Stanley Bak

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Stanley Bak is a research computer scientist investigating the formal verification of cyber-physical systems. He strives to create **scalable** and **automatic** formal analysis methods for complex models with both ordinary differential equations and discrete behaviors. The ultimate goal is to **make formal approaches applicable**, which demands developing new theory, programming efficient tools and building experimental systems.

Education

- **Doctor of Philosophy in Computer Science** — **May 2013**
  University of Illinois at Urbana-Champaign — *Champaign, IL*
  Dissertation Title: "Verifiable COTS-based Cyber-Physical Systems"
  Advisers: Marco Caccamo and Lui Sha

- **Master of Science in Computer Science** — **October 2009**
  University of Illinois at Urbana-Champaign — *Champaign, IL*
  Thesis Title: "Industrial Application of the System-Level Simplex Architecture for Real-Time Embedded System Safety"

- **Bachelor of Science in Computer Science** — **May 2007**
  Rensselaer Polytechnic Institute — *Troy, NY*
  Summa Cum Laude, GPA: 3.96/4.0

Research Experience

- **Senior Research Scientist** — **April 2018–Present**
  Safe Sky Analytics — *McLean, VA*

  Led internal research effort investigating the verification of hybrid automaton models, including proposing, managing, and technically executing grants from federal sources. Applied verification methods towards models of F-16 ground collision avoidance and space debris tracking with Air Force Research Lab personnel. Supervised summer research intern on scalable verification for deep learning (neural network) architectures.

- **Adjunct Professor** — **August 2019–December 2019**
  Georgetown University — *Washington, DC*

  Designed and taught a graduate and advanced undergraduate level course on verification methods and real-time systems. Topics included formal logic, software verification, abstract interpretation, real-time scheduling / resource sharing, model checking, temporal logic, control theory and hybrid systems verification.

- **Research Computer Scientist** — **August 2013–March 2018**
  United States Air Force Research Laboratory (AFRL) — *Dayton, OH / Rome, NY*

  Principle Investigator on two 3-year internal research efforts ($1.4 million) on formal analysis methods for the analysis of CPS, tailored at security issues and verification of autonomous systems. Initiated and coordinated AFRL funding of over $600K of external academic research. Started Verification & Validation Reading Group within the Aerospace System Autonomous Control Branch and mentored junior researchers.

- **Graduate Research Assistant** **August 2007–May 2013**
  University of Illinois at Urbana-Champaign *Champaign, IL*

  Lead research assistant on three-year grant from John Deere investigating verification architectures for off-road agricultural vehicles. Presented results to John Deere CEO in Kaiserslautern, Germany. Encoded VHDL Formal Semantics in the Maude rewriting logic framework to enable formal verification and worst-case execution time analysis. Started Real-Time Systems Security Reading Group for graduate students.

- **Summer Research Intern** **2010, 2011, 2012**
  United States Air Force Research Laboratory (AFRL) *Rome, NY*

  Devised a hardware-based coarse-grained security tagged architecture for information-flow security in system-on-chip designs. Implemented prototype on an FPGA and work was accepted for publication.

- **Summer Research Intern** **2007**
  Indian Head Naval Surface Warface Center (NSWC) *Indian Head, MD*

  Wrote sensor software in LabVIEW to measure and analyze detonation forces of experimental energetics. Taught STEM camp for middle school students using Lego Mindstorm Robots.

- **Undergraduate Research Assistant** **June 2004–May 2007**
  Rensselaer Polytechnic Institute *Troy, NY*

  Performed three undergraduate research projects in Mathematics, Robotics, and Formal Logic. Completed two journal publications from Mathematics research and was awarded RPI's Founders' Award of Excellence.

