

## CONTACT INFORMATION

Southern Illinois University  
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## EDUCATION

- Aug, 2017     **Ph.D. in Computer Science**, Arizona State University, GPA: 3.90  
Thesis: [Formal Requirements-Driven Analysis of Cyber Physical Systems](#)  
Advisor: [Georgios Fainekos](#)  
Area: Testing and Verification of Cyber-Physical Systems
- May, 2010     **M.A. in Mathematics**, Central Connecticut State University,  
Advisor: Frank Bensics  
Area of Study: Actuarial Science
- May, 2009     **B.Sc. in Computer Science**, New York Institute of Technology,  
Honors, *Summa Cum Laude*  
Minor in Accounting and Finance

## KEY ACCOMPLISHMENTS

- *Conducted research with the Air Force Research Labs on the UxAS multi-vehicle autonomy system that resulted in published work in verification and motion planning.*
- *Conducted research on simulation-based methods for testing and verification of Cyber-Physical Systems that resulted in over fifteen peer-reviewed publications.*
- *Researched new methods and developed tools that facilitate the elicitation and automatic debugging of formal requirements for Cyber-Physical Systems.*
- *Contributed to the well-known testing and verification toolbox S-TALIRO that was nominated as a technological breakthrough by the industry in a National Science Foundation report in 2012 and 2014.*
- *Conducted research with researchers from the Toyota Technical Center and Bosch Research to solve cutting-edge problems in testing and verification of Cyber-Physical Systems that resulted in several publications.*

## RESEARCH HIGHLIGHTS

### Testing and Verification:

- Applied formal verification methods to the UxAS autonomy system developed by the Air Force research Labs.
- Developed a theory for mining requirement parameters for safety-critical systems. The framework was demonstrated over high-fidelity automotive systems.
- Developed a framework for automatic test case generation for real-time stochastic systems with respect to functional system requirements. The work was conducted in collaboration with researchers from the Toyota Technical Center.
- Developed a conformance notion between Cyber-Physical Systems to facilitate model-based development. The work was conducted in collaboration with researchers from the Toyota Technical Center.
- Developed and tested a visual formalism for the elicitation of formal requirements.
- Assisted as one of the main contributors to a widely used, highly cited, testing and verification toolbox [S-TALIRO](#) for Matlab/Simulink. S-TALIRO has been applied to numerous challenging applications from the automotive and medical device industries. The toolbox was nominated twice as a technological breakthrough by the industry.

**Autonomous Driving, Racing and Motion Planning:**

- Extended the mission specification language with timing primitives for multi-vehicle mission planning in the UxAS autonomy system developed by AFRL.
- Developed a method that enables motion planning of robotic systems with dynamically changing mission requirements.
- Participated in the [F1/10](#) autonomous racing competition. The competition involved designing, building, and testing an autonomous 1/10th scale F1 race car (capable of speeds in excess of 40MPH) all while learning about perception, planning, and control for autonomous navigation. We placed 3rd in the competition.

## TECHNICAL SKILLS

**Programming & Scripting:** Python, Java, C++, Matlab, R, Mathematica

**Simulation & Design:** Simulink/Stateflow, IBM Rhapsody, IBM Doors

**IDE & TE:** Visual Studio, Sublime Text 3

**Verification:** S-TALIRO, Breach, SpaceEx, Promela/Spin, UPPAAL, PVS, Verilog

**Misc.:** Latex, Subversion, Git, SQL

ACADEMIC  
EMPLOYMENT

Southern Illinois University, Carbondale, Illinois, 2017 - up to now

**Assistant Professor in the Department of Computer Science**

Arizona State University in Tempe, Arizona, 2011 - 2017

**Research Assistant**

Central Connecticut State University in New Britain, Connecticut, 2010 - 2011

**Mathematics Lecturer**

Capital Community College in Hartford, Connecticut, 2009 - 2011

**Mathematics Lecturer**

PROFESSIONAL  
EMPLOYMENT

Capital Community College in Hartford, Connecticut, 2009 - 2011

**Web Developer**

American Institute of Physics in Melville, New York, 2008 - 2009

**Online Statistics and Web Analytics Intern**

Analyzed publication demand patterns using SPSS and R. Generated consolidated reports by gathering data from various databases.

