

Natasha JARUS

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EDUCATION

EXPECTED 2020	Ph.D. in COMPUTER ENGINEERING Missouri University of Science and Technology , Rolla, MO (MISSOURI S&T; formerly UNIVERSITY OF MISSOURI-ROLLA) Graduate Assistantships in Areas of National Need Doctoral Fellow Advisor: Dr. Sahra SEDIGH SARVESTANI Thesis: MODEL TRANSFORMATION FOR CYBER-PHYSICAL SYSTEMS Completed Qualifying Exam and all required coursework Thesis proposal/Comprehensive exam to be taken FEB 2019 GPA: 4.0/4.0
DECEMBER 2013	B.S. in COMPUTER SCIENCE Minor in MATHEMATICS Missouri University of Science and Technology , Rolla, MO Office for Undergraduate Research Experience Scholar Advisor: Dr. Sriram CHELLAPAN GPA: 3.7/4.0

RESEARCH INTERESTS

Applications of Formal Methods, Abstract Algebra, Type Theory, and Category Theory to Model Transformation
Stochastic Modeling of Complex Networked Systems
Critical Infrastructure Protection and Dependability Analysis
Prediction and Analysis of Failures in Embedded Systems

EXPERIENCE

JAN 2014 – PRESENT	Graduate Research Assistant at Missouri S&T Advisor: Dr. Sahra SEDIGH SARVESTANI Carrying out doctoral research on model transformation for cyber-physical systems. Mentoring several undergraduates working on related projects.
AUG 2018 – DEC 2018	Graduate Instructor at Missouri S&T Haskell Special Topics — Computer Science 4000 Taught details of the Haskell programming language, including types, typeclasses, common data structures, and algebraic abstractions. Also discussed aspects of lambda calculus, type theory, and applications of the Curry-Howard correspondence. Developed course curriculum as a readings class based on a textbook and supplemented by academic and industry articles. Full responsibility for instruction and evaluation of 4 students.
SEPT 2018 – NOV 2018	Graduate Instructor at Missouri S&T Trigonometry — Math 1160 Taught lectures on trigonometric functions, identities, and applications of trigonometry, including solving triangles, calculating distances and bearings, and complex numbers. Full responsibility for instruction and evaluation of two classes of 50 freshman and sophomore students each.