Grants and Fellowships

- (2019) "Enhanced Testing of Autonomous Systems using Formal Methods", AFOSR Grant under BAA-AFOSR-2019 Agile Science of Test and Evaluation (Co-PI), 540k
- (2019) "Verification and Validation of Autonomy", subcontract to Infoscitex Corporation under prime contract FA865015D2516 (PI), 136k
- (2018) "Verification and Validation / Hybrid Systems Reachability", subcontract to Wright Brothers Institute under prime contract FA86501237255. (PI), 106k
- (2016) "Agile Approaches for Correct Design of Cyber-Physical Systems", AFOSR LRIR Award under BAA-AFOSR-2016 Systems and Software (Co-PI), 739k
- (2013) "Perpetual Model Validation", AFOSR LRIR Award under BAA-AFOSR-2013 Systems and Software (Co-PI), 739k
- (2009) Science, Mathematics and Research for Transformation (SMART) Scholarship, 335k
- (2008) Debra and Ira Cohen Graduate Fellowship, Stipend (22k) + Tuition and Fees Waiver (38k) = 60k
- (2007) Debra and Ira Cohen Graduate Fellowship, Stipend (21k) + Tuition and Fees Waiver (37k) = 58k

Program Committees

- (ICCPS 2020) 11th ACM/IEEE International Conference on Cyber-Physical Systems
- (EMSOFT 2019) 19th ACM SIGBED International Conference on Embedded Software
- (CyPhy 2019) 9th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems
- (DARS 2019) 4th Workshop on Design and Analysis of Robust Systems

- (ARCH 2019) 6th International Workshop on Applied Verification of Continuous and Hybrid Systems
- (HSCC 2019) 22nd ACM International Conference on Hybrid Systems: Computation and Control
- (ICCPS 2019) 10th ACM/IEEE International Conference on Cyber-Physical Systems
- (CyPhy 2018) 8th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems
- (ARCH 2018) 5th International Workshop on Applied veRification for Continuous and Hybrid Systems
- (HSCC 2018) 21st ACM International Conference on Hybrid Systems: Computation and Control
- (ICCPS 2018) 9th ACM/IEEE International Conference on Cyber-Physical Systems
- (DARS 2018) 3rd Workshop on Design and Analysis of Robust Systems
- (SNR 2018) 4th International Workshop on Symbolic and Numerical Methods for Reachability Analysis
- (RTEST WiP 2018) CSI International Symposium on Real-Time and Embedded Systems and Technologies, Work-in-Progress Session
- (RTSS-AE 2017) 38th IEEE Real-Time Systems Symposium, Artifact Evaluation Chair
- (S5 2017) 8th Annual Safe and Secure Systems and Software Symposium
- (NSV 2017) 10th International Workshop on Numerical Software Verification
- (SNR 2017) 3rd International Workshop on Symbolic and Numerical Methods for Reachability Analysis
- (HSCC-RE 2017) 20th ACM International Conference on Hybrid Systems: Computation and Control, Repeatability Evaluation
- (ARCH 2017) 4th International Workshop on Applied veRification for Continuous and Hybrid Systems
- (IET CPS 2017) IET Cyber-Physical Systems: Theory and Applications, Guest Editor
- (CDCAS 2016) AAAI 2016 Fall Symposium: Cross-Disciplinary Challenges for Autonomous Systems
- (NSV 2016) 9th International Workshop on Numerical Software Verification
- (S5 2016) 7th Annual Safe and Secure Systems and Software Symposium
- (ARCH 2016) 3rd International Workshop on Applied veRification for Continuous and Hybrid Systems
- (RTAS 2016) 22nd IEEE Real-Time Embedded Technology and Applictions Symposium, Embedded Systems Design for Real-Time Applications Track
- (ICCPS-WiP 2016) 7th ACM/IEEE International Conference on Cyber-Physical Systems, Work-in-Progress/Demo/Poster Session
- (RTSS 2015) 36th IEEE Real-Time Systems Symposium, Cyber-Physical Systems Track
- (RTSS-WiP 2015) 36th IEEE Real-Time Systems Symposium, Work-in-Progress Session
- (S5 2015) 6th Annual Safe and Secure Systems and Software Symposium
- (ARCH 2015) 2nd International Workshop on Applied veRification for Continuous and Hybrid Systems
- (CyPhy 2014) 4th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems

Awards

- (2017) €500 Best Paper Award at ARCH Workshop
- (2016) $2000 Aerospace Systems Directorate International Award
- (2016) $400 award for Best Repeatability Evaluation Package at HSCC
- (2016) €500 Best Tool Award at ARCH Workshop

