

Anita Raja

RESEARCH INTERESTS

My main research interests are in the design and control of rational agents interacting in real-time multiagent environments and more generally distributed problem solving and artificial intelligence. As embedded systems consisting of collaborating agents capable of interaction become ubiquitous, they must be able to adapt to the dynamic, uncertain characteristics of an open environment. This adaptation needs to be based on the priority of tasks, availability of resources, and availability of alternative ways of satisfying these and future tasks. A unifying theme in my research has been to develop strategies that equip agents with this ability to adapt as well with the capacity to reason about when this adaptation process should be done and how much effort should be invested in this adaptation. I have strived to establish a strong mathematical basis to my work while making it relevant to real-world applications.

Some of the application areas that I have worked on are decision support information environments, visual analytics, critical infrastructure modeling and simulation and intelligent environment control. Now that I have tenure, I have begun to move my research into new directions while leveraging the thematic research threads that I have developed over the past decade. These new directions include tornado tracking using multiple sensors, collaborative defense in the network security domain, and management of multiple modalities and diagnostic studies in the area of biomedical engineering systems

EDUCATION

Doctor of Philosophy, Computer Science

University of Massachusetts, Amherst, September 2003

Dissertation title: *Meta-Level Control in Multi-Agent Systems*

Advisor: Professor Victor Lesser

Committee Members: Professor Shlomo Zilberstein, Professor Andrew Barto, Professor Abhijit Deshmukh

Master of Science, Computer Science

University of Massachusetts, Amherst, September 1998

Thesis title: *Reasoning about Uncertainty in Design-to-Criteria Scheduling*

Advisor: Professor Victor Lesser

Bachelor of Science in Computer Science and minor in Mathematics

With Honors, Summa Cum Laude

Temple University, Philadelphia, February 1996

PROFESSIONAL APPOINTMENTS

July 2009- Present	Associate Professor, Software and Information Systems, University of North Carolina at Charlotte.
Aug 2003- July 2009	Assistant Professor, Software and Information Systems, University of North Carolina at Charlotte.
Aug 1996-June 2003	Graduate Research Assistant, Multi Agent Systems Lab, University of Massachusetts.
January 1999	Lecturer, Computer Science, University of Massachusetts.
Feb 1995- May 1996	Undergraduate Research Assistant, FLAIRS Lab, Computer and Information Sciences, Temple University.
Aug 1993-May 1996	Tutor, Mathematics, Temple University.

PUBLICATIONS

Refereed Journals

- [J5] **Anita Raja** and Victor Lesser, "A Framework for Meta-level Control in Multi-Agent Systems", In *Autonomous Agents and Multi-Agent Systems*, Vol.15, Number 2, pp 147-196, October 2007, DOI 10.1007/s10458-006-9008-z, URL <http://dx.doi.org/10.1007/s10458-006-9008-z>.
- [J4] Thomas Wagner, **Anita Raja**, and Victor Lesser, "Modeling Uncertainty and its Implications to Sophisticated Control in TAEMS Agents", In *Autonomous Agents and Multi-Agent Systems*, Vol. 13, Number 3, pp 235-292, Nov 2006, DOI 10.1007/s10458-006-7669-2, URL <http://dx.doi.org/10.1007/s10458-006-7669-2>.
- [J3] V. Lesser, K. Decker, T. Wagner, N. Carver, A. Garvey, B. Horling, D. Neiman, R. Podorozhny, M. NagendraPrasad, **Anita Raja**, R. Vincent, P. Xuan, X.Q. Zhang, "Evolution of the GPGP/TAEMS Domain-Independent Coordination Framework", In *Autonomous Agents and Multi-Agent Systems*, Vol. 9, p 87-143, 2004.
- [J2] Victor Lesser, Bryan Horling, Frank Klassner, **Anita Raja**, Thomas Wagner, Shelley XQ. Zhang, "BIG: An Agent for Resource-Bounded Information Gathering and Decision Making", *Artificial Intelligence, Issue on Internet Applications.*, May-2000, Vol 118, issue 1-2, pages 197-244.
- [J1] Victor Lesser, Bryan Horling, **Anita Raja**, Thomas Wagner, Shelley XQ. Zhang. "Resource-Bounded Searches in a Information Marketplace", *IEEE Internet Computing, Agents on the Net* Mar/Apr 2000, Vol 4, Number 2., p 49-58.

Books

- [B1] Michael T. Cox and **Anita Raja**, editors. *MetaReasoning: Thinking about Thinking (In Preparation)*, To be published by MIT Press, 2009.

