

Timothy Middelkoop

ORCID iD: [0000-0002-3183-3078](https://orcid.org/0000-0002-3183-3078), [Google Scholar](#)

Contact Information

Timothy Middelkoop, Ph.D.
Internet2
Research Engagement
Columbia, MO

Education

- University of Massachusetts Amherst
Ph.D. in Industrial Engineering and Operations Research, 2006
- Florida State University
M.S. in Industrial Engineering, 1998
- Florida State University
B.S. in Industrial Engineering (Cum Laude), 1996

Employment

- Internet2 (Columbia, MO); Senior Research Engagement Engineer, 2020-present.
Senior Research Engagement Engineer in Research Engagement
- University of Missouri (Columbia, MO); Adjunct Assistant Teaching Professor, 2020-present.
Adjunct Assistant Teaching Professor in the department of Industrial and Systems Engineering
- University of Missouri (Columbia, MO); Director of Research Computing Support Services, 2014-2020.
Director of Research Computing Support Services in the Division of Information Technology
- University of Missouri (Columbia, MO); Assistant Teaching Professor, 2013-2020.
Assistant Teaching Professor in the department of Industrial and Manufacturing Systems Engineering
- University of Florida (Gainesville, FL); Adjunct Assistant Professor, 2010-2013.
Adjunct Professor in the department of Industrial and Systems Engineering
Assistant Director, Industrial Assessment Center
- University of Florida (Gainesville, FL); Assistant Engineer, 2007-2010.
Assistant Engineer in the department of Industrial and Systems Engineering
- Oklahoma State University (Stillwater, OK); Visiting Assistant Professor, 2006-2007.
Visiting Assistant Professor in the School of Industrial Engineering and Management
- Oklahoma State University - Tulsa (Tulsa, OK); Senior Developer, 2006.
Senior developer for the Journal of Graduate Aviation Research and Education
- University of Massachusetts Amherst (Amherst, MA); Research Assistant, 1998-2006.
Research Assistant in the Department of Mechanical and Industrial Engineering
- AmericasXchange Inc. (Miami, FL); Senior Network and Systems Engineer, 2000-2001.
Network and systems infrastructure design, installation and support.
- Florida State University (Tallahassee, FL); Research and Teaching Assistant, 1997-1998.
Research Assistant and Teaching Assistant in the Department of Industrial Engineering
- Tulip Electronics (Hanover, ON); Embedded Systems Developer, 1995-1998.
Embedded systems development (80C51)
- Hayes Systems (Tallahassee, FL); Summer Internship, 1995.
Network and system administration, customer support
- Paprima Industries (Montreal, QC); Industrial Controls Consultant, 1990-1995.
Industrial automation development and installation (PLC)

Research Areas

- Cyberinfrastructure, large-scale (HPC) and multi-core scientific computing, computational optimization, clean energy optimization and control, energy management, web-based decision support systems, integrated design systems, distributed sensor networks, and multi-agent systems.

Professional Certification

- Certified Carpentries Instructor
- Certified Energy Manager (CEM), expired

Honors and Awards

- Alpha Pi Mu, Industrial Engineering Honor Society.
- Eugene M. Isenberg Award, presented for a commitment to the integration of science, engineering, and management, 1999, 2000.
- Florida State University Athletic Department Academic Honor Roll, 1994-1996.
- Atlantic Coast Conference All-Academic and All-Conference Teams, Track and Field, 1993-1996.