- (2013) Nexus 10 Tablet winner in Coyote Logistics Hackathon (1st place)
- (2013) $100 Amazon Gift Card winner in UIUC indeed.com programming competition
- (2011) $50 Amazon Gift Card winner in UIUC indeed.com programming competition
- (2010) iPod Touch Winner in UIUC ICPC Programming Competition (1st place)
- (2007) Connect-4 Artificial Intelligence Class Champion (1st place, also beat multiyear champion)
- (2004) Founders Award of Excellence for Undergraduate Research
- (2004) Winner in RPI Programming Contest (1st place)

Publications

Conference Papers

- (C1) "Aggregation Strategies in Reachable Set Computation of Hybrid Systems", P. Duggirala and S. Bak, 16th ACM SIGBED International Conference on Embedded Software (EMSOFT 2019), 26% acceptance rate, published in special issue of ACM Transactions on Embedded Computing Systems (ACM TECS)
- (C2) "Numerical Verification of Affine Systems with up to a Billion Dimensions", S. Bak, H. D. Tran, and T. T. Johnson, 22nd International Conference on Hybrid Systems: Computation and Control (HSCC 2019), 25% full paper acceptance rate
- (C3) "t-Barrier Certificates: A Continuous Analogy to k-Induction", S. Bak, IFAC Conference on Analysis and Design of Hybrid Systems (ADHS 2018), 69% acceptance rate
- (C4) "Reachability Analysis for One Dimensional Linear Parabolic Equations", H. D. Tran, W. Xiang, S. Bak, T. Johnson, IFAC Conference on Analysis and Design of Hybrid Systems (ADHS 2018), 69% acceptance rate
- (C5) "Time-Triggered Conversion of Guards for Reachability Analysis of Hybrid Automata", S. Bak, S. Bogomolov, M. Althoff, 15th International Conference on Formal Modelling and Analysis of Timed Systems (FORMATS 2017), 58% acceptance rate
- (C6) "Simulation-Equivalent Reachability of Large Linear Systems with Inputs", S. Bak, P. Duggirala, 29th International Conference on Computer-Aided Verification (CAV 2017), 32% acceptance rate
- (C7) "Rigorous Simulation-Based Analysis of Linear Hybrid Systems", S. Bak, P. Duggirala, 23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2017), 28% acceptance rate
- (C8) "HyLAA: A Tool for Computing Simulation-Equivalent Reachability for Linear Systems", S. Bak, P. Duggirala, 20th International Conference on Hybrid Systems: Computation and Control (HSCC 2017), 38% acceptance rate
- (C9) "Verifying Cyber-Physical Systems by Combining Software Model Checking with Hybrid Systems Reachability", S.Bak, S. Chaki, 13th ACM SIGBED International Conference on Embedded Software (EMSOFT 2016), 26% acceptance rate
- (C10) "Reset-Based Recovery for Real-Time Cyber-Physical Systems with Temporal Safety Constraints", F. Abdi, R. Mancuso, S. Bak, O. Dantsker, M. Caccamo, 21st IEEE International Conference on Emerging Technology & Factory Automation (ETFA 2016)
- (C11) "Scalable Static Hybridization Methods for Analysis of Nonlinear Systems", S. Bak, S. Bogomolov, T. Henzinger, T. Johnson, P. Prakash, 19th International Conference on Hybrid Systems: Computation and Control (HSCC 2016), 49% acceptance rate, **Best Repeatability Evaluation Package Award**
- (C12) "Periodically-Scheduled Controller Analysis using Hybrid Systems Reachability and Continuization", S. Bak, T. Johnson, 36th IEEE Real-Time Systems Symposium (RTSS 2015), 22.5% conference acceptance

rate (16.7% CPS track acceptance rate)