Book Chapters

- [BC8] Michael T. Cox and **Anita Raja** "Metareasoning: An introduction" To appear in Cox, M. T., & Raja, A. (in press). *Metareasoning: Thinking about thinking*. Cambridge, MA: MIT Press.
- [BC7] George Alexander, **Anita Raja**, and David Musliner, "Controlling Deliberation in Coordinators", To appear in Cox, M. T., & Raja, A. (in press). *Metareasoning: Thinking about thinking*. Cambridge, MA: MIT Press.
- [BC6] **Anita Raja**, George Alexander, Victor Lesser and Michael Krainin. Coordinating Agent's Meta-level Control, To appear in Cox, M. T., & Raja, A. (in press). *Metareasoning: Thinking about thinking*. Cambridge, MA: MIT Press.
- [BC5] Jiang Xie, Ivan Howitt, and **Anita Raja**, "Framework for Decentralized Wireless LAN Resource Management," Chapter 2 of *Emerging Wireless LANs, Wireless PANs, and Wireless MANs: IEEE 802.11, IEEE 802.15, 802.16 Wireless Standard Family*, John Wiley & Sons, Inc., pp. 27-64, April 2009
- [BC4] **Anita Raja**, Michael Barley and Shelley Xiaoqin Zhang "Towards Safe Coordination in MultiAgent Systems". To appear in *LNAI Hot Topics Safety and Security in Multiagent systems: The Early Years*, Pages 1-7, Volume: 4324 Editors: M. Barley, H. Mouratidis, A. Unruh , D. Spears, P. Scerri, F. Massacci, 2009.
- [BC3] **Anita Raja** and Michael Klibanov "A Distributed Numerical Approach for Managing Uncertainty in Large-Scale Multi-Agent". To appear in *LNAI Hot Topics Safety and Security in Multiagent systems: The Early Years*, Pages: 75-84, Volume: 4324, Editors: M. Barley, H. Mouratidis, A. Unruh , D. Spears, P. Scerri, F. Massacci, 2009.
- [BC2] Wei-ning Xiang, William J. Tolone, **Anita Raja**, David Wilson, Qianhong Tang, Kelli McWilliams, Robert McNally Mining Critical Infrastructure Information from Municipality Data Sets: A Knowledge-driven approach and its applications. Chapter 14 in *Emerging Spatial Information Systems and Applications* by Brian Hilton, Idea Group Publishing, 2006, pp 310-326.
- [BC1] XiaoQin Zhang, **Anita Raja**, Barbara Lerner, Victor Lesser, Leon Osterweil and Thomas Wagner. "Integrating High-Level and Detailed Agent Coordination into a Layered Architecture", *Lecture Notes in Computer Science (1887): Infrastructure for Scalable Multi-Agent Systems*, Wagner/Rana editors,

Springer-Verlag. Also UMass Computer Science Technical Report 1999-029.

Refereed Conference Publications

- [C14] Dingxiang Liu, Jia Yue, Xiaoyu Wang, **Anita Raja**, William Ribarsky "The Role of Blackboard-based Reasoning and Visual Analytics in RESIN's Predictive Analysis", Proceedings of 2008 IEEE/ WIC/ ACM International Conference on Intelligent Agent Technology (Short Paper, Acceptance Rate 29%), pp 508-511, Sydney, Dec 9-12, 2008. Extended version is CVC Technical Report CVC-UNCC-08-29, July 2008 .
- [C13] George Alexander (Advisee), **Anita Raja**, and David Musliner, "Controlling Deliberation in a Markov Decision Process-Based Agent", Proceedings of the Seventh International Joint Conference on Autonomous Agents and Multi-Agent Systems, pp 461-468, Estoril, Portugal, May 12-16, 2008 (Acceptance rate 22%).
- [C12] Dingxiang Liu (Advisee), **Anita Raja**, and Jayasri Vaidyanath, "TIBOR: A Resource-bounded Information Foraging Agent for Visual Analytics" Proceedings of 2007 IEEE/ WIC/ ACM International Conference on Intelligent Agent Technology (IAT 2007), pp 349-355, Silicon Valley, CA, Nov 2-5, 2007 (Acceptance rate 20%).
- [C11] George Alexander (Advisee), **Anita Raja** "The Role of Problem Classification in Online Meta-Cognition", Proceedings of the International Conference on Intelligent Agent Technology (IAT 2006), pp 218-225, Hongkong, China, December 2006 (Acceptance rate 25%).
- [C10] Ivan Howitt, John Stamper (Advisee), **Anita Raja**, Verghese Mappillai Predictive Protocol Management with Contingency Planning for Wireless Sensor Networks. Proceedings of the 2nd IEEE International Conference on Mobile Ad-hoc and Sensor Systems MASS 2005, p 160-162.
- [C9] Qianhong Tang, Wei-ning Xiang, William J. Tolone, **Anita Raja**, David Wilson, Kelli McWilliams, Robert McNally, (2005). A Knowledge-Driven Method for Critical Infrastructure Information Mining. *Association of American Geographers 101st Annual Meeting*, April 5-9, 2005, Denver, CO.
- [C8] Wei-ning Xiang, William J. Tolone, **Anita Raja**, David Wilson, Qianhong Tang, Kelli McWilliams, Robert McNally, Mining Critical Infrastructure Information from Municipality Data Sets: A Knowledge Driven approach and its Applications. *Auto-Carto 2005*, Las Vegas, March 18-23rd, 2005.
- [C7] **Anita Raja** and Victor Lesser. Meta-level Reasoning in Deliberative Agents. In *Proceedings of the International Conference on Intelligent Agent Technology (IAT 2004)*, September, 2004. **Best Paper Award Finalist** (Acceptance rate 16%).
- [C6] William J. Tolone, David Wilson, **Anita Raja**, Wei-ning Xiang, E. Wray