Journal Publications

- Jonathan Brooks, Siddharth Goyal, Rahul Subramany, Yashen Lin, Chenda Liao, Timothy Middelkoop, Herbert Ingle, Laura Arpan and Prabir Barooah, "Experimental evaluation of occupancy-based energy-efficient climate control of VAV terminal units," In *Science and Technology for the Built Environment*, 21(4):469-480, 2015. DOI: 10.1080/23744731.2015.1023162
- Yashen Lin, Prabir Barooah, Sean Meyn and Timothy Middelkoop, "Experimental Evaluation of Frequency Regulation From Commercial Building HVAC Systems," In *IEEE Transactions on Smart Grid*, 6(2):776-783, March 2015. DOI: 10.1109/TSG.2014.2381596
- Siddharth Goyal, Prabir Barooah and Timothy Middelkoop, "Experimental study of occupancy-based control of HVAC zones," In *Applied Energy*, 140:75-84, February 2015. DOI: 10.1016/j.apenergy.2014.11.064
- Oleg V. Shylo, Timothy Middelkoop and Panos M. Pardalos, "Restart Strategies in Optimization: Parallel and Serial Cases," In *Parallel Computing*, 37(1):60-68, 2011. DOI: 10.1016/j.parco.2010.08.004
- Amanda Webb, Larry Budnick and Timothy Middelkoop, "Measuring the Costs of Custom Products through Better Technology Utilization," In *The Engineering Economist*, 54(3):222-249, July 2009. DOI: 10.1080/00137910903108294
- Abhijit Deshmukh, Timothy Middelkoop, Anjaneyulu Krothapalli, William Shields, Namas Chandra and Charles Smith, "Multiagent Design Architecture for Intelligent Synthesis Environment," In *AIAA Journal of Aircraft*, 38(2):215-223, March 2001. DOI: 10.2514/2.2778