JAN 2018 – MAY 2018 & JAN 2017 – May 2017	<p>Graduate Teaching Assistant at Missouri S&T Object-Oriented Numerical Modeling in C++ — Computer Science 5201</p> <p>Taught lectures on memory safety, the curiously recursive template pattern, and modern C++ features, including lambdas, closures, and combinators provided in the standard library. Graded projects and provided feedback on program design and implementation for classes of 30 and 45 senior and graduate students.</p>
AUG 2017 – DEC 2017	<p>Graduate Teaching Assistant at Missouri S&T Introduction to Operating Systems — Computer Science 3800</p> <p>Developed homework assignments covering multithreaded programming, diagnosing and fixing deadlock, memory allocation, and process scheduling. Developed a small kernel for students to use as a basis for class projects. Graded homework assignments for two classes of 60 sophomore and junior students.</p>
SUMMER 2017	<p>Graduate Instructor at Missouri S&T Discrete Mathematics — Computer Science 1200</p> <p>Taught logic, mathematical induction, number and set theory, probability and combinatorics, and graph theory. Full responsibility for instruction and evaluation of a class of 7 freshman and sophomore students.</p>
SUMMER 2017 & JAN 2016 – MAY 2016	<p>Graduate Instructor at Missouri S&T Data Structures Laboratory — Computer Science 1001 (now 1585)</p> <p>Taught program debugging, performance analysis, scripting, and version control. Developed course curriculum, including topic selection, instructional materials, and student exercises. Full responsibility for instruction and evaluation of three classes totaling 80 freshman and sophomore students. This class is a pilot run of a lab that is required for new students.</p>
AUG 2016 – DEC 2016	<p>Graduate Instructor at Missouri S&T Introduction to C++ Programming — Computer Science 1570</p> <p>Taught basics of computer programming, including object-oriented programming, in C++. Full responsibility for instruction and evaluation of two classes of 50 freshman and sophomore students.</p>
AUG 2015 – DEC 2015	<p>Graduate Teaching Assistant at Missouri S&T Calculus II Laboratory — Math 1215</p> <p>Guided groups of freshman and sophomore students through solving problems in an inquiry-based learning environment. Taught three classes of 30 students each. In addition, I provided tutoring assistance to students and proctored and graded exams for the associated lecture. These classes are a pilot run of a new calculus laboratory format. I provided input on problem selection and wrote solutions for the exercises.</p>
JAN 2015 – MAY 2015	<p>Graduate Instructor at Missouri S&T Digital Network Design — Computer Engineering 5410</p> <p>Taught principles of computer networking beginning from physical media and continuing through each layer of the OSI stack. Shared responsibility with Mark WOODARD for instruction and evaluation of a course of 45 senior and graduate students.</p>
AUG 2014 – DEC 2014	<p>Grader at Missouri S&T Digital Network Design — Computer Engineering 5410</p>
JAN 2012 – DEC 2013	<p>Undergraduate Research Assistant at the Missouri S&T EMC Lab Advisor: Dr. Sahra SEDIGH SARVESTANI</p> <p>Developed software-based instrumentation and analytical models for detection and analysis of the effects of electrostatic discharge on an embedded system. Modified Linux drivers to gather hardware state information. Developed methods for analyzing state information to statistically determine if a sequence of states demonstrates electrostatic discharge. Work resulted in one journal and one conference publication.</p>
AUG 2013 – DEC 2013	<p>Software Developer at Lumate, Rolla</p> <p>Designed and developed a platform to facilitate data sharing between large heterogeneous databases.</p>

JAN 2010 – DEC 2013	System Administrator at Missouri S&T Information Technology Developed a FUSE filesystem wrapper to support advanced Linux filesystem operations on a network filesystem. Developed and integrated a system for real-time 3D visualization of large data sets. Developed software to convert a generic dataset to a specific format for the visualization system. Supported research projects with both hardware and software. Managed all campus Linux machines. Migrated campus Linux distribution from Red Hat to Ubuntu.
AUG 2010 – DEC 2012	Tutor at Missouri S&T Introduction to C++ — Computer Science 1570 and 1971 Taught programming concepts, answered questions, and provided homework guidance to freshman and sophomore students.
SUMMER 2013	Software Development Engineering Intern at Amazon , Seattle Developed an Identity Broker service to vend temporary resource access credentials to clients based on their identity. Deployed service to production and configured monitoring and alarms.
SUMMER 2012	Software Development Engineering Intern at Amazon , Seattle Deployed to production a self-service scaling web service that reduced developer time spent on new clients. The service also predicted hardware requirements each quarter based on individual client growth estimates. Developed a MapReduce log parsing system to monitor actual service use and provide real-life scaling data for better accuracy.
SUMMER 2011	Software Engineering Intern at Garmin International , Kansas City Modified the map routing algorithm to log better statistical data. Created software to analyze generated routes and determine overall fitness of the routing algorithm. Developed a system to allow other engineers to easily test routing algorithm changes.
SUMMER 2010	Software Engineering Intern at Softek Solutions Inc. , Kansas City Developed an Android application that queried a REST web interface. Developed an Android library for future company applications.