- Johnson "Applying Cougaar to Integrated Critical Infrastructure Modeling and Simulation" *Proceedings of First Open Cougaar Conference* New York City, July 2004.
- [C5] William J. Tolone, David Wilson, **Anita Raja**, Wei-ning Xiang, Huili Hao, Stuart Phelps, E. Wray Johnson "Critical Infrastructure Integration Modeling and Simulation" *Proceedings of 2nd Symposium in Intelligence and Security Informatics* Tucson, Arizona, June 2004.
- [C4] **Anita Raja** and Victor Lesser, "Efficient Meta-level Control in Bounded-Rational Agents", *Proceedings of Autonomous Agents and Multi-Agent Systems 2003*, pages 1104-1105, Melbourne, Australia. (Short paper)
- [C3] **Anita Raja**, Victor Lesser and Thomas Wagner, "Toward Robust Agent Control in Open Environments", *Proceedings of Autonomous Agents 2000*, pages 84-91, Barcelona, Spain. Also UMass CS Tech Report 1999-59 (Acceptance Rate 24%).
- [C2] Victor Lesser, Michael Atigetchi, Brett Benyo, Bryan Horling, **Anita Raja**, Regis Vincent, Thomas Wagner, Ping Xuan, Shelley XQ. Zhang. "The UMASS Intelligent Home Project", *Proceedings of Third International Conference on Autonomous Agents*, Seattle, WA, pages 291-298, Spring 1999. Also UMass Technical Report 1999- (Acceptance Rate 29%).
- [C1] Victor Lesser, Bryan Horling, Frank Klassner, **Anita Raja**, Thomas Wagner, Shelley XQ. Zhang. "BIG: A Resource-Bounded Information Gathering Agent", *Proceedings of AAI-98*, pages 539-546, Madison, WI, July 1998, also UMASS Computer Science Technical Report 1998-003. (Acceptance Rate 30%).

Refereed Symposia and Workshop Publications

- [W18] Shanjun Cheng, **Anita Raja**, Linda Xie, Ivan Howitt "A Distributed Constraint Optimization Algorithm for Dynamic Load Balancing in WLANs". In *Proceedings of Eleventh International Workshop on Distributed Constraint Reasoning to be held in conjunction with IJCAI 2009*, pp 31-45, Pasadena CA.
- [W17] Ashok Goel, Emile Morse, **Anita Raja**, Jean Scholtz, John Stasko "Computational Explanations for Report Generation in Intelligence Analysis". Accepted for publication in *IJCAI 2009 Workshop on Explanantion-aware Computing (ExaCt 2009)*, Pasadena CA.
- [W16] Jia Yue, **Anita Raja**, Dingxiang Liu, Xiaoyu Wang, William Ribarsky "A Blackboard-based Approach towards Predictive Analytics", *Proceedings of AAI Spring Symposium on Technosocial Predictive Analytics*, pp 154-161, Stanford University, CA, March 23-25, 2009.
- [W15] **Anita Raja** and Victor Lesser. Coordinating Agent's Meta-level Control, April 2008. *Proceedings of AAI 2008, Workshop on Metareasoning: Thinking about Thinking*, pp 106-112, Chicago, IL. July 2008.