Refereed Conference Publications

- Timothy Middelkoop, Claire Mizumoto, Scotty Strachan, D Balamurugan, Scott Delinger, Jacob Fosso Tande, Deb McCaffrey, Ann Myatt James, David Reddy and Patrick Schmitz, "Career Phases in Research Computing and Data," In *Practice and Experience in Advanced Research Computing (PEARC '23)*, 374-377, Portland, OR, 2023. ISBN: 9781450399852 DOI: 10.1145/3569951.3597562
- Joel Cutcher-Gershenfeld, Torey Battelle, Dana Brunson, Thomas Cheatham, Jacob Fosso Tande, Douglas Jennewein, Julie Ma, Lauren A. Michael, Timothy Middelkoop, Henry Neeman and Patrick Schmitz, "Professionalization of Research Computing and Data: An Expanded Agenda," In *Practice and Experience in Advanced Research Computing (PEARC '23)*, 129-136, Portland, OR, 2023. ISBN: 9781450399852 DOI: 10.1145/3569951.3593610
- Christina Maimone, Scott Yockel, Timothy Middelkoop, Ashley Stauffer and Chris Reidy, "Characterizing the US Research Computing and Data (RCD) Workforce," In *Practice and Experience in Advanced Research Computing (PEARC '22)*, (27), Boston, MA, 2022. DOI: 10.1145/3491418.3530289
- Julie Ma, Sarah Akbar, Torey Battelle, Kevin Brandt, Eric Brown, Dana Brunson, Dhruva Chakravorty, Thomas Cheatham, Bhushan Chitre, Adrian Del Del Maestro, Andrea Elledge, Vikram Gazula, John Goodhue, James Griffioen, Abigail Hyde, Douglas Jennewein, Shelley Knuth, Bj Lougee, Timothy Middelkoop, Sasmita Mohapatra, Sia Najafi, Kaylea Nelson, Lisa Perez, Bruce Segee, Julia Sheats, Andrew Sherman, Christopher Simmons, Ermal Toto, Scott Valcourt, Lucas Varella and Ralph Zottola, "The Connect.Cyberinfrastructure Portal," In *Practice and Experience in Advanced Research Computing*, 1-4, New York, NY, 2021. ISBN: 9781450382922 DOI: 10.1145/3437359.3465606
- Carrie Brown, Ryan Johnson, Kate Adams, Kevin Brandt, Adison Kleinsasser, James Deaton and Timothy Middelkoop, "Great Plains CyberTeam: A Regional Mentor Approach to Cyberinfrastructure Workforce Development and Advancement," In *Practice and Experience in Advanced Research Computing (PEARC '20)*, Portland, OR, 2020. DOI: 10.1145/3311790.3399618
- Marisa Brazil, Dana Brunson, Aaron Culich, Lizanne DeStefano, Douglas Jennewein, Tiffany Jolley, Timothy Middelkoop, Henry Neeman, Lorna Rivera, Jack Smith and Julie Wernert, "Campus Champions: Building and Sustaining a Thriving Community of Practice Around Research Computing and Data," In *Proceedings of the Practice and Experience in Advanced Research Computing on Rise of the Machines (Learning)*, 78: 1-78:7, Chicago, IL, 2019. ISBN: 978-1-4503-7227-5 DOI: 10.1145/3332186.3332200
- Yashen Lin, Prabir Barooah, Sean Meyn and Timothy Middelkoop, "Demand Side Frequency Regulation from Commercial Building HVAC Systems: An Experimental Study," In *2015 American Control Conference (ACC)*, 3019-3024, 2015. DOI: 10.1109/ACC.2015.7171796
- Jonathan Brooks, Siddharth Goyal, Rahul Subramany, Yashen Lin, Timothy Middelkoop, Laura Arpan, Luca Carloni and Prabir Barooah, "An experimental investigation of occupancy-based energy-efficient control of commercial building indoor climate," In *2014 IEEE 53rd Annual Conference on Decision and Control (CDC)*, 5680-5685, Los Angeles, CA, USA, December 2014. ISBN: 978-1-4799-7746-8 DOI: 10.1109/CDC.2014.7040278
- Yashen Lin, Timothy Middelkoop and Prabir Barooah, "Issues in Identification of Control-Oriented Thermal Models of Zones in Multi-Zone Buildings," In *IEEE 51st Annual Conference on Decision and Control*, 6932-6937, Maui, HI, USA, December 2012. ISBN: 978-1-4673-2065-8 DOI: 10.1109/CDC.2012.6425958
- He Hao, Timothy Middelkoop, Prabir Barooah and Sean Meyn, "How Demand Response from Commercial Buildings can Provide the Regulation Needs of the Grid," In *50th Annual Allerton Conference on Communication, Control, and Computing*, October 2012. DOI: 10.1109/Allerton.2012.6483455
- Timothy Middelkoop, "The Impact of Multi-Core Computing on Computational Optimization," In *Proceedings of the 2012 Industrial and Systems Engineering Research Conference*, Orlando, FL, May 2012.
- Timothy Middelkoop and Abhijit Deshmukh, "The Scalability of an Environment for Large-Scale Sensor-Networks," In *Fifth International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS'06)*, Hakodate, Japan, May 2006.
- Roger Mailler, Regis Vincent, Victor Lesser, Tim Middelkoop and Jiaying Shen, "Soft-Real Time, Cooperative Negotiation for Distributed Resource Allocation," In *Proceedings of the AAAI Fall Symposium on Negotiation Methods for Autonomous Cooperative Systems*, (FS-01-03):63-69, Falmouth, MA, November 2001. ISBN: 1577351371
- Abhijit Deshmukh, Timothy Middelkoop, Anjaneyulu Krothapalli, William Shields, Chuck Zhang, Namas Chandra, Malakondayya Challa and Charles Smith, "Multi-Agent Design Architecture for Integrated Design System," In *36th AIAA Aerospace Sciences Meeting and Exhibit*, (AIAA 98-0914), Reno, NV, January 1998. DOI: 10.2514/6.1998-914

Refereed Book Chapters

- Timothy Middelkoop and Abhijit Deshmukh, "The Scalability of an Environment for Large-Scale Sensor-Networks," In *Massively Multi-Agent Technology*, Lecture Notes in Computer Science, 5043/2008:176-189, Springer Berlin / Heidelberg, 2008. ISBN: 978-3-540-85448-7 DOI: 10.1007/978-3-540-85449-4_13

Book Chapters

- Timothy Middelkoop, "High Resolution Data Collection for Automated Fault Diagnostics," In *Automated Diagnostics and Analytics for Buildings*, chapter 22, 271-290, Fairmont Press Inc., 2014. ISBN: 978-1498706117
- Timothy Middelkoop and Herbert Ingle, "EModel: A New Energy Optimization Modeling Language," In *Handbook of Web Based Energy Information and Control systems*, chapter 23, 325-337, Fairmont Press Inc., 2011. ISBN: 978-14-398-7684-8
- Abhijit Deshmukh, Timothy Middelkoop and Chandrasekar Sundaram, "Distributed Collaborative Designs: Challenges and Opportunities," In *Product Research: The Art and Science Behind Successful Product Launches*, chapter 9, Springer, 2010. ISBN: 978-90-481-2859-4 DOI: 10.1007/978-90-481-2860-0_9

