Daniel R. Tauritz

Full Curriculum Vitae

Department of Computer Science
Missouri University of Science and Technology[1]
Rolla, Missouri 65409-0350, U.S.A.

Primary Research Interest

The design of novel types of Evolutionary Algorithms and their application to real-world problem solving in areas such as Critical Infrastructure Protection (coevolutionary armsraces for hardening electric power transmission systems), Automated Software Engineering (coevolving test cases and software artifacts), Intrusion Detection Systems (evolving rule sets), and Inverse Diffusion Analysis (inverting differential equations).

Education

Leiden University, Leiden, The Netherlands

- Ph.D. in Computer Science (2002)
  Dissertation title: "Adaptive Information Filtering: concepts and algorithms"
  Advisors: Joost N. Kok and Ida G. Sprinkhuizen-Kuyper
- Master of Science in Computer Science (1996)
- Propaedeutic in Computer Science (1992) and Mathematics (1992)

Academic Experience

8/2002- Missouri University of Science and Technology (Missouri S&T)[1], Rolla, Missouri, U.S.A.

9/2008- Associate Professor of Computer Science with Tenure

5/2008- Investigator in the Energy Research & Development Center (ERDC)

7/2006- Research Investigator in the Intelligent Systems Center (ISC)

12/2004- Sandia National Laboratories Center for Cyber Defenders Campus Coordinator

10/2002- Director of the Natural Computation Laboratory (NC-LAB)

2/2005-6/2006 Affiliated Member of the Intelligent Systems Center (ISC)

8/2002-8/2008 Assistant Professor of Computer Science

5/2005-8/2005 Summer Faculty, Center for Cyber Defenders, Sandia National Laboratories, Albuquerque, New Mexico, U.S.A.

4/1997-12/1997 Instructor of Computer Science, University of South Alabama, Mobile, Alabama, U.S.A.

3/1996-11/1996 NATO C3 Agency, The Hague, The Netherlands

9/1996-11/1996 Research Contractor

3/1996-8/1996 Graduate Research Intern

9/1994-12/2001 Leiden University, Leiden, The Netherlands

12/1997-12/2001 Research Associate in Computer Science

9/1995-12/1995 Graduate Teaching Assistant in Computer Science

9/1994-12/1994 Graduate Teaching Assistant in Computer Science

[1] formerly University of Missouri-Rolla (UMR)

Summary of Major Accomplishments & Awards

- Founded the Natural Computation Laboratory (NC-LAB) which since the lab's founding in 2002 has concentrated on Evolutionary Computing (EC), focusing on two main areas, namely (1) the development of novel types of Evolutionary Algorithms (EAs), and (2) the application of EAs to real-world problems. The bulk of the NC-LAB funding has come from the U.S. Department of Energy via Sandia National Laboratories and the University of Missouri Research Board. Here is a sampling of some of the NC-LAB research projects in both areas:

  1. Development of Novel Types of Evolutionary Algorithms
     - Autonomous EAs: this project is designing a fundamentally novel type of EA where the central control of traditional EAs, such as parent selection, is replaced with autonomous control structures, such as individuals finding their own mate, and unnatural strategy parameters of traditional EAs, such as population size, are no longer explicitly controlled but instead become emergent behaviors of population dynamics.
     - Parameterless EAs: this project aims to eliminate all user-defined EA strategy parameters employing a wide variety of techniques, including elements from the autonomous EAs project.
     - Stored Non-Domination Level Multi-Objective EAs: combining the best of NSGA-II and ϵ-MOEA, the gold standard in Multi-Objective EAs.
  2. Application of Evolutionary Algorithms to Real-World Problem Solving
     - Coevolutionary Critical Infrastructure Protection: this project employs coevolutionary armsraces to simultaneously optimize defenses and attacks for transport network based infrastructures, with an emphasis on electric power transmission systems.
     - Intrusion Detection Systems: this project employs Learning Classifier Systems to evolve rule sets for intrusion detection systems.
     - Automated Software Engineering: this project employs coevolutionary armsraces to simultaneously correct software artifacts and find test cases for them.
     - Inverse Diffusion Analysis: this project employs Genetic Programming to invert the gas diffusion equations involved in indoor air quality simulation for the purpose of determining historic gas exposure.

- Received a UMR Outstanding Teaching Award for the 2006-2007 academic year.

- Received a Missouri S&T Outstanding Teaching Award for the 2007-2008 academic year.

- Appointed coordinator of the Missouri S&T collaboration with the Center for Cyber Defenders (CCD) at Sandia National Laboratories. In summer 2005 brought a team of four Missouri S&T students to the CCD, in the summers of 2006 and 2007 sent teams of four Missouri S&T students to the CCD, and in the summer of 2008 sent a team of five Missouri S&T students to the CCD.