- [W14] Michael Cox and **Anita Raja**, "Metareasoning: A Manifesto", Proceedings of AAAI 2008, Workshop on Metareasoning: Thinking about Thinking, pp 1-4, Chicago, IL. July 2008. Also BBN Technical Memo TM-2028. Cambridge, MA: BBN Technologies.
- [W13] George Alexander (Advisee), **Anita Raja**, Ed Durfee and David Musliner, Design Paradigms for Meta-Control in Multi-Agent Systems. Proceedings of *AAMAS 2007 Workshop on Metareasoning in Agent-based Systems*, pp 92-103, Hawaii, May 2007.
- [W12] **Anita Raja** and Ashok Goel, Introspective Self-Explanation in Analytical Agents. Proceedings of *AAMAS 2007 Workshop on Metareasoning in Agent-based Systems*, pp 76-91, Hawaii, May 2007.
- [W11] Jiang Xie, Ivan Howitt, and **Anita Raja**, "Cognitive Radio Resource Management Using Multi-Agent Systems," Proceedings of First IEEE Workshop on Cognitive Radio Networks (CRN 2007), in conjunction with IEEE Consumer Communications and Networking Conference (CCNC 2007), 2007.
- [W10] **Anita Raja**, George Alexander, Verghese Mappillai "Leveraging Problem Classification in Online Meta-Cognition", Proceedings of AAAI 2006 Spring Symposium on Distributed Plan and Schedule Management, pp 97-104, Stanford, CA, March 2006.
- [W9] **Anita Raja** and Victor Lesser. "Reasoning about Coordination Costs in Resource-Bounded Multi-Agent Systems." *In Proceedings of AAAI 2004 Spring Symposium on Bridging the multiagent and multirobotic research gap*, Stanford, CA, March 2004.
- [W8] **Anita Raja** and Victor Lesser "Automated Meta-Level Control Reasoning in Complex Agents" Proceedings of Eighteenth International Conference on Artificial Intelligence (IJCAI 2003), Workshop on 'Agents and Automated Reasoning', Acapulco Mexico.
- [W7] **Anita Raja** and Victor Lesser. "Meta-level Control in Multi-Agent Systems", *Proceedings of AAAI/KDD/UAI-2002 Joint Workshop on Real-Time Decision Support and Diagnosis Systems*, Edmonton, Alberta, Canada, July 2002.
- [W6] **Anita Raja** and Victor Lesser. "Real-Time Meta-Level Control in Multi Agent Systems", *Proceedings of Multi-Agent Systems and Applications - ACAI 2001 and EASSS 2001 Student Sessions*. Prague, Czech Republic, July 2001.
- [W5] **Anita Raja**, Thomas Wagner, and Victor Lesser. Reasoning about Uncertainty in Design-to-Criteria Scheduling. *Proceedings of AAAI 2000 Spring Symposium on Real-Time Autonomous Systems*, AAAI, pp. 76-83. 2000. Also UMass Technical Report 1998-004.
- [W4] Victor Lesser, Bryan Horling, Frank Klassner, **Anita Raja**, Thomas Wagner, Shelley XQ. Zhang. "Recent Extensions to BIG: A Resource-Bounded Information Gathering System", *Proceedings of American Association for Artificial Intelligence Workshop on Intelligent Information Systems*, Orlando, FL. July 1999. Also UMass Technical Report 1999-013.

- [W3] Victor Lesser, Michael Atighetchi, Brett Benyo, Bryan Horling, **Anita Raja**, Regis Vincent, Thomas Wagner, Ping Xuan, and Shelley XQ-Zhang. "The Intelligent Home Testbed", *Proceedings of Third International Conference on Autonomous Agents, Workshop on Autonomy Control Software*, Seattle, WA, June 1999.
- [W2] Victor Lesser, Bryan Horling, Frank Klassner, **Anita Raja**, Thomas Wagner, Shelley XQ. Zhang. "A Resource-Bounded Interpretation-Centric Approach to Information Gathering", *Research Overview, Proceedings of AAI-98 Workshop on Information Integration*. Madison, WI, July 1998.
- [W1] Joe Felder and **Anita Raja**. "Companion System to Web Browsing", *ACM 1996 Poster Presentation*, Philadelphia, PA.

Technical Reports and Unpublished Manuscripts

- [T4] Ivan Howitt, **Anita Raja**, James Conrad, Jose Gutierrez and Kaushal Shah "Predictive Protocol Management with Contingency Analysis for Wireless Sensor Networks", UNCC Technical report, November 2004.
- [T3] **Anita Raja**, Contingency Analysis in the Design-to-Criteria Scheduler Master's Thesis, 1998.
- [T2] Shanjun Cheng (Advisee), **Anita Raja**, Linda Xie, Ivan Howitt. Decentralized Load Balancing in WLANs. UNCC Technical Report, March 2008.
- [T1] Bryan Horling, Victor Lesser, Regis Vincent, Tom Wagner, **Anita Raja**, Shelley Zhang, Keith Decker. Alan Garvey, The TAEMS White Paper, UMass Tech Report

PRESENTATIONS

- March 2009, *A Blackboard-based Approach towards Predictive Analytics*, AAI Spring Symposium on Technosocial Predictive Analytics, Stanford University, CA.
- October 2008 *Metalevel Control Across Agent Boundaries* Invited Talk, School of Interactive Computing, Georgia Institute of Technology, Atlanta, GA.
- July 2008 *Coordinating Agents' Meta-level Control*, AAI 2008, Workshop on Metareasoning: Thinking about Thinking, Chicago, IL.
- June 2008 *Agent-based Computing*, Invited Talk, UNCC Diversity In information Technology Institute NSF REU program.
- May 2008 *Controlling Deliberation in a Markov Decision Process-Based Agent*, Seventh International Joint Conference on Autonomous Agents and Multi-Agent Systems (AAMAS08), Estoril, Portugal.
- January 2008 *Distributed Computing*, Invited Lecture, ITIS 1203 Survey of Computing, Software and Information Systems