- Timothy Middelkoop, David L. Pepyne and Abhijit Deshmukh, "Analysis of Negotiation Protocols for Distributed Design," In *Decision Making in Engineering Design*, chapter 22, 265-280, ASME Press, 2006. ISBN: 0791802469 DOI: 10.1115/1.802469.ch22

Edited Books

- Barney L. Capehart and Timothy Middelkoop (Editors), "Handbook of Web Based Energy Information and Control Systems," Fairmont Press Inc., 2011. ISBN: 978-1-4398-7684-8 DOI: 10.1201/9781003151678

Software Products

- Timothy Middelkoop, Bala Desinghu and Tony Cricelli, "Internet2 CLASS Capstone Project, HPC-GCP," Apache 2.0, 2021. <https://github.com/MiddelkoopT/CLASS-HPC-GCP>
- Timothy Middelkoop, "An Asynchronous BACnet logger," Apache 2.0, 2020. <https://github.com/MiddelkoopT/BacLog>
- Timothy Middelkoop, "Energy Optimization Modeling Language," GPL 3.0, 2011. <https://github.com/MiddelkoopT/EModel>
- Timothy Middelkoop, "Multi Core Modified Distributed Bellman-Ford Shortest Path," GPL 2.0+, 2010. <https://github.com/MiddelkoopT/MC-MDBF-SP>

Conference Proceedings

- Abhijit Deshmukh, Timothy Middelkoop, Anjaneyulu Krothapalli and Charles Smith, "Emergent Aerospace Designs Using Negotiating Autonomous Agents," In *Aerodynamic Design and Optimization of Flight Vehicles in a Concurrent Multi-Disciplinary Environment (RTO MP-35)*, 25-1 - 25-9, Ottawa Canada, June 2000. ISBN: 9283710401
- Tim Middelkoop and Abhi Deshmukh, "Mobile Agents for Collaborative Design and Analysis," In *1997 International CIRP Design Seminar*, October 1997.
- Tim Middelkoop, Naga Krothapalli, Abhi Deshmukh and Jim Solberg, "Rapid Deployment of Agents to Facilitate Collaborative Engineering," In *International CIRP Design Seminar - Multimedia and Virtual Reality Technologies for Collaborative Design and Manufacturing*, 208-213, October 1997.

Technical Reports

- Patrick Schmitz, Claire Mizumoto, Timothy Middelkoop and Daphne Siefert McCanse, "RCD Nexus Day 2023 Final Report," Campus Research Computing Consortium (CaRCC), November 2023. DOI: 10.5281/zenodo.10160680
- Abhi Deshmukh, Tim Middelkoop and Naga Krothapalli, "Integration of Intelligent Process Management Agents and the Information Power Grid," NASA Ames Research Center, (NCC2-1353), May 2005.
- Timothy Middelkoop and Abhijit Deshmukh, "DARPA ANT Progress Report: Analysis of Multi-Agent Negotiations," University of Massachusetts Amherst Department of Mechanical and Industrial Engineering, February 2002.