- (C13) "HYST: A Source Transformation and Translation Tool for Hybrid Automaton Models", S. Bak, S. Bogomolov, T. Johnson, ACM/IEEE 18th International Conference on Hybrid Systems: Computation and Control (HSCC 2015), 39% acceptance rate
- (C14) "Cyber-Physical Specification Mismatch Identification with Dynamic Analysis", T. Johnson, S. Bak, S. Drager, 6th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2015), 27% acceptance rate
- (C15) "A Generalized Model for Preventing Information Leakage in Hard Real-Time Systems", R. Pellizzoni, N. Paryab, M.K. Yoon, S. Bak, S. Mohan, R. Bobba, 21st IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2015), 22% acceptance rate,
- (C16) "Real-Time Reachability for Verified Simplex Design", S. Bak, T. Johnson, M. Caccamo, L. Sha, 35th IEEE Real-Time Systems Symposium (RTSS 2014), 21% acceptance rate
- (C17) "Using Run-Time Checking to Provide Safety and Progress for Distributed Cyber-Physical Systems", S. Bak, F. Abdi, Z. Huang, M. Caccamo, Proceedings of the IEEE conference on Embedded and Real-Time Computing Systems and Applications (RTCSA 2013), 30% acceptance rate
- (C18) "On-Chip Control Flow Integrity Check for Real Time Embedded Systems", F. Abdi, J. Van Der Woude, Y. Lu, S. Bak, M. Caccamo, L. Sha, R. Mancuso, S. Mohan, Proceedings of the IEEE International Conference on Cyber-Physical Systems, Networks, and Applications (CPSNA 2013)
- (C19) "S3A: Secure System Simplex Architecture for Enhanced Security and Robustness of Cyber-Physical Systems", S. Mohan, S. Bak, E. Betti, H. Yun, L. Sha, M. Caccamo, Proceedings of the 2nd ACM International Conference on High Confidence Networked Systems (HiCoNS 2013), 57% acceptance rate
- (C20) "Memory-Aware Scheduling of Multicore Task Sets for Real-Time Systems", S. Bak, G. Yao, R. Pellizzoni, M. Caccamo, 18th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA 2012), 48% acceptance rate
- (C21) "Sandboxing Controllers for Cyber-Physical Systems", S. Bak, K. Manamcheri, S. Mitra, M. Caccamo, 2nd ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2011), 25% acceptance rate
- (C22) "A Predictable Execution Model for COTS-based Embedded Systems", R. Pellizzoni, E. Betti, S. Bak, G. Yao, J. Criswell, M. Caccamo, R. Kegley, 17th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2011), 21% acceptance rate
- (C23) "Design, Implementation, and Evaluation of Covert Channel Attacks", H. Okhravi, S. Bak, S. T. King, 10th IEEE International Conference on Technologies for Homeland Security (HST 2010)
- (C24) "Hybrid Cyberphysical System Verification With Simplex Using Discrete Abstractions", S. Bak, A. Greer, S. Mitra, 16th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2010), 22% acceptance rate, **Nominated for Best Paper Award**
- (C25) "Real-Time Control of I/O COTS Peripherals for Embedded Systems", S. Bak, E. Betti, R. Pellizzoni, M. Caccamo, L. Sha, 30th IEEE Real-Time Systems Symposium (RTSS 2009), 22% acceptance rate
- (C26) "The System-Level Simplex Architecture for Improved Real-Time Embedded System Safety", S. Bak, D. Chivukula, O. Adekunle, M. Sun, M. Caccamo, L. Sha, 15th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2009), 26% acceptance rate

Journal Articles

- (J27) "Hybrid Automata: From Verification to Implementation", S. Bak, O. A. Beg, S. Bogomolov, T. T. Johnson, L. V. Nguyen, C. Schilling, International Journal on Software Tools for Technology Transfer (STTT 2019)
- (J28) "Cyber-Physical Specification Mismatches", L. V. Nguyen, K. Hoque, S. Bak, S. Drager and T. T.