- May 2007 *Design Paradigms for Meta-Control in Multi-Agent Systems*, AAMAS 2007 Workshop on Metareasoning in Agent Based Systems, Honolulu, HI.
- May 2007 *Introspective Self-Explanation in Analytical Agents*, AAMAS 2007 Workshop on Metareasoning in Agent Based Systems, Honolulu, HI.
- July 2006 Reasoning about Information Foraging Pacific National Labs, Pasco, WA.
- May 23, 2006 *Leveraging Problem Classification in Online Meta-Cognition*, DARPA PI Meeting, Las Vegas, NM.
- March 21, 2006 *Leveraging Problem Classification in Online Meta-Cognition*, AAI 2006 Spring Symposium on Distributed Plan and Schedule Management, Stanford, CA, March 2006.
- February 24, 2006 *Doing the Right Thing in Multi-Agent Systems*, Invited Talk, Computer and Information Sciences Colloquium Series, Temple University, Philadelphia.
- December 1, 2005 *A Decision-Theoretic Approach to Information Foraging*, Visual Analytics Center, UNCC.
- November 2005 *MultiAgent Systems*, Invited Lecture, UNCC Freshmen Learning Seminar.
- September 2005 *MetaCognition in COORDINATORS*, DARPA PI Meeting, Boston, MA.
- November 2004 MultiAgent Systems. Invited Lecture, UNCC Freshmen Learning Seminar.
- March 2004 *Reasoning about Coordination Costs in Resource-Bounded Multi-Agent Systems*, AAI 2004 Spring Symposium on Bridging the multiagent and multirobotic research gap, Stanford, CA, March 2004
- December 2003 *Meta-level Control in Bounded-Rational Agents*. Department Seminar, University of Maryland Baltimore County.
- April 2003 *Meta-level Control in Bounded-Rational Agents*. Invited Talk at Machine Learning and Friends Lunch Seminar, Department of Computer Science, University of Massachusetts.
- July 2002 *Meta-level Control in Multi-Agent Systems*. AAI/KDD/UAI-2002 Joint Workshop on Real-Time Decision Support and Diagnosis Systems, Edmonton, Alberta, Canada.
- March 2002 Substitute Presenter *Social Pathologies of Adaptive Agents* by David Jensen and Victor Lesser. AAI SSS-2002 Safe Learning Agents Symposium.
- June 2000 *Toward Robust Agent Control in Uncertain Environments*. Autonomous Agents 2000, Barcelona, Spain.
- June 2000 *Integrating High-Level and Detailed Agent Coordination into a Layered Architecture* Workshop on MAS Infrastructure and Requirements. Autonomous Agents 2000, Barcelona, Spain March 2000.
- March 2000 *Reasoning about Uncertainty in Design-to-Criteria Scheduling* AAI 2000 Spring Symposium on Real Time Autonomous Systems.
- July 1999 *Recent Extensions to BIG: A Resource-Bounded Information Gathering System* AAI 1999 Workshop on Intelligent Information Systems.
- July 1998 *BIG: A Resource-Bounded Information Gathering Agent*. AAI 1998 Technical Session.

- July 1998 Co-presented the work on *A Resource-Bounded Interpretation-Centric Approach to Information Gathering* poster session, AAAI 1998 Workshop on Information Integration.

GRANTS

- DHS Regional Visualization and Analytics Center, Principal Investigator: William Ribarsky; Co-Principal Investigators: **Anita Raja**, William Tolone, Jianping Fan, Robert Kosara, Jing Yang. 01/01/08-04/30/09 \$30,000 (Cumulative Award 2006-2009 \$1,554,486)
- DHS Regional Visualization and Analytics Center, Principal Investigator: William Ribarsky; Co-Principal Investigators: **Anita Raja**, William Tolone, Jianping Fan, Robert Kosara, Jing Yang. 01/01/08-06/30/08 \$196,001 (Cumulative Award 2006-2008 \$1,524,486)
- DHS Regional Visualization and Analytics Center, Principal Investigator: William Ribarsky; Co-Principal Investigators: **Anita Raja**, William Tolone, Jianping Fan, Robert Kosara, Jing Yang. 04/01/07-03/31/08 \$496,000.
- DHS Regional Visualization and Analytics Center, Principal Investigator: William Ribarsky; Co-Principal Investigators: **Anita Raja**, William Tolone, Jianping Fan, Robert Kosara,, Jing Yang. 1/1/07-06/30/07 \$17,995.
- NSF NETS-NBD: WLAN Resource Management Using Multi-Agent Systems, Principal Investigator: Linda Xie; Co-Principal Investigators: Ivan Howitt, **Anita Raja**, 09/01/2006-08/31/2008, \$75,000.
- DHS Regional Visualization and Analytics Center, Principal Investigator: William Ribarsky; Co-Principal Investigators: **Anita Raja**, William Tolone, Jianping Fan, Robert Kosara, Jing Yang. 1/1/06-01/01/07 \$742,507.
- DARPA IPTO Program “COORDINATORS: Intelligent Coordination Support for Humans” Principal Investigator: **Anita Raja**. Honeywell International, Inc. (DARPA/AFRL Prime), 1/31/2006-8/31/2007 \$137,501 (Cumulative Award 2006-2008 \$272,500).
- DARPA IPTO Program “COORDINATORS: Intelligent Coordination Support for Humans”, Principal Investigator: **Anita Raja**. Honeywell International, Inc. (DARPA/AFRL Prime), 12/31/2005-5/31/2006 \$11,329.
- DARPA IPTO Program “COORDINATORS: Intelligent Coordination Support for Humans” Principal Investigator: **Anita Raja**. Honeywell International, Inc. (DARPA/AFRL Prime) , 2/11/2005-12/31/2005 \$123,671.
- U.S. Government “Sudden Capital Real-World Model Extensions” Principal Investigator: William J. Tolone; Co-Principal Investigators: Wei-Ning Xiang, Gail-