Presentations

- Timothy Middelkoop, Claire Mizumoto, Scotty Strachan, D Balamurugan, Scott Delinger, Jacob Fosso Tande, Deb McCaffrey, Ann Myatt James, David Reddy and Patrick Schmitz, "Career Phases in Research Computing and Data," *Practice and Experience in Advanced Research Computing (PEARC '23)*, Portland, OR, July 2023.
- Joel Cutcher-Gershenfeld, Torey Battelle, Dana Brunson, Thomas Cheatham, Jacob Fosso Tande, Douglas Jennewein, Julie Ma, Lauren A. Michael, Timothy Middelkoop, Henry Neeman and Patrick Schmitz, "Professionalization of Research Computing and Data: An Expanded Agenda," *Practice and Experience in Advanced Research Computing (PEARC '23)*, Portland, OR, July 2023.
- Dana Brunson, John Hicks and Timothy Middelkoop, "Facilitating RCD Community Success," *Internet2 Technology Exchange (TechEX23)*, Minneapolis, MN, September 2023. DOI: 10.5281/zenodo.10027861
- Timothy Middelkoop, "Facilitating RCD Community Success," *Great Plains Network (GPN) 2023 Annual Meeting*, Kansas City, MO, June 2023.
- Dana Brunson, Lauren Michael, Timothy Middelkoop, Patrick Schmitz and Forough Ghahramani, "Research IT Strategic Planning," *Internet2 Community Exchange*, Atlanta, GA, May 2023.
- Timothy Middelkoop, Dana Brunson and Lauren Michael, "How Can We Advance the RCD Profession?," *Internet2 Technology Exchange*, Denver, CO, December 2022. DOI: 10.5281/zenodo.7504841
- Dana Brunson and Timothy Middelkoop, "The Cyberinfrastructure Landscape: Organizations," *Virtual Residency Introductory Workshop 2022*, June 2022.
- Timothy Middelkoop, "How the University of Missouri reports and utilizes Research Facing/CI-Engineering metrics," *CaRCC Researcher-Facing Call (2019-12-12)*, December 2019.
- Timothy Middelkoop, "The Impact of Multi-Core Computing on Computational Optimization," *Industrial and Systems Engineering Research Conference 2012*, Orlando, FL, May 2012.
- Timothy Middelkoop, "Industrial Energy Efficiency," *Florida College Energy Workshop*, Gainesville FL, September 2011.
- Timothy Middelkoop, "University of Florida Industrial Assessment Center," *Capital Region Manufacturers (CRM) Renewable Energy & the Environment Roundtable Meeting*, Tallahassee FL, April 2011.
- Timothy Middelkoop, "Computational Systems Design and Implementation," Gainesville FL, March 2010.
- Timothy Middelkoop, Herbert Ingle and Cristián Cárdenas, "Clean Energy Optimization, Control, and Integration," *Energy, Sustainability and Climate Change 2010*, (SU2.1), Gainesville FL, February 2010.
- Timothy Middelkoop, Cristián Cárdenas-Lailhacar and Elif Akçal, "Optimization and Control of Clean Technologies with COIN-OR," *INFORMS Annual Meeting*, (MD13.1), San Diego CA, October 2009.
- Timothy Middelkoop, "Clean Energy Optimization Control and Integration," *University of Florida ISE Graduate Seminar*, Gainesville FL, October 2009.
- Timothy Middelkoop, "The Impact of Multi-Core Computing on Global Optimization," *11th INFORMS Computing Society Conference (ICS 2009)*, Charleston SC, January 2009.
- Timothy Middelkoop, "The Impact of Multi-Core Computing on Algorithm Design and Implementation," *University of Florida ISE Graduate Seminar*, Gainesville FL, November 2008.
- Timothy Middelkoop, "A Parallel Open Software and Hardware Reference Platform for the Operations Research Community," *INFORMS Annual Meeting*, Washington DC, October 2008.
- Timothy Middelkoop, "Large Scale Distributed Optimization," *University of Florida ISE Graduate Seminar*, Gainesville FL, February 2008.

- Timothy Middelkoop and Abhijit Deshmukh, "Bargaining for Resources in Large-scale Wireless Sensor Networks," *INFORMS Annual Meeting*, (MD57.2), Seattle Washington, November 2007.
- Timothy Middelkoop, "Large-Scale Distributed Systems and Sensor Networks: Applications, Models and Cyberinfrastructure," *Industrial and Systems Engineering Graduate Seminar*, University of Florida, Gainesville Florida, September 2007.
- Timothy Middelkoop, "Decision Making in Large-Scale Distributed Systems," *University of Florida Job Talk*, Gainesville Florida, February 2007.
- Timothy Middelkoop and Abhijit Deshmukh, "Coordination of Emergency Response Actions Using an Integrated Decision Framework," *20th Annual International Conference on Soils, Sediments and Water*, Amherst Massachusetts, October 2004.
- Timothy Middelkoop, "Analysis of Negotiation in Distributed Decision Making Systems," *Industrial Engineering Research Conference (IERC) 2002*, Orlando Florida, May 2002.
- Timothy Middelkoop, "Agents and Electronic Commerce," *Digital Commerce Society of Boston*, Boston Massachusetts, July 1999.
- Timothy Middelkoop and Abhijit Deshmukh, "Agents for Electronic Commerce," *eFlorida Conference on Electronic Government*, Tallahassee Florida, January 1999.