- Created one of the few two-course sequences (CmpSc 348 & CmpSc 448) nationwide on Evolutionary Computing (EC). Both courses are structured such that they are widely accessible to students from all science and engineering disciplines, without compromising the advanced level at which they are taught. These courses have proved highly effective as a feeder for the NC-LAB and have resulted in a variety of Masters theses, Ph.D. dissertations, and refereed publications.

- Re-energized the Missouri S&T ACM Student Chapter SIG on Computer Security by volunteering to be its faculty advisor and helping the students organize lectures and events. In Fall

Semester 2004 this SIG performed a competition-style security audit of Rolla's wireless network infrastructure which was widely publicized (ACM TechNews, RollaTV, Rolla Daily News, Waynesville Daily Guide, UMR Visions, spotlight on UMR's front page, UMR's research news page, UMR's CS department website, etc.). Similar audits have been held every year since.

Funding

Grants Funded

- "Common Correctness for Protecting Confidentiality of Critical Infrastructure Systems" (co-PI, 15% shared credit), $28,006, 9/10/2009-12/31/2010, National Security Agency (with Bruce McMillin, Ann Miller and Sahra Sedighsarvestani).
- "A GPU-based High Performance Computing Cluster for Multiple Military Modeling Capabilities" (co-PI, 25% shared credit), $150,000, 5/12/2009-5/11/2010, Department of Defense - Air Force Office of Scientific Research (with Donald Wunsch, Sanjeev Agarwal, and Ganesh Venayagamoorthy).
- "Common Correctness for Protecting Confidentiality of Critical Infrastructure Systems" (co-PI, 15% shared credit), $32,998, 9/8/2008-9/7/2009, National Security Agency (with Bruce McMillin, Ann Miller and Sahra Sedighsarvestani).
- "Computer Science Recruitment for the 21st Century: Phase III" (PI, 100% credit), $9,500, 2008-2009 academic year, Computer Research Association's Committee on the Status of Women in Computing Research. *Direct payment from CRA of student stipends and supplies/travel reimbursement.*
- "Indoor Air Quality Simulator with Lab Interface and Interactive Consumer Interface" (PI, 50% shared credit), $22,500, 2007-2008 academic year, Computer Research Association's Committee on the Status of Women in Computing Research (with Glenn Morrison). *Direct payment from CRA of student stipends and supplies/travel reimbursement.*
- "Computer Science Recruitment for the 21st Century" (PI, 100% credit), $9,500, 2007-2008 academic year, Computer Research Association's Committee on the Status of Women in Computing Research. *Direct payment from CRA of student stipends and supplies/travel reimbursement.*
- "The Study and Reduction of the Deleterious Effects on Interacting Power Control Devices" (co-PI, 12% shared credit), $680,859, 5/1/2006-4/30/2007, Sandia National Laboratory (with Mariesa Crow, Bruce McMillin, Frank Liu, Badrul Chowdhury and Jag Sarangapani).
- "Computer Science Recruitment in the 21st Century: Improving the image of Computer Science with 6th graders, especially females" (PI, 100% credit), $6,500, 2006-2007 academic year, Computer Research Association's Committee on the Status of Women in Computing Research. *Direct payment from CRA of student stipends and supplies/travel reimbursement.*
- "Interconnected Laboratory Scale FACTS Devices" (co-PI, 12% shared credit), $1,278,391, 4/15/2005-4/30/2006, Sandia National Lab (with Mariesa Crow, Bruce McMillin, Frank Liu, Badrul Chowdhury and Jag Sarangapani).
- "A Program to Facilitate Scholastic Achievement in Computer Science, Engineering, and Mathematics" (co-PI, 45% shared credit), $225,464, 8/15/2004-7/31/2009, NSF (with Jennifer Leopold and Harvest Collier).

- "Computational Intelligence Enhanced Intrusion Detection" (PI, 100% credit), $23,400, 1/1/2003-12/31/2003, University of Missouri Research Board.

Grants Pending

- "A Doctoral Program on a Large Scale Pervasive Systems" (co-PI, 6% shared credit), $677,247, 8/1/2009-7/31/2012, US Department of Education (with many co-PIs).

Donations Obtained

- Fall Semester 2008: NVIDIA GPU cards
- Spring Semester 2005: Prizes for AI Tournament from Network Appliance
- Fall Semester 2004: Prizes for AI Tournament from Microsoft
- Fall Semester 2003: Prizes for AI Tournament from Microsoft

Publication Record

Refereed Journal Articles

- Hsin-yi Jiang, Carl Chang, Daniel R. Tauritz, Shuxing Cheng, Taiming Feng and Travis Service. A Methodology for Estimating the Applicability of GAs for Arbitrary Optimization Problems. *IEEE Transactions on Evolutionary Computation*, Second revision in review.

