP'21), Co-Chair with Changliu Liu and Stanley Bak, Affiliated with CAV 2021**.

ARCH'21 **8th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 5th Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair, Experimental Evaluation Chair, and Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, IFAC ADHS, Brussels, Belgium, July 7, 2021**.

VNN'20 **3rd International Workshop on Verification of Neural Networks (VNN20) and 1st International Verification of Neural Networks Competition (VNN-COMP'20), Workshop Co-Chair with Changliu Liu, Affiliated with CAV 2020**.

ARCH'20 **7th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 4rd Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair, Experimental Evaluation Chair, and Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, IFAC World Congress, Berlin, Germany, July 12, 2020**.

HSCC'20 **23rd ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2020), Poster and Demo Session Chair, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), April 2020**.

GHC'19 **Anita Borg Institute Grace Hopper Celebration (GHC'19), Session Chair, Orlando, FL, October 2019**.

HSCC'19 **22nd ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2019), Publicity Chair, Cyber-Physical Systems and Internet of Things Week (CPS-IoTWeek), April 2019**.

ARCH'19 **6th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 3rd Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair, Experimental Evaluation Chair, and Artificial Intelligence and Neural Network Control Systems (AINNCS) Competition Category Chair, Cyber-Physical Systems Week (CPSWeek), Montreal, Canada, April 15, 2019**.

RTSS'18 **39th IEEE Real-Time Systems Symposium (RTSS), Local Organizing Committee, Nashville, TN, December 2018**.

SNR'18 **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**.

ARCH'18 **5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 2nd Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair and Experimental Evaluation Chair, Oxford, United Kingdom, July 15, 2018**.

ARCH'17 **4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH) and 1st Hybrid Systems Verification Competition (ARCH-COMP) Repeatability Evaluation Chair and Experimental Evaluation Chair, Cyber-Physical Systems Week (CPSWeek), Pittsburgh, PA, April 17, 2017**.

HSCC-RE'17 **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**.

ICCPS-WiP'16 **7th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), Work-in-Progress, Demo, and Poster Chair, Cyber-Physical Systems Week (CPSWeek), Vienna, Austria, April 12, 2016**.

ARCH'16 **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**.

ARCH'15 **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**.

CSL'12 **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**.

CPSWeek'11 **Cyber Physical Systems Week (CPSWeek) 2011, Chicago, IL. Designed program booklet, which was reused for CPSWeek 2012, Beijing, China**.

JOURNAL REVIEWING

ACM CSUR **ACM Computing Surveys (CSUR)**, *2020-present*.

IEEE TCAD **IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems**, *2019-present*.

IEEE TPS **IEEE Transactions on Power Systems**, *2019-present*.

IEEE ACCESS **IEEE Access**, *2018-present*.

ACM TOSEM **ACM Transactions on Software Engineering and Methodology**, *2018-present*.

ACTA INF **Acta Informatica**, *2018-present*.

TCS **Elsevier Theoretical Computer Science (TCS)**, *2017-present*.

AUTOMATICA **Elsevier International Federation of Automatic Control (IFAC) Automatica**, *2017-present*.

PIEEE **Proceedings of the IEEE**, *2017-present*.

ACM TCPS **ACM Transactions on Cyber-Physical Systems (TCPS)**, *2016-present*.

IJRNC **International Journal of Robust and Nonlinear Control (IJRNC)**, *2017*.

IEEE TAC **IEEE Transactions on Automatic Control**, *2013-present*.

IEEE CSM **IEEE Control Systems Magazine (CSM)**, *2016*.

IEEE TPEL **IEEE Transactions on Power Electronics (TPEL)**, *2016*.

ACM TECS **ACM Transactions on Embedded Computing Systems (TECS)**, *2015-present*.

IEEE SJ **IEEE Systems Journal**, *2014-present*.

IET CTA **IET Control Theory and Applications (CTA)**, *2015*.

JSSSE **Journal of Systems Science and Systems Engineering (JSSSE), Springer**, *2015*.

JPEDS **International Journal of Parallel, Emergent and Distributed Systems (JPEDS) (previously Parallel Algorithms and Applications), Taylor & Francis**, *2015*.

ACM TAAS **ACM Transactions on Autonomous and Adaptive Systems (TAAS)**, *2012, 2014*.

IEEE JSAC **IEEE Journal on Selected Areas in Communications (JSAC)**, *2012*.

IEEE TC **IEEE Transactions on Computers**, *2009*.

BOOK REVIEWER

Princeton **Princeton University Press, Book Reviewer for Princeton Series in Applied Mathematics, 2017-2018**.

EXTERNAL REVIEWER FOR CONFERENCES

CDC'19 **IEEE Conference on Decision and Control (CDC), 2019**.

ICCAD'18 **IEEE/ACM International Conference On Computer Aided Design (ICCAD), 2018**.

CDC'18 **IEEE Conference on Decision and Control (CDC), 2018**.

PECI'18 **IEEE Power and Energy Conference at Illinois (PECI), 2018**.

ACC'16 **American Control Conference (ACC), 2016**.

ICST'15 **IEEE International Conference on Software Testing, Verification and Validation (ICST), 2015 Tools Track**.

MSC'14 **IEEE Multi-Conference on Systems and Control, 2014**.

PECI'14 **IEEE Power and Energy Conference at Illinois (PECI), 2014**.

ICCPS'13 **ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2013**.

HSCC'13 **ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2013**.

PECI'13 **IEEE Power and Energy Conference at Illinois (PECI), 2013, 2014**.

HSCC'12 **ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2012**.

SSS'12 **International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS), 2012**.

RSS'12 **Robotics: Science and Systems Conference (RSS), 2012**.

HSCC'11 **ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2011**.

NFM'11 **NASA Formal Methods Symposium (NFM), 2011**.

HSCC'10 **ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2010**.

OTHER REVIEWING SERVICE

2018 – 2019 **Curriculum Reviewer**.

- National Council of Examiners for Engineering and Surveying (NCEES), Fundamental of Engineering (FE) Exam, Professional Activities and Knowledge Study (PAKS), Survey Creation Committee for Electrical/Computer Engineering (2018-2019).

MISCELLANEOUS

Citizenship **US Citizen**.