Research Funding

- NSF, "CC* Compute: GP-ARGO: The Great Plains Augmented Regional Gateway to the Open Science Grid," 2020-2023, \$378,599, (CoPI), NSF Award #2018766.
- NSF, "CC* Team: Great Plains Regional CyberTeam," 2019-2022, \$1,399,479, (PI), NSF Award #1925681.
- FDACS/UF, "Self-running buildings: An autonomous system for reducing energy consumption and increasing demand flexibility of commercial buildings in hot-humid climates," 2017-2020, \$21,500, (CoPI, subcontract, 100% effort), FDACS/UF Award #UFDSP000012115.
- NSF, "CICI: RSARC: End-to-End Performance and Security Driven Federated Data-Intensive Workflow Management," 2018-2020, \$500,000, (CoPI, 5% effort), NSF Award #1827177.
- NSF, "MRI: Acquisition of Instrument for Data-Intensive Applications with Hybrid Cloud Computing Needs.," 2014-2017, \$600,408, (CoPI, 15% effort), NSF Award #1429294.
- Mizzou Advantage, "Acquisition of Biocomputing nodes for Analysis of Bioinformatics and Genomics Data," 2016, \$100,000, (PI, 20% effort).
- NIH, "Massive and Complex Data Analytics: Pre-doctoral Training in One Health," 2016-2021, \$1,427,216, (CoPI, 6% effort), NIH Award #5T32LM012410-03.
- NSF, "CC*IIE Engineer: Exploration of Roles and Tools to Fulfill Diverse Researcher Needs in Collaborative Environments," 2014-2016, \$399,775, (CoPI, 5% effort), NSF Award #1440582.
- Integrated Product and Process Design Program (Siemens Energy), "Permanent Vibration Monitor for Air Cooled Condenser Fans," 2012, \$16,500.
- Integrated Product and Process Design Program (Siemens Energy), "Temperature Monitoring System for High Voltage/High Current Electrical Equipment," 2011, \$16,500.
- New Hope Power, "Industrial Assessment Center Energy Audit Report for Florida Crystals Co-gen Facility," 2011, \$9,253, (PI).
- Integrated Product and Process Design Program (Siemens Energy Sector), "Portable Stack Bulk Temperature Measurement Device," 2010, \$15,000.
- Solarsa Inc., "A Web Based Integrated Modeling, Control and Optimization Framework for Clean Technologies," 2009-2011, \$220,552, (PI, 90% effort).
- Integrated Product and Process Design Program (Siemens Energy Sector), "Optical Roughness Probe for Steam Turbines," 2008, \$15,000.
- Integrated Product and Process Design Program (Siemens Power Generation), "Blade Monitoring System for Synchronized Real Time Image Acquisition," 2007, \$15,000.