- Ekaterina A. Holdener and Daniel R. Tauritz. Greedy Population Sizing Evolutionary Algorithm. *MIT Press' Evolutionary Computation*, Under revision.

- Joshua Wilkerson and Daniel R. Tauritz. Coevolutionary Automated Software Correction. *IEEE Transactions on Software Engineering*, Under revision.

- Travis C. Service and Daniel R. Tauritz. Increasing Infrastructure Resilience Through Competitive Coevolution. *New Mathematics and Natural Computation*, 5(2):441–457, July 2009.

- William M. Siever, Daniel R. Tauritz, Ann Miller, Mariesa L. Crow, Bruce B. McMillin, and Stanley Atcitty. Symbolic Reduction for High-Speed Power System Simulation. *Simulation: Transactions of the Society for Modeling and Simulation International*, 84(6):297-309, June 2008.

- William M. Siever, Ann Miller and Daniel R. Tauritz. Improving Grid Fault Tolerance by Optimal Control of FACTS Devices. *International Journal of Innovations in Energy Systems and Power*, 2(1):44–49, June 2007.

- Daniel R. Tauritz, Joost N. Kok, and Ida G. Sprinkhuizen-Kuyper. Adaptive information filtering using evolutionary computation. *Information Sciences*, 122(2–4):121–140, February 2000.

Refereed Conference Papers

- Travis C. Service and Daniel R. Tauritz. Free Lunches in Pareto Coevolution. In *Proceedings of GECCO 2009 - the Genetic and Evolutionary Computation Conference*, pages 1721–1728, Montreal, Canada, July 8-12, 2009. **Nominated for best theory track paper award.**
- André Nwamba and Daniel R. Tauritz. Futility-Based Offspring Sizing. In *Proceedings of GECCO 2009 - the Genetic and Evolutionary Computation Conference*, pages 1873–1874, Montreal, Canada, July 8-12, 2009 (two-page poster abstract).
- Jennifer Leopold and Daniel Tauritz. An Interactive Student-Driven Program to Facilitate Scholastic Achievement in Computer Science, Engineering, and Mathematics. In *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*, Austin, Texas, U.S.A., June 14-17, 2009.
- Travis C. Service and Daniel R. Tauritz. A No-Free-Lunch Framework for Coevolution. In *Proceedings of GECCO 2008 - the Genetic and Evolutionary Computation Conference*, pages 371–378, Atlanta, Georgia, U.S.A., July 12-16, 2008.
- Ekaterina A. Holdener and Daniel R. Tauritz. Learning Offspring Optimizing Mate Selection. In *Proceedings of GECCO 2008 - the Genetic and Evolutionary Computation Conference*, pages 1109–1110, Atlanta, Georgia, U.S.A., July 12-16, 2008 (two-page poster abstract).
- Travis C. Service and Daniel R. Tauritz. Co-Optimization Algorithms. In *Proceedings of GECCO 2008 - the Genetic and Evolutionary Computation Conference*, pages 387–388, Atlanta, Georgia, U.S.A., July 12-16, 2008 (two-page poster abstract).
- Ekaterina A. Smorodkina and Daniel R. Tauritz. Greedy Population Sizing for Evolutionary Algorithms. In *Proceedings of CEC 2007 - IEEE Congress on Evolutionary Computation*, pages 2181–2187, Singapore, September 25-28, 2007.
- Ekaterina A. Smorodkina and Daniel R. Tauritz. Toward Automating EA Configuration: the Parent Selection Stage. In *Proceedings of CEC 2007 - IEEE Congress on Evolutionary Computation*, pages 63–70, Singapore, September 25-28, 2007.
- Travis Service, Daniel R. Tauritz and William M. Siever. Infrastructure Hardening: A Competitive Coevolutionary Methodology Inspired by Neo-Darwinian Arms Races. In *Proceedings of COMPSAC 2007: the 31st IEEE Computers, Software, and Applications Conference*, pages 101–104, Beijing, China, July 23-27, 2007.
- Matt Johnson, Daniel R. Tauritz, Ralph Wilkerson. SNDL-MOEA: Stored Non-Domination Level MOEA. In *Proceedings of GECCO 2007 - the Genetic and Evolutionary Computation Conference*, pages 837–844, London, UK, July 7-11, 2007. **Nominated for best multi-objective optimization track paper award.**
- Ekaterina A. Smorodkina, Mayur Thakur and Daniel R. Tauritz. Algorithms for the Balanced Edge Partitioning Problem. In *Proceedings of WEA 2007 - the 6th Workshop on Experimental Algorithms*, pages 311–323, Rome, Italy, June 6-9, 2007.
- William M. Siever, Ann Miller and Daniel R. Tauritz. Blueprint for Iteratively Hardening Power Grids employing Unified Power Flow Controllers. In *Proceedings of IEEE SoSE 2007 - the 2nd International Conference on System of Systems Engineering*, pages 1–7, San Antonio, Texas, April 16-18, 2007.

