

J. Scott Hawker

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EDUCATION

Ph.D., Electrical Engineering, 1990, Lehigh University

Ph.D. Dissertation: "An Organization for Intelligent Robot Control"

Graduate work, signal processing and applied algebra, Rutgers University, 1983-84

M.S.E.E. 1982, **B.S.E.E.** 1981, Texas Tech University

M.S. Thesis: "A Digital Signal Processing and Display System"

EXPERIENCE

ROCHESTER INSTITUTE OF TECHNOLOGY, Rochester, New York **September, 2004 - Present**

Assistant Professor and Associate Professor (effective 2010), Department of Software Engineering, B. Thomas Golisano College of Computing and Information Sciences (GCCIS)

Co-Director, Laboratory for Environmental Computing and Decision-Making in the Center for Advancing the Study of Cyberinfrastructure

- Teaching: Software Requirements, Software Process and Project Management, Software Process Engineering, Information System Design, Software Subsystem Design, Verification and Validation, Introduction to Software Engineering
- Research:
 - Cyberinfrastructure for environmental computing and decision-making, focusing on domain-specific computing for transportation policy applications
 - Collaborative learning and knowledge management systems
 - Software process engineering
 - Model-driven development

UNIVERSITY/SPACE RESEARCH ASSOCIATION - NASA, Huntsville, Alabama **Summer 2004**

Visiting Researcher, NASA Technical Standards Program

- Develop requirements and design for next-generation information system architecture for agency-wide technical standards search and delivery system

UNIVERSITY OF ALABAMA, Tuscaloosa, Alabama **1999 – 2004**

Assistant Professor, Department of Computer Science, College of Engineering

- Teaching: undergraduate and graduate Software Engineering, Software Architecture, Human-Computer Interaction, Introduction to C++
- Research:
 - NASA Standards Advisor: applying semantic web, formal modeling (ontologies, UML, process metamodels), information retrieval (metadata-driven search), and other advanced information technology to better create, manage, find, deliver, and use standards, lessons learned, and engineering process documentation for aerospace hardware and software design and manufacture
 - Architecture and behavior of situated action and observation agents cooperating on large-scale analysis and control applications – application to traffic safety analysis
 - Component-based software engineering processes and architectures

**MOTOROLA, Phoenix, Arizona and Austin, Texas
Semiconductor Products Sector****1995 - 1999**CIM System Architect, Worldwide CIM Solutions, 1997-1999

- Systems architect working in partnership with key suppliers to develop next-generation manufacturing execution system for semiconductor manufacturing. Designed innovative data collection, storage and delivery architecture
- Defined an Advanced Process Control Platform for use in all Motorola semiconductor factories, integrating and leveraging third-party analysis and control execution environments and advanced sensors and analyzers. Architecture lead in factory pilot and in other Advanced Process Control applications
- Primary author, SEMI Standard Domain Architecture for manufacturing execution systems (SEMI-STD-E81)
- Championed concepts and practice in agile manufacturing and virtual organizations

MOTOROLA -- On assignment to SEMATECH, Austin, Texas, 1995-1997Program Manager, Project Manager, CIM Standards and CIM Framework Development

- Project Manager and architect, then promoted to Program Manager for developing industry standards for CIM (Computer Integrated Manufacturing) Frameworks
 - Led definition, development, validation and adoption of the SEMATECH CIM Framework, an industry-consensus standard for an open, multi-supplier, plug-and-play application architecture for manufacturing execution systems in semiconductor fabrication. It won the 1996 Object World award for the best use of object-oriented technology for software reuse.
 - Created, participated in, and coordinated seven focused engineering teams formed from SEMATECH assignees and volunteers from SEMATECH member companies, suppliers, users, and standards bodies (over 30 participants from more than 15 companies) to achieve industry-wide consensus in the definition, validation and adoption of CIM Framework Specification and Architecture. Obtained international participation in and led the creation and transition of these teams to SEMI Standards Task Forces (SEMI: Semiconductor Equipment and Materials, International) and to leadership in OMG (Object Management Group) Manufacturing Domain Task Force and Business Object Domain Task Force standardization.
 - Participated in the Factory Integration Technology Working Group creating the SIA National Technology Roadmap for Semiconductors. I championed and edited the Manufacturing Information and Execution Systems section, which identified technology needs through the next 15 years.
 - Project manager and program manager, responsible for budget (\$1.8M/yr.), personnel (7 staff, plus 30 industry volunteers), program-level and project-level planning and management, supplier selection and performance, strategic planning, technology transfer, and industry coordination.

**HONEYWELL INC., Phoenix, Arizona
Industrial Automation and Control Division****1991 - 1995**System Architect: New product definition and opportunity assessment

- Designed architecture for integration of manufacturing process control with production control
 - Defined information models and functional requirements for real-time, closed-loop control and reporting of product cost, quality, yield, and schedule in continuous process industries
 - Defined integration infrastructures with services including databases, real-time data caches, data communications and event propagation agents, application scheduling and invocation, and mechanisms to integrate object-oriented-style applications with relational- and procedural-style applications
 - Worked with cross-functional team to research make/buy options, recommend business alignment, and launch partnership for production control component of new product architecture
- Defined client-server architecture and led client implementation for field trial of portable, radio-linked computer for use by mobile workers in hazardous industrial sites
 - Coordinated development for three-company, ten-person development team
 - Worked with marketing to develop a business feasibility assessment

Product Architect: Process Control Engineering Workstation

- Conceived and defined engineering workstation architecture featuring a tool integration infrastructure based on CASE frameworks, including an object-oriented database, common user interface, reusable base classes, and component-based tool invocation and visual editing
 - Led seven-person international team (including USA, Japan, and Europe) in architecture design, technology evaluation and selection, and development project structuring
 - Technical lead and architect on twenty-person team for detailed design and development of tool infrastructure services, including coordination with architects of overall next-generation control system

**HONEYWELL INC., Albuquerque, New Mexico
Defense Avionics Systems Division****1988 - 1991**System and Software Engineer: Flight and Mission Management Systems

- Led design and prototype of a development facility for real-time, embedded expert systems including a knowledge engineering workstation, a real-time embedded inference engine with parallel execution, and a rule-base translation and optimization tool leveraging automatic program synthesis technology
- Defined and prototyped knowledge-based system architecture to support and integrate flight management and mission management functions for military aircraft operations. Worked with customers and corporate research to apply system to specific aircraft and missions
 - Defined modular partitioning and integration architecture for functions including sensor integration, situation assessment, action planning and reactive control, and combat crew interface
 - Leveraged Air Force Pilot's Associate results in information-based integration using a real-time control blackboard, terrain and feature databases, and real-time distributed database management
 - Provided threat, terrain, and geographic data models for planning and decision support on covert missions

LEHIGH UNIVERSITY, Bethlehem, Pennsylvania
Institute for Robotics and Center for Design and Manufacturing Innovation

1984 - 1988

Graduate Research Assistant: R&D of Knowledge-Based Control and Agile Manufacturing Systems

- Conceived and developed an intelligent control system reference model focusing on the representation and coordinated use of world knowledge and goals in modular observation/action agent controllers
 - Applied reference model to manufacturing information and control systems, dual-armed assembly robots, and autonomous underwater surveillance vehicles
 - Led an eight-person team to design and implement a dual-armed robot system for assembly tasks. System integrates and coordinates two different robot arm controllers, a vision system, sonar proximity sensors, and gripper contact/force sensors
- Developed concepts that helped lead to the definition of the Agile Manufacturing Enterprise. Applied modular, agent-based control concepts, information modeling, and communications to improve manufacturing agility
- Designed fiber optic plant for communications network for manufacturing automation
- Co-taught graduate course in robotics and intelligent machines
- Lectured on manufacturing systems engineering and computer communications networks for Manufacturing Engineering Systems program seminars, Manufacturing Excellence Symposia and industry seminars

AT&T BELL LABORATORIES, Whippany, New Jersey

1982 - 1988

(Educational Leave, 1984 - 1987)

Signal Processing Software and Systems Engineer: Undersea Surveillance Systems

- Conceived and defined a functional architecture for autonomous, underwater surveillance vehicles, including functions for sonar sensor processing and fusion, covert motion planning and control, and covert communication
- Developed, improved, and led field trials of new signal processing and display algorithms to improve signal detection performance and operator productivity

TEXAS TECH UNIVERSITY, Lubbock, Texas
Electrical Engineering Department

1981 - 1982

- Developed signal processing and data visualization tools for information analysis in geophysical exploration
- Maintained and calibrated timing and sampling instrumentation for high-energy physics experiments

PROFESSIONAL ORGANIZATIONS

Member Institute of Electrical and Electronics Engineers (Computer; Software), Association of Computing Machinery, International Environmental Modeling and Software Society, American Society for Engineering Education

PUBLICATIONS

Hawker, J.S. Comer, B., Corbett, J.J. Ghosh, A. Korfmacher, K., Lee, E.E. Li, B., Prokop, C., Winebrake, “An Integrated Model to Study Environmental, Economic, and Energy Trade-Offs in Intermodal Freight Transportation,” 2010 International Environmental Modelling and Software Society (iEMSs) 2010 International Congress, Ottawa, Canada, July, 2010.

Comer, B.S., Corbett, J.J., **Hawker**, J.S., Korfmacher, K., Lee, E.E., Prokop, C., Winebrake, J.J., “Marine Vessels as Substitutes for Heavy-Duty Trucks in Great Lakes Freight Transportation in revision for *Journal of the Air & Waste Management Association*, October 2009.

Hawker, J.S., “A Software Process Engineering Course,” Proceedings of the 2009 American Society for Engineering Education Annual Conference, Austin, TX, June 2009, Paper AC 2009-2001.

Stepp, M.D., Winebrake, J.J., **Hawker**, J.S., Skerlos, S.J., “Greenhouse Gas Mitigation Policies and the Transportation Sector: The Role of Feedback Effects on Policy Effectiveness,” *Energy Policy*, 37, 2009, pp.2774-2787.

Hawker, J.S.; Weber, I; Starenko, M.; Parry-Hill, J.; “Preliminary Experience of Using a Learning and Knowledge Management System for an SE-1 Course,” Proceedings of the 2008 American Society for Engineering Education Annual Conference and Exposition, Pittsburgh, PA, June 2008.

Winebrake, James J., James J. Corbett, Aaron Falzarano, J. Scott **Hawker**, Karl Korfmacher, Sai Ketha, and Steve Zilora, “Energy, Environmental, and Economic Tradeoffs in Freight Transportation Decision-Making,” *Journal of the Air & Waste Management Association*, Volume 58, Number 8, August 2008.

Hawker, J.S., Falzarano, A. M., Ketha, S. Korfmacher, K. Winebrake, J.J., Zilora, S.. “Intermodal Transportation Network Custom Evaluators for Environmental Policy Analysis” 2007 ESRI International User Conference. San Diego, CA.

Falzarano, A., **Hawker**, J.S., Korfmacher, K., Winebrake, J.J., Zilora, S., Ketha, S.. “Development of an Intermodal Network for Freight Transportation Analysis” 2007 ESRI International User Conference. San Diego, CA.

Hawker, J.S., “The Collaborative eNotebook: a Collaborative Learning and Knowledge Management Testbed,” Proceedings of the 2006 American Society for Engineering Education Annual Conference and Exposition, Chicago, IL, June 18-21, 2006.

Gupta, S., **Hawker**, J.S., and Smith, R.K., “Acquiring and Delivering Lessons Learned for NASA Scientists and Engineers: A Dynamic Approach,” 2005 ACM Southeast Conference, Kennesaw, GA, March, 2005.

Yau, H.Y., and **Hawker**, J.S., “SA_MetaMatch: Document Discovery through Document Metadata and Indexing,” 2004 ACM Southeast Conference, Huntsville, AL, March, 2004.

Hawker, J.S., Ma, H., and Smith, R.K., “Web-Based Process and Process Models to Find and Deliver Information to Improve the Quality of Flight Software,” (Best Paper in Track) 2003 Digital Avionics Systems Conference, October, 2003.

Burg, W.D., **Hawker**, J.S., *et al.*, “Exploring a Comprehensive CBD Method: Use of CBD/e in Practice,” Third International Workshop on Component-Based Software Engineering, International Conference on Software Engineering, Limerick, Ireland, May, 2000.

Hawker, J.S., Hodges, R., *et al.*, “Provisional Standard for CIM Framework Domain Architecture,” Semiconductor Equipment and Materials International (SEMI) Standard #E81-0699, SEMI, Inc., Mountain View, CA, 1999. (An international industry standards document)

Hawker, J.S., “CIM Framework Architecture and Application Models,” in *Information Infrastructure Systems for Manufacturing II*, J.J. Mills and F. Kimura, Editors, pp. 201-214, Kluwer Academic Publishers, Boston, 1999.

Hawker, J.S., “Java: Where and When?” in *Channel: Business and Marketing News for the Semiconductor Equipment and Materials Industry*, p. 19, SEMI, Inc., June-July 1998.

Hawker, J.S., Waskiewicz, F.W., “Agility enabled by the SEMATECH CIM Framework.” *Plug and Play Software for Agile Manufacturing* in SPIE’s Photonics East 1996 Conference, Boston Massachusetts, November 18, 1996.

Hawker, J.S. and Nagel, R.N., “World Models in Intelligent Control Systems,” Proceedings of the 1987 IEEE International Symposium on Intelligent Control, pp. 482-488. Also published in *International Trends in Advanced Manufacturing Technology: Autonomous Robots*, IFS Publications, Bedford, England, 1989.

Hawker, J.S. and Nagel, R.N., “Integration of a Dual-Arm Control System,” Proceedings of the 1986 SME Robotics Research Conference, MS86-776.

Hawker, J.S., Nagel, R.N., *et al.*, “Multiple Robotic Manipulators,” *BYTE Magazine*, Vol. 11, No. 1, January, 1986, pp. 203-219.

TECHNICAL REPORTS

Montero, E. **Hawker**, J.S., Esterman, M., Rothenberg, S., “Sustainable Printing Activities: Design and Initial Approach of a Print Energy Life-cycle Decision Tool” Research monograph PICRM-2010-03 of the Printing Industry Center at RIT, Rochester, NY, January 2010.

Ludi, S., Lutz, M., **Hawker**, J.S., and Reichlmayr, T., “Orbscan Software Product Recovery, Phase I Project Report,” Software Engineering Department, B. Thomas Golisano College of Computing and Information Sciences, Rochester Institute of Technology, October, 2005.

Hawker, J.S., “Concepts for a Lessons Learned Software System,” in *The 2003 NASA Faculty Fellowship Program Research Reports*, NASA/CR—2004-213285, pp.XVI-1 – XVI-6 May, 2004.

Hawker, J.S., “Standards Advisor: Advanced Information Technology for Advanced Information Delivery,” in *The 2002 NASA Faculty Fellowship Program Research Reports*, NASA/CR—2003-212397, pp.XX-1 – XX-5 May, 2003.

Hawker, J.S., Massey, K.E., and Davis, S.M., “Re-Architecting a Data Analysis System to Enable Pluggable Tools and Data,” Computer Science Technical Report TR-2002-08, University of Alabama, October, 2002.

Hawker, J.S., “Integrating Process, Product, and People Models to Improve Software Engineering Capability,” Computer Science Technical Report TR-2002-05, University of Alabama, September, 2002.

Hawker, J.S., “A Three-Way Stakeholder Structure for Software Engineering Course Projects,” Computer Science Technical Report TR-2002-06, University of Alabama, September, 2002.

Hawker, J.S. and Massey, K.E., “Toward Distributed, Pluggable Tools and Data: Re-Engineering a Data Analysis Architecture,” Computer Science Technical Report TR-2002-07, University of Alabama, September, 2002.

Hawker, J.S., Woolridge, R., “A Process for Gaining Competence in Component-Based Development,” Computer Science Technical Report TR-2000-08, University of Alabama, September, 2000.

Hawker, J.S., *SEMATECH CIM Framework Architecture Concepts, Principles and Guidelines*. Technology Transfer #96123214A-ENG, SEMATECH, Austin, Texas, 1996.

Hawker, J.S., *An Organization for Intelligent Robot Control*, Ph.D. Dissertation, Lehigh University, October, 1990.

INVITED PRESENTATIONS

“The NASA Standards Advisor Program: Towards a Next-Generation Information System Architecture,” presented at Rochester Institute of Technology Conference on Computing and Information Sciences, January 21, 2005.

“Components from an Industry Perspective,” presented at NSF Component-Based Software Development Workshop, June 15, 2001.

“Enterprise Integration Standards” at the ERP 2000 Workshop, University of Alabama, April 7, 2000.

“The SEMI CIM Framework: Standards for Semiconductor Manufacturing Executions System Integration” at the University of Alabama Industrial Engineering Graduate Seminar, February 15, 2000.

“CIM Framework Architecture and Application Models” at the 1998 Conference on the Design of Information Infrastructure Systems for Manufacturing, Arlington, Texas, May, 1998.

“SEMI North America CIM Framework Standards Task Force – Status Report.” Invited presentation at the SEMI Japan CIM Framework Technical Education Program (STEP), Tokyo, Japan, December 5, 1997.

“Semiconductor Industry Trends and SEMATECH CIM Framework Update.” Invited presentation, IBM SiView/POSEIDON User Meeting, Phoenix, Arizona, September 23, 1997.

“The SEMATECH CIM Framework.” Invited presentation for the European Open Workshop: IT Projects of the European Semiconductor Industry, Munich, Germany, July 11, 1997.

“SEMATECH CIM Framework.” Invited presentation, IBM POSEIDON User Symposium, Tokyo, Japan, May 21, 1997.

“The SEMATECH CIM Framework: a Standard Specification for Adaptive, Responsive Manufacturing Information Systems.” Invited presentation for the 1997 National Manufacturing Technology Conference, Gaithersburg, Maryland, April 17, 1997.

“The SEMATECH CIM Framework: An Agility Enabler.” Presented at the 1997 Agility Conference, San Diego, California, March 6, 1997.

“CIM Framework Tutorial.” Half-day tutorial at ESPRIT EuroFrame Workshop, Munich, Germany, February, 1997.

FUNDED RESEARCH

“Development of a Web-Based Energy and Emissions Calculator for MARAD,” US Department of Transportation Maritime Administration and University of Delaware, \$61,046 (my portion: \$4150 plus 1 grad student stipend), October 2009 – April 2011 (Principal Investigator).

“WebGIFT: Expanding Access to the Great Lakes Geospatial Intermodal Freight Transportation (GL-GIFT) Model, Great Lakes Maritime Research Institute, \$70,000 (my portion: \$4,000 plus 1 grad student stipend and tuition), October 2009 – October 2010 (Principal Investigator).

“Development of a California Geospatial Intermodal Freight Transport Model with Cargo Flow Analysis,” California Air Resources Board and the University of Delaware, \$84,699 (my portion: \$7,986 plus ½ grad student stipend), March 2009 – April 2010 (Principal Investigator).

“Infrastructure Performance Improvement and Congestion Relief for Freight Flows: Application of the GIFT Model for Bottlenecks Analysis,” US Department of Transportation, \$129,012 (my portion: \$12,000 plus ½ grad student tuition and stipend), October 2008—January 2010 (Co-Principal Investigator).

“Development of Geospatial Intermodal Freight Transport Model for DOT Planning and Decision Making,” US Department of Transportation, \$129,012 (my portion: \$7,000), September 2008—August 2009 (Co-Principal Investigator).

“Energy, Economic, and Environmental Tradeoffs Associated with Freight Transportation in the Great Lakes Region: Development and Application of the Great Lakes Geospatial Intermodal Freight Transportation,” Great Lakes Maritime Research Institute, \$88,491 (my portion: \$7,000 plus ½ grad student stipend), September 2008 – October 2009 (Co-Principal Investigator).

“Intermodal Freight Transport in the Great Lakes: Development and Application of a Great Lakes Geographic Intermodal Freight Transport Model,” Great Lakes Maritime Research Institute, \$88,491 (my portion: \$8,000 plus grad student tuition and stipend), October 2007 – September 2008 (Co-Principal Investigator).

“Knowledge Studio,” RIT Online Learning Emerging Technology Grant, ~\$6,000 for graduate student plus in-kind support from Online Learning course designers and information technologists to develop and deploy a pilot learning and knowledge management system, May 2007 – March 2008 (Principal Investigator).

“Automotive Greenhouse Gas Policies and Material Flows,” NSF Materials Use – Science, Engineering, and Society (MUSES) Grant, \$1,899,997 (my portion: \$21,819 plus ~\$20,000 for grad student tuition and stipend plus \$6,000 Research Experience for Undergraduates supplement). My focus is to develop integrating cyberinfrastructure and scenario generator, October 2006 – September 2011 (Co-Principal Investigator).

“Environmental Computing and Decision-Making Initiative,” Seed funding from RIT First-In-Class, \$32,500, (my portion: \$5,712), 2006-2007 plus \$18,000 (my portion ~\$5000 including students) for 2007-2008.

“Orbscan Software Product Recovery,” Bausch & Lomb Corporation, \$115,000 (my portion ~\$20,000), June – July 2005 (Co-Principal Investigator).

“Standards Advisor: MetaMatch, 7120.5B Web Portal, and Integrating Training and Lessons Learned,” NASA Marshall Space Flight Center and National Space Science Technology Consortium, \$57,223, May 2003 – May 2004 (Principal Investigator).

“ED14 Interactive Software Process,” NASA Marshall Space Flight Center and National Space Science Technology Consortium, \$25,000, May 2003 – May 2004 (Principal Investigator).

“Standards Advisor Web Portal,” NASA Marshall Space Flight Center and University Space Research Association, \$13,572, August 2002 – May 2003 (Principal Investigator).

“Systems and Data Enrichment for Traffic Safety,” North Carolina Department of Transportation, \$105,420 (my portion ~\$15,000), October 2001 – September 2002. (Senior Personnel)

NASA Faculty Fellow, \$13,500, May 2002 – August 2002; \$13,500, May 2003 – August 2003.

“ERP 2000: The Supply Chain and the Internet,” NSF Workshop, \$10,000 (my portion ~\$1,500), April, 2000. (Senior Personnel)