Research Experience

- Cyberinfrastructure Capability and Workforce Development; University of Missouri, 2019-present.
The development of a regional Cyber Team to enhance and grow institutional infrastructure capability, encourage adoption, and to promote workforce development as a model for national growth.
- Living Laboratory for Energy Management Research; University of Florida, 2010-present.
The instrumentation and analysis of energy usage and occupation of a campus building to serve as a living laboratory for research on energy optimization and control.
- A Web Based Integrated Modeling, Control and Optimization Framework for Clean Technologies; University of Florida, funded by Solarsa Inc., 2009-2011.
Principal investigator for a multi-disciplinary team working with industrial partners to develop performance and optimization models along with an integrated monitoring and control framework for HVAC systems that utilize clean energy technologies. Research lead for the integration framework, optimization formulation and computation.
- Context Aware Performance Models for Multi-Core Algorithms; University of Florida, 2009-present.
Development of tools for the collection and analysis of performance data for multi-core algorithms. This work associates performance counter data with algorithm context that generated it giving detailed insight into the impact of multi-core computing on algorithm design. This work enables the creation of algorithms that scale on multi-core systems.
- A Hardware and Software Reference Platform for the Operations Research Community; University of Florida, 2008-2010.
Developed a self-replicating Linux distribution for the PlayStation 3 for the operations research community to be used as a reference platform for the publication of numerical results and algorithm implementations. The goal of this research is to promote the open dissemination and review of numerical implementations and provide a low-cost, next generation, instructional tool for parallel computation.
- Continuous State Space Modeling for Real Time Performance Prediction in Manufacturing Systems; Oklahoma State University, funded by GM, 2006.
Investigated a data-driven modeling approach based on continuous-time nonlinear dynamic systems principles for modeling assembly operations for the accurate prediction of aggregate performance.
- Distributed Resource Allocation for Supply Chain Networks; University of Massachusetts Amherst, funded by IBM, 2005.
Developed and analyzed multi-agent negotiation protocols for resource allocation in distributed decision making systems with applications in military and civilian supply chain management and distributed sensor networks.
- Scientific Computational Grid Management; University of Massachusetts Amherst, 2004-2006.
Developed and managed multiple computational clusters and grid middleware for shared scientific computing for multiple research projects.
- Design and Analysis Information Management System; University of Massachusetts Amherst, funded by NASA, 1998-2004.
"The Design and Analysis Information Management System is a distributed decision making platform for dynamically integrating and executing engineering analysis tools that are deployed in computational and data grids."
- Autonomous Negotiating Teams (ANT); University of Massachusetts Amherst, funded by DARPA, 1999-2001.

"The goal of Autonomous Negotiating Teams is to autonomously negotiate the assignment and customization of resources, such as weapons, to tasks, such as moving targets. To do this we must enable designers to build systems that operate effectively in highly decentralized environments, making maximum use of local information, providing solutions that are both good enough, and soon enough."

- Multi-Agent Design Architecture (MADA); Florida State University, funded by NASA, 1997-1998.
"Integrated Design system (IDS) is an integration of broad range of high fidelity knowledge from expert sources in near real time to synthesize and refine design and product realization."
- Rapid Design Exploration and Optimization, Interactive Gimbal Design (RaDEO-IGD); Florida State University, funded by DARPA, 1996.
"The IGD system will offer the user the ability to interrupt the automated design process, access a specific application product, potentially make changes to both the design variables and the design intent, capture the knowledge associated with those changes, and then continue in the design process under the control of the IGD system."
- Internet Traffic Analysis; Florida State University, 1994.
An early informal work group to collect and analyze data produced by Internet browsing activity used for the development of techniques for web site process improvement.

Consulting

- Industrial Energy Efficiency Technician (IEET) Curriculum; 2011-2014.
Development of a Florida Department of Education curriculum framework for an Industrial Energy Efficiency Technician Community College Credit (IEET-CCC) program with supporting curriculum, course material, and hands on learning modules.

Workshop Instruction

- "CLASS Essentials for Google Cloud," Internet2, 2022.
- "Programming Java," Hyderabad, India, 1997.

Teaching Experience

- "Advanced Computational Systems and Data Engineering," IMSE 8410, graduate, University of Missouri, Spring 2019, Spring 2020.
- "Management Information Systems Design," IMSE 7410/4410, undergraduate and graduate, University of Missouri, Fall 2017, Fall 2018 (1/3 effort).
- "Advanced Management Information Systems Design," IMSE 8410, graduate, University of Missouri, Fall 2016.
- "Computational Optimization and Research Workflows," IMSE 8001, graduate, University of Missouri, Fall 2014.
- "Engineering Statistics," IMSE 4110/7110, undergraduate and graduate, University of Missouri, Spring 2014, Spring 2015, Spring 2016.
- "Web-Based Information Systems," IMSE 4420/7420, undergraduate and graduate, University of Missouri, Spring 2014.
- "Introduction to Industrial Engineering," IMSE 1000, undergraduate, University of Missouri, Fall 2013.
- "Decision Support Systems for Engineers," IMSE 4001-01/7001-01, undergraduate and graduate, University of Missouri, Fall 2013.
- "Industrial Energy Management," EIN4321, undergraduate, University of Florida, Fall 2011, Spring 2012, Fall 2012, Spring 2013.
- "Decision Support Systems for Industrial and Systems Engineers," ESI6355, graduate, University of Florida, Fall 2010, Fall 2012.
- "Computational Optimization," EIN6905, graduate, University of Florida, Fall 2009.
- "Web Based Decision Support Systems for Industrial and Systems Engineers," EIN6905, graduate, University of Florida, Spring 2009, Spring 2010, Spring 2011, Spring 2013.
- "Web Based Decision Support Systems for Industrial and Systems Engineers," EIN6905/ESI4357, undergraduate and graduate, University of Florida, Spring 2008, Fall 2008.
- "Project Planning and Control Technologies," IEM5623, graduate (remote and distance students), Oklahoma State University, Spring 2007.
- "Facilities and Material Handling System Design," IEM4203, undergraduate, Oklahoma State University, Spring 2007.
- "Financial and Advanced Capital Investment Analysis," IEM5503, graduate (remote and distance students), Oklahoma State University, Fall 2006.
- "Collaborative Engineering Project Management," IEM3403, undergraduate (new course), Oklahoma State University, Fall 2006.

National Service

- RCD Staff Workforce Development Interest Group co-Chair, Campus Research Computing Consortium (CaRCC), 2022-.
- Logistics Team, Campus Research Computing Consortium (CaRCC), 2022-.
- Review panel for the National Science Foundation, 2022.
- Review panel for the National Science Foundation, 2020.
- NSF workshop "Research Innovation Workforce for Research Cyberinfrastructure," 2020.
- Leadership Team, Campus Champions, 2018-2020.
- Internet2/CaRCC workshop "Research Computing Maturity Model Workshop," 2018.
- Review panel for the National Science Foundation, 2018.
- NSF/CaRCC workshop "CI Professionalization Workshop," 2018.
- Council Member, Campus Research Computing Consortium, 2017-2019.
- Deputy Regional Champion for Region 4, Campus Champions, 2016-2018.
- NSF/GPN workshop "Roll of regional organizations in improving access to the national computational infrastructure," 2015.
- Review panel for the Environmental Protection Agency (EPA), 2012.
- Review panel for the Environmental Protection Agency (EPA), 2011.
- Referee for *International Journal of Distributed Sensor Networks*, 2011.
- Referee for *Energy Systems*, 2010.
- Referee for *IIE Transactions*, 2009.
- Referee for *IEEE Transactions on Automation Science and Engineering*, 2008.
- Referee for *IIE Transactions*, 2007.
- Review panel for the National Science Foundation, 2006.

Professional Development

- Cyberinfrastructure Leadership Academy 2022.
- Carpentries Instructor Training, The Carpentries, 2021.
- Cyberinfrastructure Leadership Academy, 2019.

- Dr. Elson S. Floyd Administrative Leadership Development Program, University of Missouri System, 2019.
- Bioinformatics Algorithms 1, completed with distinction, Coursera, 2013.
- Comprehensive Five Day Training Program for Certified Energy Mangers, Atlanta, Georgia, 2010.
- "Grant Writers" Seminar, Provost, University of Florida, competitive workshop, 2008.
- NSF CMMI Engineering Research and Innovation Conference 2008, Knoxville, Tennessee, 2008.
- First European Agent Systems Summer School (EASSS'99), Utrecht, the Netherlands, 1999.

Computing

- C, C++, Python, R, SQL, XML, PHP, Java, Erlang, Matlab, MuPad, COIN-OR, HPC Clusters (hardware, software, MPI), Building Automation (BACnet), Embedded (8051, PLC, ARM), Databases, Web, Linux Administration, Networking (IPv6), Globus Toolkit, ZeroC ICE middleware, Aglets.