Johnson, ACM Transactions on Cyber-Physical Systems (TCPS 2018)

- (J29) "A Comparison of Approaches for Finding Minimum Identifying Codes on Graphs", V. Horan, S. Adachi, S. Bak, Quantum Information Processing (QIP 2016)
- (J30) "Real-Time Reachability for Verified Simplex Design", T. Johnson, S. Bak, M. Caccamo, L. Sha, ACM Transactions on Embedded Computing Systems (ACM TECS 2016)
- (J31) "Global Real-Time Memory-Centric Scheduling for Multicore Systems", G. Yao, R. Pellizzoni, S. Bak, H. Yun, M. Caccamo, IEEE Transactions on Computers (IEEE TC 2016)
- (J32) "Safety and Progress for Distributed Cyber-Physical Systems with Unreliable Communication", S. Bak, F. Abdi, Z. Huang, M. Caccamo, ACM Transactions on Embedded Computing Systems (ACM TECS 2015)
- (J33) "Real-Time I/O Management System with COTS Peripherals", E. Betti, S. Bak, R. Pellizzoni, M. Caccamo, L. Sha, IEEE Transactions on Computers (IEEE TC 2013)
- (J34) "Memory-Centric Scheduling for Multicore Hard Real-Time Systems", G. Yao, R. Pellizzoni, S. Bak, E. Betti, M. Caccamo, Real-Time Systems Journal (RTSJ 2012)
- (J35) "A Third Order Accurate Fast Marching Method for the Eikonal Equation in Two Dimensions", S. Ahmed, S. Bak, J. McLaughlin, D. Renzi, SIAM Journal on Scientific Computing (SIAM JSC 2011)
- (J36) "Some Improvements for the Fast Sweeping Method", S. Bak, J. McLaughlin, D. Renzi, SIAM Journal on Scientific Computing (SIAM JSC 2010)

Workshop Papers / Posters / Other

- (O37) "ARCH-COMP19 Category Report: Continuous and Hybrid Systems with Linear Continuous Dynamics", M. Althoff, S. Bak, M. Forets, G. Frehse, N. Kochdumper, R. Ray, C. Schilling, S. Schupp, 6th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2019)
- (O38) "Efficient n-to-n Collision Detection for Space Debris using 4D AABB Trees", S. Bak, K. Hobbs, 6th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2019)
- (O39) "HyLAA 2.0: A Verification Tool for Linear Hybrid Automaton Models of Cyber-Physical Systems", S. Bak, P. Duggirala, Demo and Poster Session, 39th IEEE Real-Time Systems Symposium (RTSS 2018)
- (O40) "Numerical Verification of 10000-dimensional Linear Systems 10000x Faster", S. Bak, 5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2018)
- (O41) "Verification Challenges in F-16 Ground Collision Avoidance and Other Automated Maneuvers", P. Heidlauf, A. Collins, M. Bolender, S. Bak, 5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2018)
- (O42) "Space Debris Collision Detection using Reachability", K. Hobbs, P. Heidlauf, A. Collins, S. Bak, 5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2018)
- (O43) "ARCH-COMP18 Category Report: Continuous and Hybrid Systems with Linear Continuous Dynamics", M. Althoff, S. Bak, X. Chen, C. Fan, M. Forets, G. Frehse, N. Kochdumper, Y. Li, S. Mitra, R. Ray, C. Schilling, S. Schupp, 5th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2018)
- (O44) "Formal Verification of CPS using Flow-Pipe Construction of Hybrid Automata", S. Bak, Halmstad Summer School on Cyber-Physical Systems (HSSCPS 2017), Invited Instructor
- (O45) "Challenges and Tool Implementation of Hybrid Rapidly-Exploring Random Trees", S. Bak, S. Bogomolov, T. Henzinger, A. Kumar, 10th International Workshop on Numerical Software Verification (NSV 2017)
- (O46) "Direct Verification of Linear Systems with over 10000 Dimensions", S. Bak, P. Duggirala, 4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2017), 83%