TEACHING  
EXPERIENCE

Fall 2017: Senior Project in CS

Southern Illinois University

Fall 2017: Ethics & Communication in CS

Southern Illinois University

[Fall 2013: Randomized and Approximation Algorithms](#)

Teaching Assistant to [Charles Colbourn](#), Arizona State University

[Fall 2012: Introduction to Theoretical Computer Science](#)

Teaching Assistant to [Georgios Fainekos](#), Arizona State University

[2011: Principles of Statistics](#)

Lecturer, Capital Community College

[2011: Introduction to Software Applications](#)

Lecturer, Capital Community College

**2011: Statway I**

Lecturer, Capital Community College

**2011: Algebra**

Lecturer, Central Connecticut State University

**GRADUATE  
COURSEWORK****Mathematics:** Optimization, Linear Models and Time Series, Linear Systems Theory**Statistics:** Mathematical Statistics, Probability and Stochastic Models**Computer Science:** Theory of Formal Languages, Theory of Computation, Interaction Testing, Artificial Intelligence, Randomized and Approximation Algorithms, Real-Time Embedded Systems, Algorithmic Robotics, Combinatorial Algorithms and Intractability**Actuarial Science:** Loss & Credibility Models, Frequency & Severity Models, Mathematics of Financial Derivatives, Theory of Interest, Survival Models**RELEASED  
SOFTWARE****S-TALIRO** (Contributor): A toolbox for Matlab for testing and verification of Cyber-Physical Systems. The toolbox searches for trajectories of minimal robustness in Simulink / Stateflow. It can analyze arbitrary Simulink models or user defined functions that model a CPS.★ *The toolbox was nominated as a technological breakthrough by the industry in the National Science Foundation report in 2012 and 2014.*<https://sites.google.com/a/asu.edu/s-taliro/s-taliro>**ViSPEC:** A tool for the elicitation of formal requirements. It enables users to formalize Metric Temporal Logic specifications through a graphical formalism.<https://sites.google.com/a/asu.edu/s-taliro/vispec>**PATENT  
APPLICATIONS**

Guided Temporal Logic Testing of Cyber-Physical Systems

U.S. Patent Application No 61/900,866, Submitted on 11/6/2013.

Querying Parametric Temporal Logic Properties on Embedded Systems

U.S. Patent Application No 61/835,352, Submitted on 6/14/2013.

**WORK IN PROGRESS**

Elicitation of Temporal Logic Requirements

Bardh Hoxha and Georgios Fainekos

[Conformance Testing as Falsification for Cyber-Physical Systems](#)

H. Abbas, B. Hoxha, G. Fainekos, J. V. Deshmukh, J. Kapinski and K. Ueda

**PROFESSIONAL  
ACTIVITIES AND  
AFFILIATIONS**

Program Committee member:

- Repeatability Evaluation Hybrid Systems: Computation and Control (HSCC) 2016 & 2017
- International Joint Conference on Artificial Intelligence (IJCAI) 2016

Reviewer for Journal:

- IEEE Systems Journal (ISJ)

Reviewer for Conferences:

- IEEE Conference on Decision and Control (CDC)
- International Conference on Cyber-Physical Systems (ICCPS)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- American Control Conference (ACC)
- Applied Verification for Continuous and Hybrid Systems (ARCH)

Professional Memberships:

- Association for Computing Machinery (ACM)
- Institute of Electrical and Electronics Engineers (IEEE)

OTHER  
EDUCATIONAL  
BACKGROUND

NASA/NIA Prototype Verification System (PVS) Class, Hampton, VA, 2012  
The Program Verification System (PVS) is a formal verification system developed by SRI International. It is a specification language integrated with support tools and a theorem prover. It is intended to capture the state-of-the-art in mechanized formal methods and to be sufficiently rugged that it can be used for significant applications.