- Radha P. Kalyani and Mariesa L. Crow and Daniel R. Tauritz. Optimal Placement and Control of Unified Power Flow Control devices using Evolutionary Computing and Sequential Quadratic Programming. In *Proceedings of the 2006 IEEE PES Power Systems Conference & Exposition - PSCE2006*, pages 959–964, Atlanta, Georgia, October 29 - November 1, 2006.

- Ekaterina A. Smorodkina and Daniel R. Tauritz. Power Grid Protection Through Rapid Response Control of FACTS Devices, In *Proceedings of the International Workshop on Complex Network and Infrastructure Protection - CNIP 2006*, pages 441–450, Rome, Italy, March 28-29, 2006.

- William M. Siever, Daniel R. Tauritz and A. Miller. Improving grid fault tolerance by optimal control of FACTS devices. In *Proceedings of First International ICSC Symposium on Artificial Intelligence in Energy Systems and Power - AIESP 2006*, *CD only proceedings with no page numbers*, Madeira, Portugal, February 7-10, 2006.

- John Chaloupek, Daniel R. Tauritz, B. McMillin and M.L. Crow. Evolutionary Optimization of Flexible AC Transmission System Device Placement for Increasing Power Grid Reliability. In *Proceedings of FEA 2005, the 6th International Workshop on Frontiers in Evolutionary Algorithms*, pages 516–519, Salt Lake City, Utah, July 21-26, 2005.

- Timothy Rupe, Jennifer Leopold, Anne Maglia and Daniel R. Tauritz. Evolutionary Optimization of Filter Parameters for Image Segmentation. In *Proceedings of FEA 2005, the 6th International Workshop on Frontiers in Evolutionary Algorithms*, pages 511–515, Salt Lake City, Utah, U.S.A., July 21-26, 2005.

- Daniel R. Tauritz and Ida G. Sprinkhuizen-Kuyper. Adaptive information filtering: evolutionary computation and n-gram representation. In Antal van den Bosch and Hans Weigand, editors, *Proceedings of the Twelfth Belgium-Netherlands Artificial Intelligence Conference*, pages 157–164, 2000. `http://web.mst.edu/~tauritzd/papers/bnaic00.pdf.gz`

- Daniel R. Tauritz and Ida G. Sprinkhuizen-Kuyper. Adaptive information filtering algorithms. In David J. Hand, Joost N. Kok, and Michael R. Berthold, editors, *Advances in Intelligent Data Analysis, Third International Symposium, IDA-99*, volume 1642 of *Lecture Notes in Computer Science*, pages 513–524. Springer-Verlag, 1999. `http://link.springer.de/link/service/series/0558/bibs/1642/16420513.htm`

- Daniel R. Tauritz, Ida G. Sprinkhuizen-Kuyper, and Joost N. Kok. Evolutionary computation applied to adaptive information filtering. In K. van Marcke and W. Daelemans, editors, In *Proceedings of NAIC'97*, pages 17–26, 1997. `http://web.mst.edu/~tauritzd/papers/naic97.ps.gz`

- Daniel R. Tauritz, Joost N. Kok, and Ida G. Sprinkhuizen-Kuyper. Adaptive information filtering using evolutionary computation. In *Proceedings of JCIS'97*, volume 1, pages 77–80, March 1997. `http://web.mst.edu/~tauritzd/papers/jcis97.ps.gz`

Other Refereed Conference Papers

- William M. Siever, R.P. Kalyani, Mariesa L. Crow and Daniel R. Tauritz. UPFC control employing Gradient Descent Search. In *Proceedings of the 37th Annual North American Power Symposium*, pages 379–382, Ames, Iowa, U.S.A., October 23-25, 2005.

- Alex J. Berry, Daniel R. Tauritz and Michael Hilgers. Evolving Intelligent Agents for First Responder Training Simulation. In *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems and Artificial Life – Volume 14 – Proceedings of the Artificial Neural Networks In Engineering Conference – ANNIE 2004*, pages 177–182, St. Louis, Missouri, U.S.A., November 7-10, 2004.

- Matt Johnson, Daniel R. Tauritz and Ralph W. Wilkerson. Evolutionary Computation Applied to Melody Generation. In *Smart Engineering System Design: Neural Networks, Fuzzy Logic, Evolutionary Programming, Complex Systems and Artificial Life – Volume 14 – Proceedings of the Artificial Neural Networks In Engineering Conference – ANNIE 2004*, pages 307–312, St. Louis, Missouri, U.S.A., November 7-10, 2004.

Position Papers

- Bruce McMillin, C. Gill, M. L. Crow, F. Liu, D. Niehaus, A. Potthast, and Daniel R. Tauritz. Cyber-Physical Systems Distributed Control: The Advanced Electric Power Grid. National Workshop on Beyond SCADA: Networked Embedded Control for Critical Physical Systems (HCSS:NEC4CPS), Pittsburgh, PA, U.S.A., November 8-9, 2006.

- Bruce McMillin, C. Gill, M. L. Crow, F. Liu, D. Niehaus, A. Potthast, and Daniel R. Tauritz. Cyber-Physical Systems Engineering: The Advanced Power Grid. NSF Workshop on Cyber-Physical Systems: Research Motivation, Techniques and Roadmap, Austin, TX, U.S.A., October 16-17, 2006.

- Mariesa L. Crow, C. Gill, F. Liu, B. McMillin, D. Niehaus, and Daniel R. Tauritz. Engineering the Advanced Power Grid: Research Challenges and Tasks. Workshop on Research Directions for Security and Networking in Critical Real-Time and Embedded Systems - CRTES06, San Jose, California, U.S.A., April 4, 2006. `http://moss.csc.ncsu.edu/~mueller/crtes06/papers/008-final.pdf`

- Bruce McMillin, Mariesa L. Crow, Daniel R. Tauritz, F Liu, B Chowdhury and J Sarangapani. Improving Power Transmission Efficiency and Reliability through Hardware/Software Co-Design. Second Carnegie Mellon Conference in Electric Power Systems: Monitoring, Sensing, Software and Its Valuation for the Changing Electric Power Industry, Pittsburgh, Pennsylvania, January 11-12, 2006. `http://www.ece.cmu.edu/~electriconf/McMillen-Crow.pdf`

Technical Reports

- Daniel R. Tauritz. Adaptive Information Filtering: concepts and algorithms. Ph.D. dissertation, Leiden University, 2002, ISBN 90-9015926-6. `http://web.mst.edu/~tauritzd/papers/dissertation.pdf`

- Daniel R. Tauritz and Ida G. Sprinkhuizen-Kuyper. Adaptive information filtering: improvement of the matching technique and derivation of the evolutionary algorithm. Technical Report 99-04, Leiden University, 1999. `http://www.liacs.nl/TechRep/1999/tr99-04.html`

- Daniel R. Tauritz. Adaptive information filtering as a means to overcome information overload. Master's thesis, Leiden University, 1996. `http://web.mst.edu/~tauritzd/papers/thesis.ps.gz`

- Daniel R. Tauritz. Concepts of adaptive information filtering. Technical Report 96-19, Leiden University, 1996. `http://web.mst.edu/~tauritzd/papers/concepts.ps.gz`

- Daniel R. Tauritz. Optimization of the discriminatory power of a trigram based document clustering algorithm using evolutionary computation. Technical Report 96-5, Leiden University, 1996. `http://web.mst.edu/~tauritzd/papers/trigram.ps.gz`
- Lucien G. Heins and Daniel R. Tauritz. Adaptive Resonance Theory (ART): An introduction. Technical Report 95-35, Leiden University, 1995. `http://web.mst.edu/~tauritzd/papers/art.ps.gz`

Invited Talks

3/2009 "Grand Challenges in Evolutionary Computing", Computer Science Colloquium, Iowa State University, Ames, Iowa, U.S.A.

11/2008 "New Directions in Parameterless Evolutionary Algorithms", Symposium on New Directions in Evolutionary Algorithms, Donders Centre for Cognition, Radboud University Nijmegen, The Netherlands

11/2008 Introduction to, and Experimental Research in, Evolutionary Algorithms, Workshop, Donders Centre for Cognition, Radboud University Nijmegen, The Netherlands

3/2008 "A Co-Evolutionary Armsrace Methodology for Improving Cyber-Physical System Robustness - Distributed Power Electronics Devices", Fourth Annual Carnegie Mellon Conference on the Electricity Industry: Future Energy Systems: Efficiency, Security, Control, Carnegie Mellon University, Pittsburgh, Pennsylvania, U.S.A.

4/2007 "Real-world adversarial game-theoretic problem solving employing competitive coevolutionary armsraces: Critical infrastructure protection & automated software engineering", University of Missouri-St. Louis, St. Louis, Missouri, U.S.A.

3/2005 "How Darwin can help Increase the Robustness of our Nations Electrical Power Grid: Evolving A Distributed Agent-Based SCADA System", Sandia National Laboratories, Albuquerque, New Mexico, U.S.A.

10/2004 "How to write grants", UMR Council of Graduate Students Grant Writing Workshop.

4/2004 "Can Darwin save the US electric power grid?", Truman State University ACM Chapter, Kirksville, Missouri, U.S.A.

5/2003 "Natural Computation: computational models inspired by nature", UMR Bioinformatics Working Group.

9/2002 "Applications of n-grams", UMR CS Department Colloquium Series.

1999 "Methods and Algorithms for Adaptive Information Filtering", CWI (National Research Institute for Mathematics and Computer Science of the Netherlands), Amsterdam, The Netherlands.

1999 "Methods and Algorithms for Adaptive Information Filtering", University of Maastricht, The Netherlands.

1998 "Adaptive Information Filtering", Symposium on the SION Digital Information Super Highway Theme, Amsterdam, The Netherlands.

Academic Activities

Course Development

2006-2008 Evolutionary Computing (CmpSc 348/448) - created one of just a few two-course sequences purely focused on evolutionary computing in the nation, consisting of a senior/graduate introductory course and an advanced, research emphasized, graduate course which builds on the foundations laid in the introductory course.

2006 Computer Security (CmpSc 483) - completely revamped as an advanced graduate course centered around problem-based learning (PBL) in teams.

2004 Discrete Mathematics for Computer Science (CmpSc 158) - instituted a LEAD Learning Center. In Spring Semester 2005 expanded this Learning Center to all sections and coordinated shared responsibility for it with the other section instructors.

2003 Introduction to Artificial Intelligence (CmpSc 347) - completely revamped to provide an in-depth and hands-on overview of search algorithms and heuristics with a major implementation component in a modern programming language. The programming assignments in the second half of a semester progressively prepare the students for Missouri S&T's Artificial Intelligence Tournament.

2002 Advanced graduate course on Evolutionary Computing (CmpSc 448) - created this course to provide an introduction to the general theory of Evolutionary Algorithms (EAs) as well as an overview of the major types of EAs, including Genetic Algorithms, Evolutionary Strategies, Genetic Programming, and Learning Classifier Systems. This course involves individual term research projects in which students implement EAs, typically to solve real-world problems, a number of which have led to Masters theses and conference papers. Besides traditional lectures, in-class case studies are performed in groups, and students give presentations on their individual research projects.

Courses Taught

Missouri S&T course #	*title*	*year(s) taught*
CmpSc 158	Discrete Mathematics for Computer Science	2004-2005
CmpSc 348[1,2]	Evolutionary Computing	2007-2008
CmpSc 347[2]	Introduction to Artificial Intelligence	2003-2007, 2009
CmpSc 401[2,3]	Cyber Security Research & Development	2006, 2008
CmpSc 448[4]	Advanced Evolutionary Computing	2002-2006, 2008, 2009
n/a	Introduction to Scientific Computing in C	1997
n/a	Introduction to Scientific Computing in Fortran	1997

[1]formerly taught as CmpSc 301, [2]distance section offered, [3]formerly taught as CmpSc 483, [4]formerly taught as CmpSc 401/447

Professional Development

3/2006 Attended 1st CI2RCO Conference on Critical Information Infrastructure Protection, Rome, Italy

11/2005 Participated in Microsofts Security Development Lifecycle-Information Technology (SDL-IT) Workshop for Academia, Curriculum/Course Development Workshop, Atlanta, Georgia

4/2005 Attended NSF Regional Grants Conference, Oakland, California

8/2004- Member of Missouri S&T's On Course Users Workgroup

4/2004 Attended the UM Grantsmanship Day in Columbia, Missouri

8/2003-5/2004 University of Missouri New Faculty Teaching Scholar

5/2003- Member of Missouri S&T's Promotion & Tenure Writers Group

8/2002-5/2003 Member of Missouri S&T's Freshman Faculty Forum

Students Supervised Summary

Total number of Ph.D. students graduated	4[1]
Total number of Ph.D. students active	2
Total number of M.S. students graduated	8[2]
Total number of M.S. thesis students active	3
Total number of undergraduate research students supervised	28

[1] *3 co-supervised,* [2] *3 co-supervised*

Graduate Research Students Supervised

Name	Support	Description	Degree	Status
Monu Bambroo	UMRB[2]	Intrusion Detection using Fuzzy Logic and Evolutionary Algorithm techniques	M.S.	Graduated 2005
Alex Berry[1]	DoD TACOM,GTA	Evolving Intelligent Agents for Adaptive First Responder Virtual Training	M.S.	Graduated 2004
John Chaloupek	SNL/DoE	Power Informatics: Evolutionary Optimization of FACTS device placements	M.S.	Switched non-thesis
Ajith Cherukad Jose	ORNL	Evolutionary Optimization of Affective Computing	M.S.	Active
Christopher Gore		A Time Series Classifier	M.S.	Graduated 2008
Jason Cook	GTA	Autonomous Evolutionary Algorithms	M.S.	Active
Lisa Guntly	NSF,GTA	Autonomous Evolutionary Algorithms	Ph.D.	Active
Ekaterina Holdener née Smorodkina[1]	GTA	Numerical and Parametrical Analysis of Higher Order Material Models	M.S.	Graduated 2005
Ekaterina Holdener née Smorodkina	Sandia/DoE,GTA	The Art of Parameterless Evolutionary Algorithms	Ph.D.	Graduated 2008
Matt Johnson[1]	GTA	The Stored Non-Domination Level Multi-Objective Evolutionary Algorithm	Ph.D.	Graduated 2007
Radha Kalyani[1]	Sandia/DoE,GTA	Power Informatics: Optimal Control of UPFC devices w/ Sequential Quadratic Programming	Ph.D.	Graduated 2007
André Nwamba	GTA	Automated Offspring Sizing in Evolutionary Algorithms	M.S.	Graduated 2009
Kasthurirangan Parthasarathy	UMRB[2]	Bio-inspired Approaches for Critical Infrastructure Protection: Application of Clonal Selection Principle for Intrusion Detection and FACTS Placement	M.S.	Graduated 2005
Rohit Parti	UMRB[2]	An Evolutionary Computation approach to Intrusion Response	M.S.	Graduated 2004
Travis Service	Sandia/DoE,GTA	Co-Optimization: A Generalization of Coevolution	M.S.	Graduated 2008
William Siever[1]	Sandia/DoE,Tang Fellowship,GTA	A Reinforcement Learning approach to controlling UPFC devices	Ph.D.	Graduated 2007
Christopher Walker[1]		A Two-Phase Algorithm for the Registration of Fractured Surfaces	M.S.	Graduated 2005
Joshua Wilkerson	ISC[3],GTA	Co-Evolutionary Automated Software Correction: A Proof of Concept	M.S.	Graduated 2008
Joshua Wilkerson	ISC[3],GTA	Coevolutionary Automated Software Engineering	Ph.D.	Active

[1] *Co-supervised*

[2] *University of Missouri Research Board (`http://www.umsystem.edu/ums/departments/aa/research/`)*

[3] *Intelligent Systems Center (`http://isc.mst.edu`)*

Undergraduate Research Students Supervised

Name	Support	Description	Year
Elizabeth Babb[1]	MRO-W[2]	Indoor Air Quality Simulator	2007
Bret Brown	OURE[3]	Local search optimization of FACTS device placement for improving the national power grid	2004-2005
Matthew Bruns		Artificial Intelligence Game Framework	2005
Timothy Coalson		Artificial Intelligence Game Assessment	2008
Joshua Eads	OURE[3]	Multi-Agent modeling of cooperative distributed flow-control devices for transport network applications	2006-2007
Joshua Eads[1]	OURE Fellow[5]	Deriving Gas-Phase Exposure History through Computationally Evolved Inverse Diffusion Analysis	2007-2008
Joshua Eads	OURE[3]	Artificial Intelligence Game Framework	2008
Matthew Entrekin	OURE[3]	Evolutionary Computation Library	2008-2009
Jasmine Glaese née Bowles	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century	2007-2008
Jasmine Glaese née Bowles	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century: Phase III	2008-2009
Brian Goldman	OURE[3]	Evolutionary Computation Library	2008-2009
Janet Guntly[1]	MRO-W[2]	Indoor Air Quality Simulator	2008
Janet Guntly	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century: Phase III	2008-2009
Lisa Guntly	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century	2007-2008
Patrick Hammond		Artificial Intelligence Game Framework	2005
Ashley Lang[1]	MRO-W[2]	Indoor Air Quality Simulator	2007
Kristen Loesch	CREU[4],OURE[3]	Improving Computer Science recruitment with emphasis on female recruitment	2006-2007
Amber Loftis[1]	MRO-W[2]	Indoor Air Quality Simulator	2007-2008
Kevin Markussen		Artificial Intelligence Game Framework	2005
Charissa Mathis	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century: Phase III	2008-2009
Eric Mertens	OURE[3]	Grid Computing: Deployment of BOINC on the UMR Campus	2005-2006
Justin Miller	OURE[3]	Computer Network Status and Vulnerability Assessment & Visualization Tool Development	2004-2005
Benjamin Murrell		Artificial Intelligence Game Framework	2008
Timothy Olson		Artificial Intelligence Game Framework	2008
Christopher Roush	OURE[3]	Evolutionary Computation Library	2008-2009
George Rush	OURE[3]	Evolutionary Algorithm Software Factory: Phase II	2009-2010
Travis Service		Artificial Intelligence Game Framework	2005
Brian Shaver		Artificial Intelligence Game Framework	2005
Charles Tullock	OURE[3]	AI Robotic Soccer Development Platform	2006-2007
Jessica Williams	CREU[4],OURE[3]	Computer Science Recruitment for the 21st Century	2007-2008
Laura Woodard	CREU[4],OURE[3]	Improving Computer Science recruitment with emphasis on female recruitment	2006-2007
Evan Wright	OURE[3]	Power Informatics: graph theoretic algorithms for modeling flow control	2006-2007