acceptance rate, **Best Paper Award**

- (O47) "ARCH-COMP17 Category Report: Continuous and Hybrid Systems with Linear Continuous Dynamics", M. Althoff, S. Bak, D. Cattaruzza, X. Chen, G. Frehse, R. Ray, S. Schupp, 4th International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2017)
- (O48) "HyLAA: A Tool For Computing Simulation-Equivalent Reachability of Linear Systems", P. Duggirala, S. Bak, Demo and Poster Session, ACM/IEEE 19th International Conference on Hybrid Systems: Computation and Control (HSCC 2017)
- (O49) "Tutorial: Software Tools for Hybrid Systems Verification, Transformation, and Synthesis: C2E2, HyST, and TuLiP", P. Duggirala, C. Fan, M. Potok, B. Qi, S. Mitra, M. Viswanathan, S. Bak, S. Bogomolov, T. T. Johnson, L. V. Nguyen, C. Schilling, A. Sogokon, H. D. Tran, W. Xiang, S. Dathathri, I. Filippidis, S. C. Livingston, R. M. Murray, N. Ozay, C. Schiling, IEEE Multi-Conference on Systems and Control (MSC 2016)
- (O50) "Model Generation for Hybrid Systems Verification in HYST", S. Bak, S. Bogomolov, T. Johnson, 7th Annual Safe and Secure Systems and Software Symposium (S5 2016)
- (O51) "High-level Hybrid Systems Analysis with Hypy", S. Bak, S. Bogomolov, C. Schiling, 3rd International Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2016) **Best Tool Award**
- (O52) "Hybrid Systems Model Transformations with HyST", S. Bak, S. Bogomolov, T. Johnson, Demo and Poster Session, ACM/IEEE 19th International Conference on Hybrid Systems: Computation and Control (HSCC 2016)
- (O53) "HYST: A Source-to-Source Transformation Framework for Hybrid Automata", S. Bak, S. Bogomolov, T. Johnson, 1st International Workshop Symbolic and Numerical Methods for Reachability Analysis (SNR 2015)
- (O54) "Hybrid Systems Analysis of Periodic Control Systems using Continuization", S. Bak, 6th Annual Safe and Secure Systems and Software Symposium (S5 2015)
- (O55) "Benchmark Generator for Stratified Controllers of Tank Networks", S. Bak, S. Bogomolov, M. Greitschus, T. Johnson, Applied Verification for Continuous and Hybrid Systems (ARCH 2015)
- (O56) "Reducing the Wrapping Effect in Flowpipe Construction using Pseudo-Invariants", S. Bak, Fourth Workshop on Design, Modeling and Evaluation of Cyber Physical Systems (CyPhy 2014)
- (O57) "Verifiable COTS-based Cyber-physical Systems", S. Bak, PhD Dissertation (UIUC 2013)
- (O58) "Hardware Control Flow Protection for Cyber-Physical Systems", S. Bak, Work-in-Progress, 2nd ACM International Conference on High Confidence Networked Systems (HiCoNS 2013)
- (O59) "Computing Reachability for Nonlinear Systems with HyCreate", S. Bak, M. Caccamo, Demo and Poster Session, ACM/IEEE 16th International Conference on Hybrid Systems: Computation and Control (HSCC 2013)
- (O60) "Integrated Security for System-on-Chip Architectures", S. Bak, J. Heiner, 7th International Workshop on Unique Chips and Systems (UCAS 2012)
- (O61) "Large-Scale Network Simulation Scalability and an FPGA-based Network Simulator", S. Bak, Technical Report (UIUC 2012)
- (O62) "Achieving Predictable Execution in COTS-based Embedded Systems", S. Bak, R. Pellizzoni, E. Betti, G. Yao, J. Criswell, M. Caccamo, R. Kegley, Invited Talk, 2nd Workshop on Time ORiented Reliable Embedded NeTworked Systems (TORRENTS 2011)
- (O63) "A Step Towards Verification and Synthesis from Simulink/Stateflow models", K. Manamcheri, S. Mitra, S. Bak, M. Caccamo, Poster, Proceedings of the 14th International Conference on Hybrid Systems: Computation and Control (HSCC 2011)
- (O64) "Predictable Execution Model: Concept and Implementation", R. Pellizzoni, E. Betti, S. Bak, G.

Yao, J. Criswell, M. Caccamo, Technical Report (UIUC 2010)

- (O65) "Industrial Application of the System-Level Simplex Architecture for Real-Time Embedded System Safety", S. Bak, Master's Thesis (UIUC 2009)

Spoken Languages

- English (Native)
- Polish (Heritage)
- Mandarin Chinese (Advanced Intermediate)