PUBLICATIONS

2019	<p>N. Jarus, S. Sedigh Sarvestani, and A. Hurson. “Towards Refinement and Generalization of Component State-Based Reliability Models”. To appear in <i>Resilience Week 2019 Symposium</i></p> <p>N. Jarus, S. Sedigh Sarvestani, and A. Hurson. “Formalizing Cyber-Physical System Model Transformation via Abstract Interpretation”. In <i>Proc. of the 19th IEEE Int’l. Symposium on High Assurance Systems Engineering (HASE)</i>, Hangzhou, China, pp. 107–114</p>
2018	<p>N. Jarus, S. Sedigh Sarvestani, and A. Hurson. “Facilitating Model-Based Design and Evaluation for Sustainability”. In <i>Proc. of the 9th IEEE Int’l. Green and Sustainable Computing Conference (IGSC)</i>, Pittsburgh, PA, USA, pp. 1–2</p>
2017	<p>N. Jarus, M. Woodard, K. Marashi, S. Sedigh Sarvestani, J. Lin, A. Faza, and P. Maheshwari. “Survey on Modeling and Design of Cyber-Physical Systems”. Submitted to <i>ACM Transactions on Cyber-Physical Systems</i> in Feb. 2017.</p>
2016	<p>N. Jarus, S. Sedigh Sarvestani, and A. Hurson. “Models, Metamodels, and Model Transformation for Cyber-Physical Systems”. In <i>Proc. of the 7th IEEE Int’l. Green and Sustainable Computing Conference (IGSC)</i>, Hangzhou, China, pp. 1–8.</p>

- 2015 | **N. Jarus**, A. Sabatini, P. Maheshwari, and S. Sedigh Sarvestani.
 “Detection, Analysis, and Prediction of the Effects of Electrostatic Discharge on USB Peripherals”.
 Submitted to *IEEE Transactions on Electromagnetic Compatibility* in Oct. 2015.
- 2014 | M. Albasrawi, **N. Jarus**, K. Joshi, and S. Sedigh Sarvestani.
 “Analysis of Reliability and Resilience for Smart Grids”.
 In *Proc. of the 38th IEEE Int’l. Computer Software and Applications Conference (COMPSAC), Vasteras, Sweden*, pp. 529–534.
 Selected for inclusion in the 2nd 2015 issue of the *NSF Science of Security Index of Significant Research in Cyber Security*.
- 2013 | A. Sabatini, **N. Jarus**, P. Maheshwari, and S. Sedigh.
 “Software Instrumentation for Failure Analysis of USB Host Controllers”.
 In *Proc. of the IEEE Int’l. Instrumentation and Measurement Technology Conference (I²MTC), Minneapolis, MN, USA*, pp. 1109–1114.
- 2012 | **N. Jarus**.
 “Old Ideas in a New Age: Descartes’ Influence on Modern Animal Farming”.
 In *Missouri S&T Undergraduate Research Conference*.
 First place in Arts and Humanities

HONORS AND AWARDS

- JAN 2019 – PRESENT | US Department of Education:
 Graduate Assistantships in Areas of National Need (GAANN) Fellowship (covered all educational expenses and need-based stipend) (\$30,000)
- OCT 2018 | Institute of Electrical and Electronic Engineers:
 9th Int’l. Conference on Green and Sustainable Computing Travel Grant (\$1200)
- AUG 2015 | NSA Science of Security Initiative:
 “Analysis of Reliability and Resilience for Smart Grids” cited as significant research in cyber security
- MAR 2015 | Institute of Electrical and Electronic Engineers:
 13th Int’l. Conference on Pervasive Computing and Communication Travel Grant (\$500)
- JAN 2014 – AUG 2015 | US Department of Education:
 Graduate Assistantships in Areas of National Need (GAANN) Fellowship (covered all educational expenses and need-based stipend) (\$30,000)
- SEPT 2012 – MAY 2014 | Missouri S&T:
 Office for Undergraduate Research Experience (OURE) Scholarship (\$2,000)
 Access Missouri Scholarship (\$2,200)
- APR 2012 | Missouri S&T:
 “Old Ideas in a New Age: Descartes’ Influence on Modern Animal Farming” awarded First Place in Arts and Humanities section of the Missouri S&T Undergraduate Research Conference
- SEPT 2009 – MAY 2014 | Missouri S&T:
 Bright Flight Scholarship (\$10,000)

SEPT 2009 – | Missouri S&T:
MAY 2013 | Curators' Scholarship (\$14,000)
Excellence Scholarship (\$4,000)
First Robotics Scholarship (\$2,000)
Miner Alumni Association Silver Scholarship (\$5,000)

SEPT 2009 – | Missouri S&T:
MAY 2010 | Dean's Scholarship (\$750)
Computer Science Dept. Scholarship (\$250)

TECHNICAL SKILLS

LANGUAGES | C++, Python, Haskell, Rust, Idris, Ruby, Javascript, Java, BASH, SQL, L^AT_EX

SOFTWARE | GNU toolchain, Vim, Git, FLEX/YACC

OPERATING SYSTEMS | Linux (Debian, Ubuntu, Arch, Embedded), Windows (7, Vista, XP)

SELECTED COURSEWORK

NETWORK PERFORMANCE ANALYSIS | Discrete and continuous probability distributions;
MARKOV DECISION PROCESSES | stochastic modeling using Markov chains and
queueing theory with applications in computer
network and physical process modeling.

COMPLEX NETWORKED SYSTEMS | Analyzing large system networks using graph theoretical al-
gorithms and metrics.

COMPUTATIONAL INTELLIGENCE | Neural networks, clustering, reinforcement learning,
EVOLUTIONARY COMPUTING | and swarm intelligence; evolutionary algorithms,
DATA MINING | multi-objective evolution, and genetic programming;
data mining algorithms and techniques.

MODERN ALGEBRA | Theory, properties, and applications of groups and
RING THEORY | rings from abstract algebra.

FOUNDATIONS OF MATHEMATICS | Axiomatic development of mathematical systems; developing
sound mathematical arguments.

PROFESSIONAL DEVELOPMENT

2018 | Missouri S&T Center for Advancing Faculty Excellence — Authentic Assessment Techniques
Missouri S&T Student Diversity Initiatives — Safe Space Training

2015 | Missouri S&T Mathematics Graduate Teaching Seminar

2014 | Presenting Data and Information Workshop by Edward TUFTE
Missouri S&T Graduate Teaching Assistant Workshop

PROFESSIONAL SERVICE AND AFFILIATIONS

MEMBERSHIPS | Institute of Electrical and Electronic Engineers
IEEE Eta Kappa Nu Honors Society

Association for Computing Machinery
American Mathematical Society
Association for Women in Mathematics

CONFERENCES | 9th IEEE Int'l. Conference on Green and Sustainable Computing (IGSC) 2018
13th IEEE Int'l. Conference on Pervasive Computing and Communication (PERCOM) 2015 — Volunteer

PEER REVIEW | Resilience Week Symposium 2019
Int'l. Symposium on High Assurance Systems Engineering (HASE) 2019
Int'l. Conference on Computing, Networking, and Communications (ICNC) 2018
Int'l. Conference on Computing, Networking, and Communications (ICNC) 2017
39th IEEE Int'l. Computers, Software & Applications Conference (COMPSAC) 2015
IEEE Int'l. Conference on Software Quality, Reliability & Security (QRS) 2015
Int'l. Workshop on Model-Based Design for Cyber-Physical Systems (MB4CP) 2015
(in conjunction with the 45th IEEE Int'l. Conference on Dependable Systems and Networks (DSN))
16th IEEE Int'l. Conference on Information Reuse and Integration (IRI) 2014

OUTREACH AND COMMUNITY ENGAGEMENT

2018 | Expanding Your Horizons — Microcontroller Programming Workshop
SWE — “It’s Electrifying” Soldering Workshop
Phelps County Master Gardeners — Earth Day Booth on Native Flora

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SWE — “It’s Electrifying” Soldering Workshop
ACM — Presentation on Linux Basics
EcoGirls — Presentation on Cyber-Physical Systems
Missouri S&T Biological Sciences — Local Pollinator Conservation Project

2016 | Introduction to the CS Department for Prospective Students