Joon Ahn, David Wilson, **Anita Raja**, and Seok-Won Lee, 01/21/2005 – 12/21/2005 \$1,464,587.

- U.S. Government “Sudden Capital Real-World Model Extensions” Principal Investigator: William J. Tolone; Co-Principal Investigators: David Wilson, **Anita Raja**, and Wei-Ning Xiang, 11/12/2004 – 03/31/2005 \$264,606.
- Critical Infrastructure Protection Center Initiative “Critical Infrastructure Data Acquisition and Impact Modeling” Principal Investigator: William J. Tolone; Co-Principal Investigators: David Wilson, **Anita Raja**, and Wei-Ning Xiang. 6/24/04-9/30/04 \$9,584.
- NSF SFS Capacity Building Proposal “Collaborative Project: Bridging Gaps in IA Education through Collaboration” Principal Investigator: Bill Chu; Co-Principal Investigators: Seok-Won Lee, Gail-Joon Ahn, **Anita Raja**, Yuliang Zheng, Yongge Wang, William Tolone, Zhaoyu Liu, and David Wilson, 08/15/04 - 07/31/06. \$300,000.
- National Security Agency “Department of Defense Information Assurance Scholarship Program” Principal Investigator: Gail-Joon Ahn; Co-Principal Investigators: Bill Chu, William Tolone, Yuliang Zheng, Yongge Wang, Zhaoyu Liu, David Wilson, **Anita Raja**, Seok-Won Lee, Teresa Dahlberg. 09/17/2004-09/16/2005. \$58,088.
- U.S. Government “Sudden Capital Real-World model Construction, Validation and Verification” (2004). Principal Investigator: William J. Tolone; Co-Principal Investigators: David Wilson, **Anita Raja**, and Wei-Ning Xiang. 4/15/04-9/30/04. \$424,536.
- U.S. Government “Model Capability Demonstration”(2004). Principal Investigator: William J. Tolone; Co-Principal Investigators: David Wilson, **Anita Raja**, and Wei-Ning Xiang. 4/15/04-9/30/04. \$170,474.
- U.S. Government “Critical Infrastructure Modeling” (2003-2004). Principal Investigator: William J. Tolone; Co-Principal Investigators: Bei-tseng Chu, Wei-Ning Xiang, Mirsad Hadzikadic, David Wilson, **Anita Raja**, and Teresa A. Dahlberg. \$725,468.

AWARDS

- Essam El-Kwae 2006 UNCC College of IT Student-Faculty Research Award (with undergraduate student George Alexander).
- Finalist for Best Paper, IAT 2004, The paper “Meta-level Reasoning in Deliberative Agents” published at the Intelligent Agent Technologies Conference 2004 was one of 3 finalists for the best paper award.
- AAI Student Scholarship to participate in AAI 2002, Edmonton, Canada.

- NSF/Intel/AAAI grant to AAAI grant to attend Grace Hopper Celebration of Women in Computing, Cap Cod, MA. September 2000.
- NSF Student Scholarship to attend ICMAS 2000, Boston. July 2000.
- NSF/DARPA Scholarship awarded to student first authors with accepted publication at Agents 2000 to participate in the conference, Barcelona, Spain. June 2000
- NSF Scholarship to attend EASSS 1999 (European Agent Systems Summer School) in University of Utrecht, Netherlands.
- B.S degree summa cum laude with University Honors and Distinction in Major.
- Temple University's Presidential Award for academic excellence, Spring 1996.
- Member of Phi Beta Kappa Honor society.
- Member of Golden Key National Honor Society.
- Recipient of Temple University's International Student Scholarship, Spring 1995.
- Best Teaching Assistant Award at Temple University, Spring 1996.
- Scored 99.9 percentile in the All India Senior School Examination (March 1992)