Cisco Certified Network Associate (CCNA), Expired

PEER-REVIEWED  
PAPERS

[Mining Parametric Temporal Logic Properties in Model Based Design for Cyber-Physical Systems](#)  
Bardh Hoxha, Adel Dokhanchi and Georgios Fainekos - STTT, 2017

[Planning in Dynamic Environments Through Temporal Logic Monitoring](#)  
Bardh Hoxha and Georgios Fainekos - Phoenix, Arizona - AAAI PlanHS, 2016

[Metric Interval Temporal Logic Specification Elicitation and Debugging](#)  
Adel Dokhanchi, Bardh Hoxha and Georgios Fainekos - Austin, Texas - MEMOCODE, 2015

[ViSPEC: A graphical tool for easy elicitation of MTL requirements](#)  
Bardh Hoxha, Nikolaos Mavridis and Georgios Fainekos - Hamburg, Germany - IROS, 2015

[Towards Formal Specification Visualization for Testing and Monitoring of Cyber-Physical Systems](#)  
B. Hoxha, H. Bach, H. Abbas, A. Dokhanchi, Y. Kobayashi and G. Fainekos  
Lausanne, Switzerland - DIFTS, 2015

[On-Line Monitoring for Temporal Logic Robustness](#)  
Adel Dokhanchi, Bardh Hoxha and Georgios Fainekos - Toronto, Canada - RV, 2014

[Robustness-Guided Temporal Logic Testing and Verification for Stochastic CPS](#)  
H. Abbas\*, B. Hoxha\*, G. Fainekos and K. Ueda - Hong Kong, China - CYBER, 2014  
\* *Finalist for best student paper award; \* Authors contributed equally to the work*

[Benchmarks for Temporal Logic Requirements for Automotive Systems](#)  
Bardh Hoxha, Houssam Abbas and Georgios Fainekos - Berlin, Germany - ARCH, 2014

[Using S-TaLiRo on Industrial Size Automotive Models](#)  
Bardh Hoxha, Houssam Abbas and Georgios Fainekos - Berlin, Germany - ARCH, 2014

[WiP Abstract: Conformance Testing as Falsification for Cyber-Physical Systems](#)  
H. Abbas, B. Hoxha, G. Fainekos, J. V. Deshmukh, J. Kapinski and K. Ueda  
Berlin, Germany - ICCPS 2014

[Querying Parametric Temporal Logic Properties on Embedded Systems](#)  
Hengyi Yang, Bardh Hoxha and Georgios Fainekos - Aalborg, Denmark - ICTSS, 2012

PRESENTATIONS,  
POSTERS AND  
DEMOS

[Demo: System Testing with S-TaLiRo: Recent Functionality and Additions,](#)  
*ACM/IEEE Hybrid Systems: Computation and Control, Vienna, Austria, April 2016*

[Pareto Front Exploration for Parametric Temporal Logic Specifications of CPS,](#)  
*1st Workshop on Monitoring and Testing of Cyber-Physical Systems, Vienna, Austria, April 2016*

[Planning in Dynamic Environments Through Temporal Logic Monitoring,](#)  
*AAAI-16 Workshop on Planning for Hybrid System, Phoenix, Arizona, February 2016*

[ViSPEC: A graphical tool for elicitation of MTL requirements,](#)  
*IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, Hamburg, Germany, September 2015*

Demo: S-TaLiRo: A tool for Testing and Verification for Hybrid Systems,  
*ACM/IEEE Hybrid Systems: Computation and Control, Berlin, Germany, April 2014*

Metric Temporal Logic Falsification and Path Planning for Robotic Systems,  
*ACM/IEEE Hybrid Systems: Computation and Control, Berlin, Germany, April 2014*

Robustness-Guided Temporal Logic Testing for Stochastic Hybrid Systems,  
*ACM/IEEE Hybrid Systems: Computation and Control, Berlin, Germany, April 2014*

Conformance Testing as Falsification for Cyber-Physical Systems,  
*ACM/IEEE International Conference on Cyber-Physical Systems, Berlin, Germany, April 2014*

## REFERENCES

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Dr. Christoph Gladisch

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Development Environment (CR/AEA4)  
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