Dr. Bardh Hoxha

CONTACT INFORMATION	Southern Illinois University Engineering A409E, 1230 Lincoln Drive, Carbondale, IL 62901 347-556-0289 bhoxha@cs.siu.com www.bhoxha.com

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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