TEACHING

- UNCC ITIS 5166 Network Based Application Development, Spring 2004, Fall 2004, Fall 2006, Fall 2007, Spring 2008, Fall 2008, Spring 2009.
 - Graduate Course, redesigned course to include lab components and interactive elements.
- UNCC ITIS 4166 Network Based Application Development, Fall 2006, Fall 2007, Spring 2008.
 - Undergraduate Course cross-listed with graduate level course, developed undergraduate requirements making it core course in Web Application track.
- UNCC ITIS 6010/8010 Multiagent Systems, Spring 2005, Spring 2007, Spring 2009.
 - Graduate Course, developed new course.
- UNCC ITIS 2300 Web Based Application Development, Spring 2006.
 - Undergraduate Course, Lecturer.
- UNCC ITIS/ITCS 6148/8148 Advanced Object Oriented Design and Implementation, Fall 2003, Fall 2005.
 - Graduate Course, developed new course.
- UNCC ITIS 3650, 3651 Undergraduate Senior Project Fall 2005, Spring 2006, Spring 2007, Summer 2007, Fall 2007, Spring 2008.
- UMASS CMPSCI 197J Advanced UNIX Environment, Winter 1999
 - Undergraduate Course, Lecturer.

RESEARCH GROUP

Advisees

- Shanjun Cheng , Ph.D. Program, (2007-Present).
- Jia Yue, M.S. Program, (2007-Present).

Projects Supervised

- M.S. Thesis Defense Chair, Jia Yue, Department of Software and Information Systems, “*Controlling resource-bounded reasoning for visual analytics in a blackboard-based agent*”
- Ph.D. Qualifying Exam Chair, December 2008, George Alexander, Area of Concentration: Artificial Intelligence.
- Ph.D. Defense Committee Member, September 2008, Gautam Singaraju, College of Computing, “*Toward Sender Accountability on Email Infrastructure Using Sender Identity and Reputation Management*”.
- M.S. Thesis Defense Committee Member, Keonsu Kim, Department of Electrical and Computer Engineering, June 2008, “*Wireless LAN Traffic prediction based on the Support Vector Machine*”.
- M.S. Thesis Defense Committee Member, April 2008, Jason Whaley, Department of Software and Information Systems, “*Improving Recommendation Quality in Large-Scale Online Systems*”.
- Ph.D. Proposal Committee Member, December 2007, Gautam Singaraju, College of Computing, “*Toward Sender Accountability on Email Infrastructure Using Sender Identity and Reputation Management*”.
- Primary Advisor for Undergraduate Senior Project, Fall 2007-Spring 2008, Jason Hillgen, Department of Computer Science, “*Empirical Study of a Multi-Agent System that Tracks Meteorological Phenomenon*”.
- Primary Advisor for Undergraduate Senior Project, Fall 2007-Spring 2008, James Rozier, Department of Computer Science, “*Role of Constraint Optimization Algorithms in Wireless Network Resource Management*”.
- Primary Advisor for Undergraduate Senior Project, Summer 2007-Fall 2007, George Nwador, Department of Software and Information Systems, “*A Web-based Application for Research Project and Publication Display and Management*”.
- Primary Advisor for Undergraduate Senior Project, Fall 2005- Spring 2006, George Alexander, Department of Computer Science, “*Role of Problem Classification in Online Meta-Cognition*”.
- M.S. Independent Study Project Supervisor, August 2006, Niraj Mehta, Department of Software and Information Systems, “*Managing Uncertainty Propagation Using a Numerical Approach*”.
- M.S. Thesis Defense Committee Member, December 2005, Vikram Sharma, Department of Software and Information Systems, “*Centralized Registry Framework*”.

for Windows Based Information Infrastructure System Management and Configuration Diagnostics”.

- Research supervisor as a UMass Ph.D. student for an undergraduate student from Smith College (Summer 2002). Project was to build a parameterized generator of stochastic multi-agent environments.

Alumni

Graduate Research Assistants:

- George Alexander, Ph.D. Program, (2006-2009).
- Dingxiang Liu, Ph.D. Program, (2006-2008).
- Paul Abernathy (M.S., 2006, Bank of America)
- Phani Burra (M.S., 2007)
- Verghese Mapillai (2004-2005)
- Niraj Mehta (M.S., 2006, TIAA-CREF)
- Kaushal Shah (M.S., 2004, Programmer Analyst, SDG Corporation)
- Jayasri Vaidyanath (M.S. 2007, Systems Analyst, Solix Technologies, CA)

Undergraduate Research Assistants:

- George Alexander (B.S, 2006, Ph.D. student)
- Jason Hillgen (2007-2008)
- Brian Rozier (B.S. 2008)