[1] *Co-supervised*

[2] *Multidisciplinary Research Opportunities for Women (`http://www.cra.org/Activities/craw/mrow/`)*

[3] *Opportunities for Undergraduate Research Experience (`http://ugs.mst.edu/oure.html`)*

[4] *Collaborative Research Experience for Undergraduates in Computer Science and Engineering (`http://www.cra.org/Activities/craw/creu/`)*

[5] *Opportunities for Undergraduate Research Experience Fellow Program (http://ugs.mst.edu/oure_fellows.html)*

Academic Service

Academic Community Service

- Served as NSF panelist
- Served as University of Missouri Research Board grant proposal reviewer

Institutional

10/2009- Chair, Discipline Specific Curriculum Committee - Sciences

10/2009- Member, Campus Curriculum Committee

10/2008- Chair, Faculty Senate Standing Committee on Library and Learning Resources

9/2008-9/2009 Member, Discipline Specific Curriculum Committee - Sciences

2008- Chair, Computer Science Department Publicity Committee

2008-2009 Member, Computer Science Department Diversity Committee

2007-2009 Member, Computer Science Department Graduate Practices and Policies Committee

2007 Member, Computer Science Department Space Allocation Committee

2006-2007 Member, Computer Science Department Chair Search Committee

2006-2007 Rotating Coordinator, Promotion & Tenure Writers Group

2004-2006 Member, Academic Council Ad Hoc Committee on Conflict of Interest

2004- Computer Science Department Library Liaison

2004 Member, Computer Science Ad Hoc Undergraduate Omnibus Curriculum Committee

2003- Member, Missouri S&T Computer Security Task Force

2003-2005 Member, College of Arts & Sciences Curriculum Committee

2003-2008 Member, Computer Science Department Curriculum Committee

2003- Missouri S&T's ACM Student Chapter SIG Security Faculty Sponsor

1993-1996 Leiden University, Computer Science & Math Advisory Committee (student member)

1993-1996 Leiden University, Computer Science Department Faculty Council (student member)

1991-1996 Leiden University, Computer Science Department Teaching Committee (student member)

1991-1994 Leiden University, Math Department Teaching Committee (student member)

Conferences

2010 Late Breaking Papers Chair, GECCO 2010 - Genetic and Evolutionary Computation Conference

2009 Program Committee, Genetic Algorithm Track, GECCO 2009 - Genetic and Evolutionary Computation Conference

2009 Program Committee, IEEE CEC 2009 - Congress on Evolutionary Computation

2008 Program Committee, Genetic Algorithm Track, GECCO 2008 - Genetic and Evolutionary Computation Conference

2008 Program Committee, SIS 2008 - IEEE Swarm Intelligence Symposium

2008 Program Committee, IEEE COMPSAC 2008 - The 32nd Annual International Computer Software and Applications Conference

2007 Session Chair, IEEE CEC 2007 - Congress on Evolutionary Computation

2007 Program Committee, ISA 2007 - IADIS Intelligent Systems and Agents 2007

2005 Program Committee, FEA 2005 - 6th International Workshop on Frontiers in Evolutionary Algorithms (JCIS 2005 conference track)

2004 Session Chair, ANNIE 2004

2004 Program Committee, IEEE IRE-2004 - 2004 IEEE International Conference on Information Reuse and Integration

1997 Session Chair, FEA 1997 - 1st International Workshop on Frontiers in Evolutionary Algorithms (JCIS 1997 conference track)

Journal Referee
Natural Computing, IEEE Software, IEEE Transactions on Control Systems Technology, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Neural Networks, IEEE Transactions on Systems, Man, and Cybernetics–Part C: Applications and Reviews, International Journal of Smart Engineering System Design

Textbook Reviews
McGraw-Hill Higher Education, Oxford University Press

Professional Affiliations

- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Genetic and Evolutionary Computation (SIGEVO)
- ACM Special Interest Group on Artificial Intelligence (SIGART)
- ACM Special Interest Group on Computer Science Education (SIGCSE)
- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Computer Society
- IEEE Computational Intelligence Society

Miscellaneous

1993-1995 Dutch national Computer Science advisory board (student member)

1995- Founder and maintainer of *The Adaptive Resonance Theory (ART) clearinghouse* (`http://web.mst.edu/~tauritzd/art`)