SELECTED PROFESSIONAL ACTIVITIES

- Co-Chair, SASO Workshop on Metareasoning in Self Adaptive Systems. September 2009, San Francisco, USA.
- Co-Chair, AAI Workshop on MetaReasoning: Thinking about Thinking, July 2008, Chicago, USA.
- Co-Chair, First International Workshop on Meta Reasoning in Agent-Based Systems (MRABS 2007), Colocated with AAMAS 2007, May 14, 2007, Hawaii, USA.
- Program Co-Chair, FLAIRS-2006, Special Track on Artificial Intelligence Education.
- Program Committee:
 - Autonomous Agent and Multi-Agents Systems - AAMAS (2004, 2005, 2007, 2008, 2009, 2010).
 - Association for the Advancement of Artificial Intelligence - AAI (2006, 2007, 2008).
 - Florida Artificial Intelligence Research Society - FLAIRS (2008)

- Special Track on Artificial Intelligence Education (2004, 2005, 2006, 2007, 2008, 2009).
- AAMAS Workshop on Safety and Security in Multiagent Systems - SASEMAS (2004, 2005, 2006).
- AAMAS Workshop on Multi-Agent Sequential Decision Making in Uncertain Domains (2007, 2008, 2009).
- AAAI Spring Symposium on Technosocial Predictive Analytics (March 2009).
- Fifth International Symposium High-capacity Optical Networks & Enabling Technologies (2008).
- Workshop on New Forms of Reasoning for the Semantic Web: Scalable, Tolerant and Dynamic (NeFOR08).
- ECAI Workshop on New Trends in Real-Time Artificial Intelligence - NTeRTAIIn (2006).
- Pacific Rim International workshop on Multi-Agent systems - PRIMA (2004, 2005), International Workshop on Agent-based Computing for Enterprise Collaboration - ACEC-WETICE (2004, 2005, 2006), International Workshops on Enabling Technologies Infrastructure for Collaborative Enterprises - WETICE (2002, 2003).

- Reviewer:
 - Journal of Autonomous Agents and MultiAgent Systems (2007, 2008, 2009).
 - Artificial Intelligence Journal (2009), Computational Intelligence (2008).
 - Special issue of Multiagent and Grid Systems on "Coordinating Agents' Plans and Schedules (2008).
 - International Journal of Cooperative Information Systems (2007).
 - IEEE Transactions on Automation Science and Engineering (2007).
 - IEEE Transactions on Systems, Man and Cybernetics (2001, 2002, 2006, 2007).
 - Journal of Machine Learning Research (2006).
 - Journal of Systems and Software (2004).
 - International Journal of Computers and Applications (2004).
 - Fifth International Conference on Knowledge Based Computer Systems (2004).
 - European Conference on Artificial Intelligence (2002).
 - Autonomous Agents Workshop on Infrastructure for Agents, MAS, and Large Scale MAS (2001).

- Grant Proposal Review:
 - NSF IIS Panel Member (2004, 2008, 2009).
 - NSF External Reviewer (2007).
 - Dutch National Science Foundation (NWO), 2004.

- University/Inter-Departmental Activities:
 - Moderator and Panelist on Robo-Ethics Panel, UNC Charlotte Ethics in Emerging Technologies Symposium (April 2008).
 - Co-organizer and Judge, Department of Software and Information Systems' "8-hour start-up Competition" (April 2008).
 - UNCC Graduate Research Fair Judge (2005).

- Invited Panel Member at New Faculty Orientation (August 2004).
- College Committees:
 - Alternate Representative to Faculty Council (2009-2010).
 - Chair of Honors Committee (2008-2010).
 - Member of Honors Committee (2007-2008).
 - Member of College of Computing and Informatics Philosophy Alliance (2007-2008).
 - Member of University College (2007-2008).
 - Member of Undergraduate Committee (2007-2009).
 - Member of Ad-hoc Committee for Undergraduate Curriculum (2006-2008).
 - Member of Ad Hoc Committee for Recruiting Ph.D. students (2006-2007).
 - Secretary of Executive Committee, (2005-2006).
 - Member of Faculty Advisory Committee (2004-2005).
 - Member of Graduate Committee (2003-2005).
 - Member of PhD Steering Committee (2004-2006).
 - Member of Faculty Council (2004-2005).
 - Member of Diversity Committee (2004-2005).
 - Member of Summer Sessions Committee (Alternate) (2004-2006).
- Departmental Committees:
 - Chair of Academic Planning Committee (2009-2010).
 - Member of Departmental Reappointment, Promotion and Tenure Committee (2009-2010).
 - Member of Undergraduate Committee (2006-2007)
 - Member of SIS Lab Space Coordination Committee (2007-2008)
 - Member of Graduate Student Support (2004-2006)
 - Chair of SIS Track PhD Committee (2004-2006)
 - Chair of Graduate Committee (2005-2006)
 - Member of Graduate Committee (2003-2005, 2008-2009)
 - Member of Cognitive Science Academy.
- Graduate Student Representative, Department of Computer Science, University of Massachusetts (Jan 2001- Jan 2002).

PROFESSIONAL AFFILIATIONS

- Association for the Advancement of Artificial Intelligence (AAAI).
- Voting Member of The International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS).