

Curriculum Vitae

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1 Brief Resume

1.1 Education

- Ph.D. in Computer Sciences; University of Texas, Austin: 1993. *Dissertation Title*: “A Theory of Actions, Intentions, and Communications for Multiagent Systems.”
Doctoral Supervisors: Professors E. Allen Emerson (coadvisor) and Nicholas M. Asher (coadvisor).
- M.S.C.S., with a minor in Philosophy (logic); University of Texas, Austin: 1988.
- B.Tech. in Computer Science & Engineering; Indian Institute of Technology, Delhi, India: 1986.

1.2 Professional Experience

- August 2003–present: Full Professor, Computer Science, North Carolina State University, Raleigh.
- August 2000–July 2003: Associate Professor with tenure, Computer Science, NCSU, Raleigh.
- August 1995–July 2000: Assistant Professor, Computer Science, NCSU, Raleigh.
- December 1992–July 1995: Member of the Technical Staff, MCC, Austin.
- January 1992–November 1992: Associate Member of the Technical Staff, MCC, Austin.
- June 1989–August 1990 and September 1991–December 1991: Graduate Research Assistant, MCC, Austin.
- September 1990–May 1991: Graduate Research Assistant, Center for Cognitive Science, University of Texas.
- Visiting Summer Appointments: SRI International, Menlo Park, CA: Summer 1986 and 1987; DFKI (German Research Center for Artificial Intelligence), Kaiserslautern, Germany: Summer 1991.

1.3 Membership in Professional Organizations

- Association for the Advancement of Artificial Intelligence (AAAI): Fellow.
- Institute of Electrical and Electronics Engineers (IEEE) and its Computer Society: Fellow.
- Association for Computing Machinery (ACM).

1.4 Scholarly and Professional Honors

- Member, NCSU Research Leadership Academy: 2017.
- NCSU Alumni Association Outstanding Research Award: 2017.
- Fellow, Association for the Advancement of Artificial Intelligence (AAAI): 2017.
- IBM Partnership Award: 2016.
- IFAAMAS Influential Paper Award: 2016. This is for Paper [115]. IFAAMAS is the International Foundation for Autonomous Agents and MultiAgent Systems.
- NCSU Alumni Association Distinguished Graduate Professorship Award: 2016.

- NCSU Thank a Teacher Recognition Letter: Fall 2015.
- Best Paper Award at the *Thirteenth International Conference on Service-Oriented Computing (IC-SOC)* for Paper [140]: 2015.
- NCSU Alumni Association Outstanding Research Award: 2015.
- Selection among the top 10% of the papers accepted at the *Thirteenth International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)* of Paper [155]: 2014.
- Finalist for Best Senior Program Committee Member Award: 2011. Three out of 78 SPC members were named finalists.
- Fellow, Institute of Electrical and Electronics Engineers: 2009.
- Intel Research Council Faculty Award: 2007.
- IBM Partnership Award: 2007.
- Charter Member, Board of Directors, International Foundation for Autonomous Agents and Multi-agent Systems (IFAAMAS): 2007–2012.
- Best Student Paper Award at the *Third IEEE International Conference on Services Computing (SCC)* for Paper [190]: 2006.
- Williams Evans Visiting Fellowship, University of Otago: June 2006.
- Selection as finalist for the Best Innovative System or Application Paper Award at the *Second International Joint Conference on Autonomous Agents and MultiAgent Systems* of Paper [211]: 2003.
- Cisco University Research Grant: 2000.
- IBM Partnership Award: 2000.
- Selection as one of the best papers at the *Third International Conference on Multiagent Systems (IC-MAS)* of Paper [219]: July 1998.
- IBM Partnership Award: 1998.
- Nominated for a Packard Fellowship as one of two candidates from NCSU: 1998.
- IEEE Computer Society Distinguished Visitor: 1997–2000.
- Outstanding Reviewer, International Joint Conference on Artificial Intelligence (IJCAI): 1997. Fewer than 10% of the reviewers were considered outstanding.
- IBM Partnership Award: 1997.
- National Science Foundation CAREER Award: 1996–2000.
- IBM Partnership Award: 1996.
- Selection as one of the best papers at *Tenth IEEE Conference on Artificial Intelligence for Applications (CAIA)* of Paper [222]: 1994.
- Nomination to the Harvard Society of Fellows: 1992. I did not pursue this nomination.

- Microelectronics and Computer Development Fellowship from the University of Texas at Austin: 1986–1988. This is the highest award offered by this University at the graduate level.
- Merit Prizes for the First Position in three of four semesters in Junior and Senior years at the Indian Institute of Technology.
- National Talent Search Scholarship of India: 1980–1986.
- Junior Science Talent Scholarship of Delhi Administration, Delhi, India: 1978–1980.
- Merit prize in the National Mathematics Olympiad of India: 1980.

2 Personal Statement

2.1 Research

My lifelong program of research can be summed up as discovering, modeling, studying, and applying high-level abstractions for computing. Computing is in the midst of a paradigm shift from individual computations to *interaction*. Traditional techniques are woefully inadequate for modern settings such as social computing and the Internet of Things, which involve a number of heterogeneous (independently designed) and autonomous (independently operated) entities. The increasing attention on the human elements of information technology speaks to this need. However, traditional approaches mostly patch in interaction as an afterthought or position their primary research in an outside discipline with computing reduced to merely supporting data analysis. In contrast, I seek to understand interaction in its various flavors and to develop a computational understanding of interaction that reflects some of the key intuitions acquired from other disciplines. The sources of insight for my work include not only distributed computing and distributed artificial intelligence, but also linguistics, psychology, sociology, philosophy, organizational theory, and law.

The following past and current efforts arose in pursuit of this research program.

- Agent communication and interaction protocols, ranging from their information content to the social and organizational relationships presumed and evolved through communication. *Theory*: formal semantics, declarative models for distributed computing, alignment of local states of communicating parties. *Application*: in modeling business protocols, e.g., in finance and healthcare.
- Trust, including how it emerges in commercial transactions; its properties from a rational perspective; and how it relates to the felt and displayed emotions of the interacting parties. *Theory*: formalizing trust, tackling its disparate facets, including psychological, organizational, and rational. *Application*: in persuasive technologies, promoting healthful living and energy efficiency; in context-aware personal agents; in understanding and enhancing performance and cohesion in human organizations.
- Governance, compliance, and cybersecurity, including how to capture the correctness criteria for open systems, wherein interactions cannot be regimented through technical architectures and must be regulated through social means. *Theory*: formal models for normative systems, including of their soundness and resilience. *Application*: in cyberinfrastructure for scientific collaboration and is a basis for current research on the study of normative models for accountability and cybersecurity.
- Conceptual modeling of interactions with a view to facilitating the engineering of systems that involve more than one locus of control. *Theory*: reconstruction of software engineering principles with respect to interaction; formalization to support model checking of designs; models of user context centered on social interaction. *Application*: in manufacturing and healthcare (cross-organizational interaction) as well as in engineering context-aware personal agents (human-to-human interaction).

In pursuing my research, I have contributed to the three main varieties of computing research: *theoretical* (formal methods in agents, protocols, business processes); *experimental* (human-subject studies of developers and end users as well as simulation studies of trust in networks); and *practical* (tools for heterogeneous databases and processes, and approaches for engineering multiagent systems).

I have sought to promote the study of interaction and to tear down the arbitrary boundaries between artificial intelligence and distributed systems, both of which provide essential insights for a comprehensive understanding of interaction, as is necessary for emerging applications of information technology.

2.2 Instruction

My teaching philosophy emphasizes imparting a rigorous grounding in computer science principles and exercising these principles on realistic problems. I try to develop the desire and ability for critical thinking in my students. Computer scientists should be able to formulate and solve the right technical problems that underlie a given task, not merely carry out steps defined by someone else. I have attended several teaching workshops and routinely incorporate collaborative and active learning in my teaching, as a way to stimulate and motivate students to think about open-ended problems, defend their thinking, and learn from others.

I have introduced new courses and developed extensive online materials for them. My coauthored advanced textbook and course on *Service-Oriented Computing* incorporated artificial intelligence and distributed computing foundations for this subject as it was emerging. I introduce new concepts, techniques, and tools in my courses each time I offer them. For example, I was an early adopter of mobile computing as a platform for service-oriented computing. When mobile computing became established, I introduced context-aware mobile computing. My course materials have been adopted by colleagues worldwide.

I recently introduced a course on *Social Computing*, which pulls together key facets of computing with social abstractions. Unlike typical efforts, this course goes beyond the analysis of social network datasets and crowdsourcing applications, and includes considerations ranging across eliciting information from people, voting theory, markets, organizational models, and sociotechnical systems, several of which are important research themes in multiagent systems with an artificial intelligence or distributed computing flavor.

I have built a world-class program in multiagent systems and service-oriented computing. I have graduated twenty-five Ph.D. and twenty-eight Masters students, and advised eight postdoctoral associates. My peer-reviewed publications with advisees include forty journal and seventy-three conference articles, appearing in some of the best forums in their areas. Of these, based on figures from Google Scholar in January 2017, two have drawn over 600 citations each, six over 300 each, twelve more than 200 each, and twenty-five over 100 citations each. Twenty-One of my students have authored major publications on multiagent systems (in AAAI, IJCAI, . . .); and fifteen on service computing (in CACM, ICSOC, ICWS, . . .). Three of my former students (Chopra, Maximilien, and Yolum) are editorial board members of leading journals.

2.3 Service

I take service both within the university and externally seriously. As a member of the graduate oversight committee, I contributed to improvements in the graduate program, including the structure for qualifier examinations, which emphasize the research skills and interests of students. I have participated in several faculty searches (four as cochair), and chaired the awards committee. I serve and have served as a formal and an informal mentor for several colleagues in my department and elsewhere.

I have participated in numerous conference committees, cochairing six international events. These include the 2005 edition of the *International Conference on Autonomous Agents and MultiAgent Systems*. I have given several tutorials and invited talks, participated on panel discussions, and served as reviewer and panelist for funding agencies.

I am the editor-in-chief of the *ACM Transactions on Internet Technology (TOIT)* and was previously the editor-in-chief of *IEEE Internet Computing*. I have been leading the revival of TOIT as a top venue in its area, articulating a vision and improving its administration. I serve on the editorial boards of the leading journals in my specialty, including *Autonomous Agents and Multi-Agent Systems*, *IEEE Internet Computing*, *IEEE Transactions on Services Computing*, and *ACM Transactions on Intelligent Systems and Technology*. I previously served on the boards of *Journal of Web Semantics* and *Journal of Artificial Intelligence Research*.

3 Mentoring Activities

Faculty Colleagues Mentored Computer Science began a formal mentoring process in Fall 2000. I attended a workshop given by Rich Felder and Rebecca Brent, *Effective Mentoring*, NCSU College of Engineering, 7 September 2000.

1. Dr. Collin Lynch, Spring 2016–present.
2. Dr. Mohammed Shahzad, Fall 2015–present.
3. Dr. Ranga Raju Vatsavai, Fall 2015–present.
4. Dr. Rada Y. Chirkova, Fall 2015–present.
5. Dr. Kemafor Anyanwu, Fall 2008–present.
6. Dr. Robert A. St. Amant, Spring 2007–present.
7. Dr. Ben Watson, Spring 2006–Spring 2015.
8. Dr. Ting Yu, Spring 2006–Spring 2013.
9. Dr. James C. Lester, Spring 2006–Spring 2009.
10. Dr. Jaewoo Kang, Fall 2005–Spring 2007.
11. Dr. Jun Xu, Spring 2004–Spring 2007.
12. Dr. Peter R. Wurman, Summer 2000–Spring 2006.

Graduated Doctoral Advisees

1. Mehdi Mashayekhi (coadvised with Dr. George List, Civil, Construction, and Environmental Engineering), graduated Fall 2016.
2. Adel Magdi El Messiry, graduated Fall 2016.
3. Anup K. Kalia, graduated Summer 2016.
4. Pradeep K. Murukannaiah, graduated Spring 2016.
5. Guangchao Yuan, graduated Spring 2016.
6. Zhe Zhang, graduated Fall 2014.
7. Pankaj R. Telang, graduated Spring 2013.
8. Scott N. Gerard, graduated Spring 2013.
9. Xibin Gao, graduated Summer 2012.
10. Chung-Wei Hang, graduated Summer 2011.
11. Derek J. Sollenberger, graduated Fall 2010.
12. Christopher J. Hazard, graduated Spring 2010.

13. Yonghong Wang, graduated Spring 2009.
14. Amit K. Chopra, graduated Fall 2008.
15. Yathiraj B. Udupi, graduated Spring 2008.
16. Qing Zhang (coadvised with Dr. Ting Yu), graduated Spring 2008.
17. Nirmitt V. Desai, graduated Fall 2007.
18. A. Soydan Bilgin (coadvised with Dr. Rada Y. Chirkova), graduated Fall 2007.
19. Zhengang Cheng (coadvised with Dr. Mladen A. Vouk), graduated Summer 2006.
20. Ashok U. Mallya, graduated Fall 2005.
21. E. Michael Maximilien, graduated Fall 2004.
22. Feng Wan, graduated Fall 2004.
23. Pinar Yolum, graduated Summer 2003.
24. Bin Yu, graduated Fall 2001.
25. Jie Xing, graduated Summer 2001.

Current Doctoral Advisees The list below includes current Ph.D. students who have passed at least one research examination under my supervision. Additional students are also in progress.

1. Samuel H. Christie V (qualified; expected graduation: December 2018).
2. Nirav S. Ajmeri (qualified; expected graduation: December 2017).

Graduated Masters Advisees I have graduated twenty-eight research Masters students. Of these, twenty-one students wrote theses under my direction; the remaining MS graduates obtained their degrees based on their Ph.D. written prelims (identified below).

1. Samuel H. Christie V (graduated Spring 2017, based on Ph.D. written prelim).
2. Anup K. Kalia (graduated Fall 2013).
3. Guangchao Yuan (graduated Fall 2013, based on Ph.D. written prelim).
4. Zhe Zhang (graduated Spring 2012, based on Ph.D. written prelim).
5. Pradeep K. Murukannaiah (graduated Spring 2011, based on Ph.D. written prelim).
6. Pankaj R. Telang (graduated Fall 2010, based on Ph.D. written prelim).
7. Koushik N. Rajagopalan (graduated: Spring 2010).
8. Narendran Ranjit (graduated Spring 2007).
9. Arvind Batalagundu Viswanathan (graduated Spring 2007).
10. Payal Chakravarty (graduated Spring 2007).

11. Yathiraj B. Udipi (graduated Fall 2005, based on Ph.D. written prelim).
12. Leena V. Wagle (graduated Summer 2005).
13. Amit K. Chopra (graduated Fall 2003).
14. A. Soydan Bilgin (graduated Summer 2003).
15. Srivatsa V. Chivukula (graduated Spring 2003).
16. E. Michael Maximilien (graduated Spring 2003, based on Ph.D. written prelim).
17. Ashok U. Mallya (graduated Fall 2002).
18. Raghuram M. Sreenath (graduated Fall 2002).
19. Subhayu S. Chatterjee (graduated Fall 2002).
20. Paul J. Palathingal (graduated Summer 2002).
21. Wentao Mo (graduated Summer 2001).
22. Mahmoud S. Elhaddad (graduated Summer 2001).
23. Pinar Yolum (graduated Summer 2000).
24. Mahadevan Venkatraman (graduated Summer 1999).
25. Sudhir K. Rustogi (graduated Summer 1999).
26. Anuj K. Jain (graduated Fall 1998).
27. Jiejun Kong (graduated Summer 1998).
28. Chubin Lin (graduated Spring 1998).

Postdoctoral Research Associates

1. Özgür Kafalı, May 2015–present. Coadvised with Laurie Williams.
2. Rahul Pandita, November 2015–August 2016. Coadvised with Laurie Williams.
3. Hongying Du, October 2014–May 2016. Coadvised with Jon Doyle.
4. Adrián Fernández Martínez, December 2012–June 2013.
5. Chung-Wei Hang, July 2011–June 2013.
6. Christopher J. Hazard, July 2010–February 2011.
7. Nirmitt V. Desai, January 2008–June 2008.
8. Bin Yu, January 2002–June 2003.

Research Assistants Unlike graduate research assistants, research assistants are full-time employees not concurrently pursuing a degree.

1. Michael J. Suralik, September 2001–December 2001.
2. Kevin Vaughan, November 1999–March 2000.
3. Mahadevan Venkatraman, August 1999–May 2000.
4. Sudhir K. Rustogi, August 1999–September 1999.

Current Graduate Research Assistants

1. Zhen Guo, January 2017–present.
2. Hui Guo, January 2017–present.
3. Nirav Ajmeri, August 2012–present.

Past Graduate Research Assistants I have directed forty-one graduate research assistants.

1. Samuel Christie V, August 2014–December 2016 .
2. Pradeep Kumar Murukannaiah, November 2009–May 2016.
3. Guangchao Yuan, January 2013–May 2016.
4. Anup Kumar Kalia, January 2011–May 2015 and January 2016–May 2016.
5. Bennett Yates Narron, June 2014–December 2015.
6. Zhe Zhang, January 2010–May 2013.
7. Dhanwant Singh Kang, January 2011–May 2012.
8. Moin Ayazifar, August 2012–December 2012.
9. Prashant C. Kediya, September 2007–May 2009; January 2011–August 2012.
10. Chung-Wei Hang, August 2008–May 2011.
11. Kartik Tadanki, January 2009–December 2010.
12. Christopher J. Hazard, February 2010–July 2010.
13. Amit K. Chopra, August 2002–May 2008.
14. Yathiraj B. Udupi, August 2002–December 2003; January 2005–May 2007.
15. Nirmitt V. Desai, August 2003–December 2003; May 2004–December 2007.
16. Ashok U. Mallya, May 2002–December 2005.
17. Yonghong Wang, August 2004–May 2005.
18. Leena V. Wagle, January 2004–June 2004.

19. Pinar Yolum, January 2000–June 2003.
20. A. Soydan Bilgin, May 2003–June 2003.
21. Raghuram M. Sreenath, January 2002–December 2002.
22. Paul J. Palathingal, January 2002–May 2002.
23. Bin Yu, August 1998–December 2001.
24. Jie Xing, January 1998–May 2001.
25. Wentao Mo, August 2000–May 2001.
26. Zhengang Cheng, January 2000–May 2000; January 2001–May 2001.
27. Mayank S. Ajmera, October 1999–May 2000.
28. Swati Kher, October 1999–May 2000.
29. Hong Ji, October 1999–May 2000.
30. Harish Kammanahalli, October 1999–May 2000.
31. Feng Wan, August 1997–December 1999.
32. Sudhir K. Rustogi, May 1998–August 1999.
33. Xiaokang Sang, January 1998–May 1998.
34. Mahadevan Venkatraman, August 1997–August 1999.
35. Jiejun Kong, January 1997–August 1998.
36. Yu Lei, January 1997–February 1998.
37. Chris L. Grove, January 1997–May 1998.
38. Anuj K. Jain, May 1996–May 1998.
39. Chubin Lin, May 1996–April 1997.
40. Neerja Bhatt, May 1996–July 1996.
41. Hong Han, January 1996–April 1996.

Graduate Fellows Supervised

1. Anup Kumar Kalia, ORISE Fellowship, May 2015–December 2015.
2. Zhe Zhang, IBM PhD Fellowship, August 2013–December 2014.
3. Ricard López Fogués, TEE Fellowship, December 2012–December 2014.
4. Qanita Ahmad, Fulbright Fellowship, August 2012–December 2014.

Undergraduate Research Assistants

1. Samuel Rappl, January 2017–May 2017.
2. Priya Paul, May 2007–June 2007.
3. Naveen Z. Malik, September 1999–December 1999.
4. Chris L. Grove, May 1996–December 1996.

Doctoral Dissertations Directed I have graduated twenty-five Ph.D. students. Jie Xing was hired by an IBM group in RTP, and now works for SAS. Bin Yu is with Air Liquide in Delaware. Pınar Yolum accepted a postdoctoral position at the Free University of Amsterdam, and is now a tenured full professor at Boğaziçi University in Istanbul. Feng Wan and Zhengang Cheng remain in North Carolina with SimpliCTI Technologies, where Feng is now Principal Architect. Michael Maximilien moved to IBM Almaden Research Center as a research staff member. Ashok Mallya is with Apple in Cupertino and Soydan Bilgin with Amazon in Seattle. Nimit Desai joined the IBM India Research Lab as a research staff member and moved to IBM Research in New York in 2014. Qing Zhang is with Teradata in San Diego. Yathi Udipi is with the Cisco Systems CTO Office in San Jose. Amit Chopra took up a postdoctoral fellowship at the University of Trento and now is a lecturer at Lancaster University in UK. Yonghong Wang took up a postdoctoral fellowship at Carnegie Mellon University and now works for Apple in Cupertino. Christopher Hazard has founded a gaming startup based in the area. Derek Sollenberger is a senior software engineer with Google in Chapel Hill. Chung-Wei Hang is now working at IBM in the IBM Watson Solutions group in RTP. Xibin Gao is a research software development engineer at Microsoft in Seattle. Scott Gerard is a senior technical staff member at IBM Research. Pankaj Telang is a senior research scholar with the Laboratory for Analytic Sciences at NC State. Zhe Zhang works in the IBM Watson Solutions group in RTP. Guangchao joined Microsoft's Bing Local Search group in California. Pradeep is an assistant professor at the Rochester Institute of Technology. Anup joined IBM Research. Adel is with Invivo Link. Mehdi joined eBay.

1. Mehdi Mashayekhi, *Regulation of Open Normative Multiagent Systems*, Fall 2016.
2. Adel Elmessiry, *Natural Language Techniques for Decision Support Based on Patient Complaints*, Fall 2016.
3. Anup K. Kalia, *Understanding Human Communication to Estimate Trust, Hierarchy, and Performance*, Summer 2016.
4. Pradeep K. Murukannaiah, *Engineering Personal Agents Toward Personalized, Context-Aware, and Privacy-Preserving Applications*, Spring 2016.
5. Guangchao Yuan, *Exploiting Content, Homophily, and Location for Understanding User Interactions in Social Media*, Spring 2016.
6. Zhe Zhang, *Text Mining for Sentiment Analysis*, Fall 2014.
7. Pankaj R. Telang, *Multiagent Business Modeling*, Summer 2013.
8. Scott N. Gerard, *Designing, Verifying, and Evolving Commitment-Based Business Protocols*, Summer 2013.
9. Xibin Gao, *Knowledge Discovery from Business Contracts*, Summer 2012.
10. Chung-Wei Hang, *Probabilistic Trust Models for Social and Service Networks*, Summer 2011.

11. Derek J. Sollenberger, *Engineering Personal and Social Affective Applications*, Fall 2010.
12. Christopher J. Hazard, *Trust and Reputation in Multiagent Systems: Strategies and Dynamics with Reference to Electronic Commerce*, Spring 2010.
13. Yonghong Wang, *Evidence-Based Trust in Distributed Agent Systems*, Spring 2009.
14. Amit K. Chopra, *Commitment Alignment: Semantics, Patterns, and Decision Procedures for Distributed Computing*, Fall 2008.
15. Yathiraj B. Udipi, *Modeling Service Engagements in Dynamic Organizations: Multiagent Model and Architecture for Policy-Based Governance*, Spring 2008.
16. Qing Zhang, *Microdata Privacy Protection Through Permutation-Based Approaches*, coadvised with Dr. Ting Yu, Spring 2008.
17. Nirmitt V. Desai, *Interorganizational Business Interactions: Contracts, Processes, Evolution*, Fall 2007.
18. A. Soydan Bilgin, *Deriving Efficient SQL Sequences Via Prefetching*, coadvised with Dr. Rada Y. Chirkova, Fall 2007.
19. Zhengang Cheng, *Verifying Commitment-Based Business Protocols and their Compositions: Model Checking using Promela and Spin*, coadvised with Dr. Mladen A. Vouk, Summer 2006.
20. Ashok U. Mallya, *Modeling and Enacting Business Processes via Commitment Protocols Among Agents*, Fall 2005.
21. E. Michael Maximilien, *Toward Autonomic Web Services Trust and Selection*, Fall 2004.
22. Feng Wan, *Commitment-Based Business Process Modelling and Enactment*, Fall 2004.
23. Pinar Yolum, *Emergent Properties of Referral Networks*, Summer 2003.
24. Bin Yu, *Emergence and Evolution of Agent-Based Referral Networks*, Fall 2001.
25. Jie Xing, *Commitment-Based Interoperation for E-Commerce*, Summer 2001.

Masters Theses Directed I have graduated twenty-eight research Masters students, of whom twenty-one wrote MS theses under my direction. Chubin was hired by Nortel, RTP; he now works for Unisys in Virginia. Anuj was hired by Ericsson, RTP; he now works for CitiBank. Jiejun moved to Los Angeles. Sudhir works for Cisco, RTP. Mahadevan works for Microsoft. Pinar and Ashok continued on for a Ph.D. at NCSU. Mahmoud took up graduate studies in Pittsburgh to be closer to his wife. Wentao works in Atlanta. Paul works for Oak Ridge National Laboratory. Subhayu is with IBM, RTP and Raghuram with IBM, Bangalore. Soydan and Amit continued on for a Ph.D. at NCSU. Leena joined FedEx in Memphis. Payal joined IBM's Tivoli division in RTP. Arvind works for Cisco, San Jose. Narendran works for Symantec, Durham. Koushik joined Epic Systems in Madison, Wisconsin. Anup continued on for a Ph.D. at NCSU.

1. Anup Kumar Kalia, *Muon: Designing Multiagent Communication Protocols from Interaction Scenarios*, Fall 2013.
2. Koushik Narayanan Rajagopalan, *Tools for Business Protocols*, Spring 2010.
3. Narendran Ranjit, *Multiagent Referral Systems through Social Networks*, Spring 2007.

4. Arvind Batalagundu Viswanathan, *Modeling Social Networks as Multiagent Systems*, Spring 2007.
5. Payal Chakravarty, *An Event-Driven Approach to Agent-Based Business Process Enactment*, Spring 2007.
6. Leena V. Wagle, *Incorporating Business Policies in Business Protocols*, Summer 2005.
7. Amit K. Chopra, *Nonmonotonic Commitment Machines*, Fall 2003.
8. A. Soydan Bilgin, *Semantic Web Services Query and Manipulation Language*, Summer 2003.
9. Srivatsa V. Chivukula, *Evolution of Trust in Anonymous Interactions*, Spring 2003.
10. Ashok U. Mallya, *Specifying and Resolving Temporal Commitments*, Fall 2002.
11. Raghuram M. Sreenath, *A Community-Based Rating System for Selecting among Web Services*, Fall 2002.
12. Subhayu S. Chatterjee, *Instant Messaging Interface and Transport for the Multiagent Referral System*, Fall 2002.
13. Paul J. Palathingal, *Integrating Information Retrieval in a Referral System for Knowledge Management*, Summer 2002.
14. Wentao Mo, *A Referral-Based Recommender System for E-Commerce*, Summer 2001.
15. Mahmoud S. Elhaddad, *Adaptive Multipath Traffic Allocation in TCP/IP Networks*, Summer 2001.
16. Pinar Yolum, *Flexible Execution of E-Commerce Protocols: A Commitment-Based Approach*, Summer 2000.
17. Mahadevan Venkatraman, *Specifying and Verifying Compliance with Commitment Protocols Among Autonomous Agents*, Summer 1999.
18. Sudhir K. Rustogi, *Empirical Studies of Coordination in Decentralized Multiagent Systems*, Summer 1999.
19. Anuj K. Jain, *Maintaining Process Coherence in Heterogeneous Information Environments*, Fall 1998.
20. Jiejun Kong, *Constructing Multiagent Systems: The MEP Project*, Summer 1998.
21. Chubin Lin, *Design and Implementation of a Distributed Workflow Scheduler*, Spring 1998.

Publications with Advisees The following publications are coauthored with graduate and postdoctoral advisees and, on occasion, with other students.

- *Journals*: A total of forty articles with advisees.

[69], [70], [71], [73], [74], [75], [76], [77], [78], [79], [81], [82], [84], [85], [86], [88], [90], [91], [92], [93], [94], [95], [96], [97], [98], [99], [100], [101], [102], [54], [104], [105], [106], [107], [108], [109], [110], [111], [113], and [114].

- *Major conferences and symposia:* A total of seventy-three articles with advisees.
[127], [128], [129], [130], [131], [132], [133], [134], [135], [136], [137], [140], [141], [142], [143], [149], [150], [152], [154], [155], [156], [157], [158], [159], [160], [163], [165], [167], [171], [172], [173], [174], [175], [176], [177], [178], [180], [181], [182], [183], [184], [185], [188], [189], [190], [191], [192], [193], [194], [195], [196], [197], [198], [199], [200], [201], [203], [204], [205], [206], [207], [209], [210], [211], [212], [213], [214], [215], [217], [231], [232], [233], and [234].
- *Other refereed conferences and symposia:* A total of fifty-two articles with advisees.
[239], [240], [241], [59], [60], [61], [242], [244], [245], [246], [247], [248], [249], [250], [47], [257], [259], [260], [261], [262], [263], [264], [265], [266], [268], [269], [270], [271], [272], [273], [274], [276], [279], [280], [281], [282], [283], [284], [285], [286], [287], [288], [289], [291], [292], [293], [294], [296], [297], [298], [299], and [302].
- *Bulletin and Magazine articles:* A total of five articles with advisees.
[372], [373], [334], [335], and [336].
- *Miscellaneous external publications:* A total of nineteen articles with advisees.
[343], [344], [345], [348], [349], [355], [356], [357], [358], [359], [360], [361], [362], [363], [364], [365], [366], [367], and [428].

4 Publications

I have included acceptance ratios where such were available; for a special issue, generally the ratio is for the issue. Final versions of all “in press” papers have been delivered.

4.1 Books

- [26] Munindar P. Singh and Michael N. Huhns. *Service-Oriented Computing: Semantics, Processes, Agents*. Chichester, United Kingdom: John Wiley & Sons, 2005.
- [27] Munindar P. Singh, editor. *Practical Handbook of Internet Computing*. Baton Rouge: Chapman Hall & CRC Press, 2005.

This handbook, which includes 56 contributed chapters, appears in the *Computer and Information Science Series* edited by Professor Sartaj Sahni. Professor Sahni invited me to edit this handbook.
- [28] Michael N. Huhns and Munindar P. Singh, editors. *Readings in Agents*. San Francisco: Morgan Kaufmann, 1998.
- [29] Munindar P. Singh. *Multiagent Systems: A Theoretical Framework for Intentions, Know-How, and Communications*. Volume 799. Lecture Notes in Computer Science. Available at <http://www.csc.ncsu.edu/faculty/mpsingh/books/MAS/>. Heidelberg: Springer, 1994.

4.2 Edited Proceedings

- [30] David M. Nicol and Munindar P. Singh, editors. *Proceedings of the International Symposium and Bootcamp on the Science of Security (HotSoS)*. New York: ACM, 2014.
- [31] Longbing Cao, Yifeng Zeng, Andreas L. Symeonidis, Vladimir Gorodetsky, Philip S. Yu, and Munindar P. Singh, editors. *Proceedings of the 8th International Workshop on Agents and Data Mining Interaction*. Volume 7607. Lecture Notes in Computer Science. Heidelberg: Springer, 2013.
- [32] Guido Boella, Gabriella Pigozzi, Munindar P. Singh, and Harko Verhagen, editors. *Proceedings of the 3rd International Workshop on Normative Multiagent Systems (NormAS)*. Luxembourg, July 2008.
- [33] Rino Falcone, Suzanne Barber, Jordi Sabater-Mir, and Munindar P. Singh, editors. *Proceedings of the 11th International TRUST Workshop*. Volume 5396. Lecture Notes in Computer Science. Heidelberg: Springer, 2008.
- [34] Frank Dignum, Virginia Dignum, Sven Koenig, Sarit Kraus, Munindar P. Singh, and Michael Wooldridge, editors. *Proceedings of the 4th International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Utrecht, The Netherlands: ACM Press, 2005.
- [35] Rino Falcone, Suzanne Barber, Jordi Sabater-Mir, and Munindar P. Singh, editors. *Trusting Agents for Trusting Electronic Societies: Theory and Applications in HCI and E-Commerce: Proceedings of the 6th and the 7th International Workshops on Trust in Agent Societies*. Volume 3577. Lecture Notes in Computer Science. Berlin: Springer, 2005.
- [36] Gianluca Moro, Claudio Sartori, and Munindar P. Singh, editors. *Proceedings of the 2nd International Workshop on Agents and Peer-to-Peer Computing*. Volume 2872. Lecture Notes in Computer Science. Heidelberg: Springer, 2005.

- [37] Rino Falcone, Suzanne Barber, Larry Korba, and Munindar P. Singh, editors. *Trust, Reputation, and Security: Theories and Practice*. Volume 2631. Lecture Notes in Computer Science. Berlin: Springer, 2003.
- [38] Rino Falcone, Munindar P. Singh, and Yao-Hua Tan, editors. *Trust in Cyber-Societies: Integrating the Human and Artificial Perspectives*. Volume 2246. Lecture Notes in Computer Science. Berlin: Springer, 2003.
- [39] Jörg P. Müller, Munindar P. Singh, and Anand S. Rao, editors. *Intelligent Agents V: Proceedings of the 5th International Workshop on Agent Theories, Architectures, and Languages*. Volume 1555. Lecture Notes in Artificial Intelligence. Berlin: Springer, 1999.
- [40] Munindar P. Singh, Anand S. Rao, and Michael J. Wooldridge, editors. *Intelligent Agents IV: Proceedings of the 4th International Workshop on Agent Theories, Architectures, and Languages*. Volume 1365. Lecture Notes in Artificial Intelligence. Berlin: Springer, 1998.
- [41] Arbee L. P. Chen, Wolfgang Klas, and Munindar P. Singh, editors. *Proceedings of the 2nd IFCIS International Conference on Cooperative Information Systems (CoopIS)*. Los Alamitos, California: IEEE Computer Society Press, 1997.

4.3 Invited Papers

I was an initial invitee for these papers. Papers for which I was not directly invited are listed under other categories.

Invited Book Chapters

- [42] Pablo Noriega, Amit K. Chopra, Nicoletta Fornara, Henrique Lopes Cardoso, and Munindar P. Singh. “Regulated MAS: Social Perspective.” *Normative Multi-Agent Systems*. Edited by Giulia Andrighetto, Guido Governatori, Pablo Noriega, and Leendert W. N. van der Torre. Volume 4. Dagstuhl Follow-Ups. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2013. Chapter 4, pages 93–133.
- [43] Munindar P. Singh, Matthew Arrott, Tina Balke, Amit K. Chopra, Rob Christiaanse, Stephen Crane-field, Frank Dignum, Davide Eynard, Emilia Farcas, Nicoletta Fornara, Fabien Gandon, Guido Governatori, Hoa Khanh Dam, Joris Hulstijn, Ingolf Krüger, Ho-Pun Lam, Michael Meisinger, Pablo Noriega, Bastin Tony Roy Savarimuthu, Kartik Tadanki, Harko Verhagen, and Serena Villata. “The Uses of Norms.” *Normative Multi-Agent Systems*. Edited by Giulia Andrighetto, Guido Governatori, Pablo Noriega, and Leendert W. N. van der Torre. Volume 4. Dagstuhl Follow-Ups. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2013. Chapter 7, pages 191–229.
- [44] Amit K. Chopra and Munindar P. Singh. “Agent Communication.” *Multiagent Systems*. Edited by Gerhard Weiß. Second. Cambridge, Massachusetts: MIT Press, 2013. Chapter 3, pages 101–141.
- [45] Munindar P. Singh. “Commitments in Multiagent Systems: Some History, Some Confusions, Some Controversies, Some Prospects.” *The Goals of Cognition: Essays in Honour of Cristiano Castelfranchi*. Edited by Fabio Paglieri, Luca Tummolini, Rino Falcone, and Maria Miceli. Available at <http://www.csc.ncsu.edu/faculty/mpsingh/papers>. London: College Publications, 2012. Chapter 32, pages 613–638.

- [46] Amal El Fallah Seghrouchni, Jorge J. Gomez-Sanz, and Munindar P. Singh. “Formal Methods in Agent-Oriented Software Engineering.” *Proceedings of the 10th International Workshop on Agent-Oriented Software Engineering (AOSE 2009)*. Lecture Notes in Computer Science 6038. Budapest: Springer, May 2011, pages 213–228.
- [47] Pankaj R. Telang and Munindar P. Singh. “Enhancing Tropos with Commitments: A Business Metamodel and Methodology.” *Conceptual Modeling: Foundations and Applications*. Edited by Alexander Borgida, Vinay K. Chaudhri, Paolo Giorgini, and Eric S. K. Yu. Volume 5600. Lecture Notes in Computer Science. Springer, 2009, pages 417–435.
- [48] Munindar P. Singh. “Agent-Based Abstractions for Software Development: Accommodating Complexity in Open Systems.” *Methodologies and Software Engineering for Agent Systems: The Handbook of Agent-Oriented Software Engineering*. Edited by Federico Bergenti, Marie-Pierre Gleizes, and Franco Zambonelli. Dordrecht, The Netherlands: Kluwer, 2004. Chapter 1, pages 5–19.
- [49] Munindar P. Singh. “The Future of Agent Communications.” *Communication in Multiagent Systems: Agent Communication Languages and Conversation Policies*. Edited by Marc-Philippe Huget. Volume 2650. Lecture Notes in Artificial Intelligence. Berlin: Springer, 2003, pages 318–322.
- [50] Munindar P. Singh and Michael N. Huhns. “Social Abstractions for Information Agents.” *Intelligent Information Agents: Cooperative, Rational and Adaptive Information Gathering in the Internet*. Edited by Matthias Klusch. Berlin: Springer, 1999. Chapter 2, pages 37–52.
- [51] Munindar P. Singh and Mladen A. Vouk. “Network Computing.” *Encyclopedia of Electrical and Electronics Engineering*. Edited by John G. Webster. Volume 14. New York: John Wiley & Sons, 1999, pages 114–132.
- [52] Munindar P. Singh, Anand S. Rao, and Michael P. Georgeff. “Formal Methods in DAI: Logic-Based Representation and Reasoning.” *Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence*. Edited by Gerhard Weiß. Cambridge, Massachusetts: MIT Press, 1999. Chapter 8, pages 331–376.
- [53] Munindar P. Singh. “Know-How.” *Foundations of Rational Agency*. Edited by Anand S. Rao and Michael J. Wooldridge. Applied Logic Series. Dordrecht, The Netherlands: Kluwer, 1998.

Invited Journal Articles

- [54] Feng Wan and Munindar P. Singh. “Enabling Persistent Web Services with Commitments.” *Information Technology and Management* 6(1), January 2005, pages 41–60.
- [55] Munindar P. Singh and Michael N. Huhns. “Multiagent Systems for Workflow.” *International Journal of Intelligent Systems in Accounting, Finance & Management* 8(2), June 1999, pages 105–117.

Invited Proceedings Articles

- [56] Munindar P. Singh and Amit K. Chopra. “The Internet of Things and Multiagent Systems: Decentralized Intelligence in Distributed Computing.” *Proceedings of the 37th IEEE International Conference on Distributed Computing Systems (ICDCS)*. Blue Sky Track. Atlanta: IEEE, 2017, pages 1–9.
- [57] Munindar P. Singh. “Norms as a Basis for Governing Sociotechnical Systems: Extended Abstract.” *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI)*. Extended abstract appearing in the IJCAI Journal Abstracts Track. Buenos Aires: IJCAI, 2015, pages 4207–4211.

- [58] Munindar P. Singh. “Can’t We All Just Get Along? Agreement Technologies and the Science of Security.” *Proceedings of the 2nd International Conference on Agreement Technologies*. Volume 8068. Lecture Notes in Computer Science. Beijing: Springer, August 2013, pages 1–3.
- [59] Amit K. Chopra, Nir Oren, Sanjay Modgil, Nirmal Desai, Simon Miles, Michael Luck, and Munindar P. Singh. “Analyzing Contract Robustness through a Model of Commitments.” *Proceedings of the 11th International Workshop on Agent Oriented Software Engineering (AOSE 2010)*. Volume 6788. Lecture Notes in Computer Science. Toronto: Springer, 2011, pages 17–36.
- [60] Amit K. Chopra and Munindar P. Singh. “Interoperation in Protocol Enactment.” *Declarative Agent Languages and Technologies V: Selected, Revised, and Invited Papers*. Volume 4897. Lecture Notes in Artificial Intelligence. Heidelberg: Springer, May 2007, pages 36–49.
- [61] Amit K. Chopra and Munindar P. Singh. “Producing Compliant Interactions: Conformance, Coverage, and Interoperability.” *Declarative Agent Languages and Technologies IV: Selected, Revised, and Invited Papers*. Volume 4327. Lecture Notes in Artificial Intelligence. Heidelberg: Springer, 2006, pages 1–15.
- [62] Munindar P. Singh. *The Pragmatic Web: Preliminary Thoughts*. *Proceedings of the NSF-OntoWeb Workshop on Database and Information Systems Research for Semantic Web and Enterprises*, Amicalola State Park, Georgia. April 2002.
- [63] Munindar P. Singh. *Communication as Agent Interaction: Toward a Public Semantics*. *Preproceedings of the 3rd Workshop on the Semantics and Pragmatics of Dialogue (Amstelogue)*, Amsterdam. May 1999.
- [64] Mona Singh and Munindar P. Singh. “Applying Mixed-Initiative Interaction in User Interfaces for Communicators.” *Proceedings of the National Conference on Artificial Intelligence (AAAI) Workshop on Mixed-Initiative Intelligence*. July 1999.
- [65] Munindar P. Singh. “Conceptual Modeling for Multiagent Systems: Applying Interaction-Oriented Programming.” *Conceptual Modeling: Current Issues and Future Directions (Selected Papers from the Workshop on Conceptual Modeling)*. Edited by Peter P. Chen, Jacky Akoka, Hannu Kangassalo, and Bernhard Thalheim. Volume 1565. Lecture Notes in Computer Science. Berlin: Springer, 1999, pages 195–210.
- [66] Michael N. Huhns and Munindar P. Singh. “Multiagent Systems in Information-Rich Environments.” *Proceedings of the 2nd International Workshop on Cooperative Information Agents: Learning, Mobility and Electronic Commerce for Information Discovery on the Internet*. Springer, 1998, pages 79–93.
- [67] Munindar P. Singh and Michael N. Huhns. “Challenges for Machine Learning in Cooperative Information Systems.” *Distributed Artificial Intelligence Meets Machine Learning: Learning in Multi-Agent Environments*. Edited by Gerhard Weiß. Volume 1221. Lecture Notes in Artificial Intelligence. Berlin: Springer, 1997, pages 11–24.
- [68] Munindar P. Singh. “Commitments in the Architecture of a Limited, Rational Agent.” *Intelligent Agent Systems: Theoretical and Practical Issues*. Edited by Lawrence Cavedon, Wayne Wobcke, and Anand Rao. Volume 1209. Lecture Notes in Artificial Intelligence. Berlin: Springer, 1997, pages 72–87.

4.4 Journal Articles

Some of the publications listed in Section III.A.3 are also journal articles.

- [69] Nirav Ajmeri, Chung-Wei Hang, Simon D. Parsons, and Munindar P. Singh. “Aragorn: Eliciting and Maintaining Secure Service Policies.” *IEEE Computer* 50(6), June 2017. To appear, pages 1–8.
- [70] Anup K. Kalia, Norbou Buchler, Arwen H. DeCostanza, and Munindar P. Singh. “Computing Team Performance Measures from the Structure and Content of Broadcast Collaborative Communications.” *IEEE Transactions on Computational Social Systems* 4(2), June 2017. To appear, pages 1–12.
- [71] Ricard López Fogués, Pradeep K. Murukannaiah, Jose M. Such, and Munindar P. Singh. “Understanding Sharing Policies in Multiparty Scenarios: Incorporating Context, Preferences, and Arguments in Decision Making.” *ACM Transactions on Computer-Human Interaction* 24(1), March 2017, 5:1–5:29.
- [72] Athman Bouguettaya, Munindar P. Singh, Michael N. Huhns, Quan Z. Sheng, Hai Dong, Qi Yu, Azadeh Ghari Neiat, Sajib Mistry, Boualem Benatallah, Brahim Medjahed, Mourad Ouzzani, Fabio Casati, Xumin Liu, Hongbing Wang, Dimitrios Georgakopoulos, Liang Chen, Surya Nepal, Zaki Malik, Abdelkarim Erradi, Yan Wang, Brian Blake, Schahram Dustdar, Frank Leymann, and Michael Papazoglou. “A Service Computing Manifesto: The Next 10 Years.” *Communications of the ACM (CACM)* 60(4), April 2017, pages 64–72.
- [73] Özgür Kafalı, Nirav Ajmeri, and Munindar P. Singh. “Revani: Revising and Verifying Normative Specifications for Privacy.” *IEEE Intelligent Systems* 31(5), September 2016, pages 8–15.
- [74] Luis G. Nardin, Tina Balke-Visser, Nirav Ajmeri, Anup K. Kalia, Jaime S. Sichman, and Munindar P. Singh. “Classifying Sanctions and Designing a Conceptual Sanctioning Process for Socio-Technical Systems.” *The Knowledge Engineering Review* 31(2), March 2016, pages 142–166.
- [75] Anup K. Kalia, Zhe Zhang, and Munindar P. Singh. “Güven: Estimating Trust from Communications.” *Journal of Trust Management (JTM)* 2, January 2016, pages 1–19.
- [76] Pankaj R. Telang, Anup K. Kalia, and Munindar P. Singh. “Modeling Healthcare Processes using Commitments: An Empirical Evaluation.” *PLoS ONE* 10(11), November 2015, e0141202.
- [77] Pradeep K. Murukannaiah and Munindar P. Singh. “Platys: An Active Learning Framework for Place-Aware Application Development and its Evaluation.” *ACM Transactions on Software Engineering and Methodology (TOSEM)* 24(3), May 2015, 19:1–19:32.
- [78] Anup K. Kalia and Munindar P. Singh. “Muon: Designing Multiagent Communication Protocols from Interaction Scenarios.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 29(4), July 2015, pages 621–657.
- [79] Pankaj R. Telang, Anup K. Kalia, and Munindar P. Singh. “Engineering Service Engagements via Commitments.” *IEEE Internet Computing* 18(3), May 2014, pages 46–54.
- [80] Simon D. Parsons, Katie Atkinson, Zimi Li, Peter McBurney, Elizabeth I. Sklar, Munindar P. Singh, Karen Haigh, Karl Levitt, and Jeff Rowe. “Argument Schemes for Reasoning about Trust.” *Argumentation and Computation* 5(2–3), August 2014, pages 160–190.

- [81] Xibin Gao and Munindar P. Singh. “Mining Contracts for Business Events and Temporal Constraints in Service Engagements.” *IEEE Transactions on Services Computing* 7(3), July 2014, pages 427–439.
- [82] Prashant C. Kediya and Munindar P. Singh. “Licit: Administering Usage Licenses in Federated Environments.” *IEEE Transactions on Services Computing* 7(1), January 2014, pages 96–108.
- [83] Munindar P. Singh. “Norms as a Basis for Governing Sociotechnical Systems.” *ACM Transactions on Intelligent Systems and Technology (TIST)* 5(1), December 2013, 21:1–21:23.
- [84] Chung-Wei Hang, Zhe Zhang, and Munindar P. Singh. “Shin: Generalized Trust Propagation with Limited Evidence.” *IEEE Computer* 46(3), March 2013, pages 78–85.
- [85] Chung-Wei Hang and Munindar P. Singh. “Generalized Framework for Personalized Recommendations in Agent Networks.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 25(3), November 2012, pages 475–498.
- [86] Pradeep K. Murukannaiah and Munindar P. Singh. “Platys Social: Relating Shared Places and Private Social Circles.” *IEEE Internet Computing* 16(3), May 2012, pages 53–59.
- [87] Frances Brazier, Virginia Dignum, Michael N. Huhns, Christian Derksen, Frank Dignum, Tim Lessner, Julian Padget, Thomas Quillinan, and Munindar P. Singh. “Agent-Based Organisational Governance of Services.” *Multiagent and Grid Systems: An International Journal (MAGS)* 8(1), January 2012, pages 3–18.
- [88] Scott N. Gerard and Munindar P. Singh. “Formalizing and Verifying Protocol Refinements.” *ACM Transactions on Intelligent Systems and Technology (TIST)* 42(2), March 2013. Appendix pages 1–7, 21:1–21:27.
- [89] Amit K. Chopra, Alexander Artikis, Jamal Bentahar, Marco Colombetti, Frank Dignum, Nicoletta Fornara, Andrew J. I. Jones, Munindar P. Singh, and Pinar Yolum. “Research Directions in Agent Communication.” *ACM Transactions on Intelligent Systems and Technology (TIST)* 42(2), March 2013, 20:1–20:23.
- [90] Yonghong Wang, Chung-Wei Hang, and Munindar P. Singh. “A Probabilistic Approach for Maintaining Trust Based on Evidence.” *Journal of Artificial Intelligence Research* 40, January 2011, pages 221–267.
- [91] Pankaj R. Telang and Munindar P. Singh. “Specifying and Verifying Cross-Organizational Business Models: An Agent-Oriented Approach.” *IEEE Transactions on Services Computing* 5(3), July 2012. Appendix pages 1–5, pages 305–318.
- [92] Xibin Gao, Munindar P. Singh, and Pankaj Mehra. “Mining Business Contracts for Service Exceptions.” *IEEE Transactions on Services Computing* 5(3), July 2012, pages 333–344.
- [93] Derek J. Sollenberger and Munindar P. Singh. “Koko: An Architecture for Affect-Aware Games.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 24(2), March 2012, pages 255–286.
- [94] Christopher J. Hazard and Munindar P. Singh. “Intertemporal Discount Factors as a Measure of Trustworthiness in Electronic Commerce.” *IEEE Transactions on Knowledge and Data Engineering* 23(5), May 2011, pages 699–712.

- [95] Chung-Wei Hang and Munindar P. Singh. “Trustworthy Service Selection and Composition.” *ACM Transactions on Autonomous and Adaptive Systems (TAAS)* 6(1), February 2011, 5:1–5:17.
- [96] Yonghong Wang and Munindar P. Singh. “Evidence-Based Trust: A Mathematical Model Geared for Multiagent Systems.” *ACM Transactions on Autonomous and Adaptive Systems (TAAS)* 5(4), November 2010, 14:1–14:28.
- [97] Munindar P. Singh, Amit K. Chopra, and Nirmitt Desai. “Commitment-Based Service-Oriented Architecture.” *IEEE Computer* 42(11), November 2009, pages 72–79.
- [98] Nirmitt Desai, Amit K. Chopra, and Munindar P. Singh. “Amoeba: A Methodology for Modeling and Evolving Cross-Organizational Business Processes.” *ACM Transactions on Software Engineering and Methodology (TOSEM)* 19(2), October 2009, 6:1–6:45.
- [99] Payal Chakravarty and Munindar P. Singh. “Incorporating Events into Cross-Organizational Business Processes.” *IEEE Internet Computing* 12(2), March 2008, pages 46–53.
- [100] Ashok U. Mallya and Munindar P. Singh. “An Algebra for Commitment Protocols.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 14(2), April 2007, pages 143–163. Acceptance ratio: 15.3%.
- [101] Nirmitt Desai, Ashok U. Mallya, Amit K. Chopra, and Munindar P. Singh. “Interaction Protocols as Design Abstractions for Business Processes.” *IEEE Transactions on Software Engineering* 31(12), December 2005, pages 1015–1027. Acceptance ratio: 12.5%.
- [102] Pinar Yolum and Munindar P. Singh. “Engineering self-organizing referral networks for trustworthy service selection.” *IEEE Transactions on Systems, Man, and Cybernetics, Part A* 35(3), May 2005, pages 396–407. Acceptance ratio: 35.7%.
- [103] Michael N. Huhns and Munindar P. Singh. “Service-Oriented Computing: Key Concepts and Principles.” *IEEE Internet Computing* 9(1), January 2005, pages 75–81.
- [104] E. Michael Maximilien and Munindar P. Singh. “A Framework and Ontology for Dynamic Web Services Selection.” *IEEE Internet Computing* 8(5), September 2004, pages 84–93.
- [105] Raghuram M. Sreenath and Munindar P. Singh. “Agent-Based Service Selection.” *Journal of Web Semantics* 1(3), April 2004, pages 261–279.
- [106] Pinar Yolum and Munindar P. Singh. “Dynamic Communities in Referral Networks.” *Web Intelligence and Agent Systems* 1(2), 2003, pages 105–116.
- [107] Pinar Yolum and Munindar P. Singh. “Reasoning About Commitments in the Event Calculus: An Approach for Specifying and Executing Protocols.” *Annals of Mathematics and Artificial Intelligence* 42(1–3), September 2004, pages 227–253.
- [108] Bin Yu, Mahadevan Venkatraman, and Munindar P. Singh. “An Adaptive Social Network for Information Access: Theoretical and Experimental Results.” *Applied Artificial Intelligence* 17(1), January 2003, pages 21–38.
- [109] Bin Yu and Munindar P. Singh. “Distributed Reputation Management for Electronic Commerce.” *Computational Intelligence* 18(4), November 2002, pages 535–549.

- [110] Jie Xing, Feng Wan, Sudhir K. Rustogi, and Munindar P. Singh. “A Commitment-Based Approach for Business Process Interoperation.” *IEICE Transactions on Information and Systems* E84-D(10), October 2001. Special issue on *Autonomous Decentralized Systems and Systems Assurance*, pages 1324–1332.
- [111] Munindar P. Singh, Bin Yu, and Mahadevan Venkatraman. “Community-Based Service Location.” *Communications of the ACM (CACM)* 44(4), April 2001, pages 49–54.
- [112] Munindar P. Singh. “Synthesizing Coordination Requirements for Heterogeneous Autonomous Agents.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 3(2), June 2000, pages 107–132.
- [113] Mahadevan Venkatraman and Munindar P. Singh. “Verifying Compliance with Commitment Protocols: Enabling Open Web-Based Multiagent Systems.” *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)* 2(3), September 1999, pages 217–236.
- [114] Anuj K. Jain, Manuel Aparicio IV, and Munindar P. Singh. “Agents for Process Coherence in Virtual Enterprises.” *Communications of the ACM (CACM)* 42(3), March 1999, pages 62–69.
- [115] Munindar P. Singh. “Agent Communication Languages: Rethinking the Principles.” *IEEE Computer* 31(12), December 1998, pages 40–47.
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- [128] Nirav Ajmeri, Hui Guo, Pradeep K. Murukannaiah, and Munindar P. Singh. “Arnor: Modeling Social Intelligence via Norms to Engineer Privacy-Aware Personal Agents.” *Proceedings of the 16th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. São Paulo: IFAAMAS, May 2017, pages 1–9. Acceptance ratio: 26.1%.
- [129] Amit K. Chopra, Samuel H. Christie V, and Munindar P. Singh. “Splee: A Declarative Information-Based Language for Multiagent Interaction Protocols.” *Proceedings of the 16th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. São Paulo: IFAAMAS, May 2017, pages 1–10. Acceptance ratio: 26.1%.
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- [133] Pradeep K. Murukannaiah, Nirav Ajmeri, and Munindar P. Singh. “Acquiring Creative Requirements from the Crowd: Understanding the Influences of Individual Personality and Creative Potential in Crowd RE.” *Proceedings of the 20th IEEE International Requirements Engineering Conference (RE)*. Beijing: IEEE Computer Society, September 2016, pages 176–185. Acceptance ratio: 27.8%.
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- [143] Pradeep K. Murukannaiah, Anup K. Kalia, Pankaj R. Telang, and Munindar P. Singh. “Resolving Goal Conflicts via Argumentation-Based Analysis of Competing Hypothesis.” *Proceedings of the 19th IEEE International Requirements Engineering Conference (RE)*. Ottawa: IEEE Computer Society, August 2015, pages 156–165. Acceptance ratio: 19.8%.
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- [216] Mona Singh, Anuj K. Jain, and Munindar P. Singh. “E-commerce over Communicators: Challenges and Solutions for User Interfaces.” *Proceedings of the 1st Annual ACM Conference on Electronic Commerce*. Denver: ACM Press, 1999, pages 177–186. Acceptance ratio: 29%.
- [217] Sudhir K. Rustogi and Munindar P. Singh. “Be Patient and Tolerate Imprecision: How Autonomous Agents can Coordinate Effectively.” *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*. 1999, pages 512–519. Acceptance ratio: 25.9%.
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- [219] Munindar P. Singh. “Developing Formal Specifications to Coordinate Heterogeneous Autonomous Agents.” *Proceedings of the 3rd International Conference on Multiagent Systems (ICMAS)*. IEEE Computer Society, July 1998, pages 261–268. Acceptance ratio: 23.2%.
- [220] Munindar P. Singh. “Synthesizing Distributed Constrained Events from Transactional Workflow Specifications.” *Proceedings of the 12th International Conference on Data Engineering (ICDE)*. New Orleans, February 1996, pages 616–623. Acceptance ratio: 22.7%.
- [221] Munindar P. Singh, L. Greg Meredith, Christine Tomlinson, and Paul C. Attie. “An Event Algebra for Specifying and Scheduling Workflows.” *Proceedings of the 4th International Conference on Database Systems for Advanced Applications*. April 1995, pages 53–60. Acceptance ratio: 29.7%.
- [222] Michael N. Huhns and Munindar P. Singh. “Automating Workflows for Service Provisioning: Integrating AI and Database Technologies.” *Proceedings of the 10th IEEE Conference on Artificial Intelligence for Applications*. March 1994, pages 405–411. Acceptance ratio: 29.3%.
- [223] Paul C. Attie, Munindar P. Singh, Amit P. Sheth, and Marek Rusinkiewicz. “Specifying and Enforcing Intertask Dependencies.” *Proceedings of the 19th International Conference on Very Large Data Bases (VLDB)*. Dublin, August 1993, pages 134–145. Acceptance ratio: 16.3%.
- [224] Michael N. Huhns, Nigel Jacobs, Tomasz Ksiezyk, Wei-Min Shen, Munindar P. Singh, and Philip E. Cannata. “Integrating Enterprise Information Models in Carnot.” *International Conference on Intelligent and Cooperative Information Systems (ICICIS)*. Rotterdam, May 1993, pages 32–42. Acceptance ratio: 31.7%.
- [225] Munindar P. Singh. “A Critical Examination of the Cohen-Levesque Theory of Intentions.” *Proceedings of the 10th European Conference on Artificial Intelligence*. Vienna, August 1992, pages 364–368. Acceptance ratio: 29%.
- [226] Mona Singh and Munindar P. Singh. “Computing the Temporal Structure of Events in Natural Language.” *Proceedings of the European Conference on Artificial Intelligence*. Vienna, August 1992, pages 528–532. Acceptance ratio: 29%.
- [227] Munindar P. Singh. “Towards a Formal Theory of Communication for Multiagent Systems.” *Proceedings of the 12th International Joint Conference on Artificial Intelligence (IJCAI)*. Sydney, August 1991, pages 69–74. Acceptance ratio: 19.1%.
- [228] Munindar P. Singh. “Intentions, Commitments and Rationality.” *Proceedings of the 13th Annual Conference of the Cognitive Science Society*. Chicago, August 1991, pages 493–498.

- [229] Munindar P. Singh. “A Logic of Situated Know-how.” *Proceedings of the National Conference on Artificial Intelligence (AAAI)*. Anaheim, California, July 1991, pages 343–348.
- [230] Munindar P. Singh. “Towards a Theory of Situated Know-how.” *Proceedings of the 9th European Conference on Artificial Intelligence (ECAI)*. Stockholm, August 1990, pages 604–609. Acceptance ratio: 31.1%.

4.6 Papers in Major Symposia and Workshop Proceedings

The following are papers in major refereed symposia and workshops, mostly with acceptance ratios of about 30% or better.

- [231] Pinar Yolum and Munindar P. Singh. “Commitment Machines.” *Proceedings of the 8th International Workshop on Agent Theories, Architectures, and Languages (ATAL 2001)*. Volume 2333. Lecture Notes in Artificial Intelligence. Seattle: Springer, 2002, pages 235–247.
- [232] Zhengang Cheng, Munindar P. Singh, and Mladen A. Vouk. “Composition Constraints for Semantic Web Services.” *Proceedings of the WWW Conference Workshop on Real World RDF and Semantic Web Applications*. Honolulu, May 2002. Long presentation. Acceptance ratio: 30.7%.
- [233] Bin Yu and Munindar P. Singh. “A Social Mechanism of Reputation Management in Electronic Communities.” *Proceedings of the 4th International Workshop on Cooperative Information Agents*. Volume 1860. Lecture Notes in Artificial Intelligence. Boston: Springer, July 2000, pages 154–165. Acceptance ratio: 36%.
- [234] Sudhir K. Rustogi and Munindar P. Singh. “The Bases of Effective Coordination in Decentralized Multiagent Systems.” *Intelligent Agents V: Proceedings of the 5th International Workshop on Agent Theories, Architectures, and Languages (ATAL-98)*. Paris: Springer, July 1998, pages 149–161. Acceptance ratio: 27.5%.
- [235] Munindar P. Singh. “A Customizable Coordination Service for Autonomous Agents.” *Intelligent Agents IV: Proceedings of the 4th International Workshop on Agent Theories, Architectures, and Languages (ATAL-97)*. Volume 1365. Lecture Notes in Computer Science. Providence, Rhode Island: Springer, 1998, pages 93–106. Acceptance ratio: 26.3%.
- [236] Munindar P. Singh. “Commitments Among Autonomous Agents in Information-Rich Environments.” *Proceedings of the 8th European Workshop on Modelling Autonomous Agents in a Multi-Agent World (MAAMAW)*. Ronneby, Sweden: Springer, May 1997, pages 141–155. Acceptance ratio: 29.4%.
- [237] Munindar P. Singh. “Formalizing Actions in Branching Time: Model-Theoretic Considerations.” *Proceedings of the 2nd International Workshop on Temporal Representation and Reasoning (TIME)*. Melbourne Beach, Florida, April 1995, pages 97–104. Acceptance ratio: 25%.
- [238] Michael N. Huhns, Munindar P. Singh, Tomasz Ksiezyk, and Nigel Jacobs. “Global Information Management via Local Autonomous Agents.” *Proceedings of the 13th International Workshop on Distributed Artificial Intelligence (DAI)*. Seattle, August 1994. Acceptance ratio: 28.8%.

4.7 Papers in Other Refereed Proceedings

- [239] Guangchao Yuan, Nirav S. Ajmeri, Chris Allred, Pankaj R. Telang, Mark A. Wilson, and Munindar P. Singh. “Modeling Analytics as Knowledge Work: Computing Meets Organizational Psychology.” *Proceedings of the 9th IEEE International Conference on Research Challenges in Information Science (RCIS)*. Athens: IEEE, May 2015, pages 382–387.
- [240] Hongying Du, Bennett Y. Narron, Nirav Ajmeri, Emily Berglund, Jon Doyle, and Munindar P. Singh. “ENGMAS – Understanding Sanction under Variable Observability in a Secure Environment.” *Proceedings of the 2nd International Workshop on Agents and CyberSecurity (ACySE)*. Istanbul: ACM, May 2015, pages 1–8.
- [241] Hongying Du, Bennett Y. Narron, Nirav Ajmeri, Emily Berglund, Jon Doyle, and Munindar P. Singh. “Understanding Sanction under Variable Observability in a Secure, Collaborative Environment.” *Proceedings of the 2nd International Symposium and Bootcamp on the Science of Security (HotSoS)*. Urbana, Illinois: ACM, April 2015, 12:1–12:10. Acceptance ratio: 59.1%.
- [242] Anup K. Kalia, Nirav Ajmeri, Kevin Chan, Jin-Hee Cho, Sibel Adalı, and Munindar P. Singh. “A Model of Trust, Moods, and Emotions in Multiagent Systems, and its Empirical Evaluation.” *Proceedings of the 16th AAMAS Workshop on Trust in Agent Societies (Trust)*. Paris, May 2014.
- [243] Simon Parsons, Elizabeth Sklar, Munindar P. Singh, Karl N. Levitt, and Jeff Rowe. “An Argumentation-Based Approach to Handling Trust in Distributed Decision Making.” *AAAI Spring Symposium: Trust and Autonomous Systems*. Volume SS-13-07. AAAI Publications. <http://www.aaai.org/ocs/index.php/SSS/SSS13/paper/view/5785>. Palo Alto, California: AAAI, March 2013, pages 66–71.
- [244] Anup K. Kalia, Zhe Zhang, and Munindar P. Singh. “Trustworthy Decision Making via Commitments.” *Proceedings of the 15th AAMAS Workshop on Trust in Agent Societies (Trust)*. St. Paul, May 2013, pages 24–35.
- [245] Dhanwant S. Kang, Hua Liu, Munindar P. Singh, and Tong Sun. “Adaptive Process Execution in a Service Cloud: Service Selection and Scheduling Based on Machine Learning.” *Proceedings of the 11th IEEE International Conference on Web Services*. Santa Clara, California, 2013, pages 324–331.
- [246] Elizabeth I. Sklar, Simon D. Parsons, and Munindar P. Singh. “Towards an Argumentation-Based Model of Social Interaction.” *Proceedings of the 10th International Workshop on Argumentation in Multi-Agent Systems (ArgMAS)*. May 2013.
- [247] Scott N. Gerard, Pankaj R. Telang, Anup K. Kalia, and Munindar P. Singh. “Positron: Composing Commitment Protocols.” *Proceedings of the 1st International Workshop on Engineering Multiagent Systems (EMAS)*. May 2013. Acceptance ratio: 63.3%.
- [248] Yuqing Tang, Chung-Wei Hang, Simon D. Parsons, and Munindar P. Singh. “Towards Argumentation with Symbolic Dempster-Shafer Evidence.” *Proceedings of the 4th International Conference on Computational Models of Argument (COMMA)*. Vienna, September 2012, pages 462–469. Acceptance ratio: 36.8%.
- [249] Amit K. Chopra and Munindar P. Singh. “Colaba: Collaborative Design of Cross-Organizational Business Processes.” *Proceedings of the International Workshop on Requirements Engineering for Systems, Services, and Systems of Systems (RES⁴)*. Trento, Italy: IEEE, August 2011, pages 36–43.

- [250] Pankaj R. Telang, Neil Yorke-Smith, and Munindar P. Singh. “Relating Goal and Commitment Semantics.” *Proceedings of the 9th International Workshop on Programming Multiagent Systems (ProMAS 2011)*. Volume 7217. Lecture Notes in Computer Science. Taipei: Springer, 2012, pages 22–37.
- [251] Sibel Adalı, William A. Wallace, Yi Qi, Priyanka Vijayakumar, and Munindar P. Singh. “A Unified Framework for Trust in Composite Networks.” *Proceedings of the 13th AAMAS Workshop on Trust in Agent Societies (Trust)*. Taipei, 2011, pages 1–12.
- [252] Chung-Wei Hang and Munindar P. Singh. “Trust-based Recommendation Based on Graph Similarity.” *Proceedings of the 12th AAMAS Workshop on Trust in Agent Societies (Trust)*. Toronto, 2010, pages 71–81.
- [253] Christopher J. Hazard and Munindar P. Singh. “An Architectural Approach to Combining Trust and Reputation.” *Proceedings of the 12th AAMAS Workshop on Trust in Agent Societies (Trust)*. Toronto, 2010, pages 83–93.
- [254] Pankaj R. Telang and Munindar P. Singh. “Abstracting Business Modeling Patterns from RosettaNet.” *Proceedings of the 8th AAMAS Workshop on Service-Oriented Computing: Agents, Semantics, and Engineering (SOCASE)*. Toronto, 2010, pages 83–96.
- [255] Frances Brazier, Frank Dignum, Virginia Dignum, Michael N. Huhns, Tim Lessner, Julian Padget, Thomas Quillinan, and Munindar P. Singh. “Governance of Services: A Natural Function for Agents.” *Proceedings of the 8th AAMAS Workshop on Service-Oriented Computing: Agents, Semantics, and Engineering (SOCASE)*. Toronto, 2010, pages 8–22.
- [256] Scott N. Gerard and Munindar P. Singh. “Protocol Refinement: Formalization and Verification.” *Proceedings of the AAMAS Workshop on Agent Communication (AC)*. Toronto, 2010, pages 19–36.
- [257] Munindar P. Singh and Amit K. Chopra. “Correctness Properties for Multiagent Systems.” *Proceedings of the 6th AAMAS Workshop on Declarative Agent Languages and Technologies (DALT 2009)*. Volume 5948. Lecture Notes in Artificial Intelligence. Budapest: Springer, May 2010, pages 192–207.
- [258] Matthew Arrott, Alan D. Chave, Claudiu Farcas, Emilia Farcas, Jack E. Kleinert, Ingolf Krueger, Michael Meisinger, John A. Orcutt, Cheryl Peach, Oscar Schofield, Munindar P. Singh, and Frank L. Vernon. “Integrating Marine Observatories into a System-of-Systems: Messaging in the US Ocean Observatories Initiative.” *Proceedings of Oceans, the MTS-IEEE Conference on Marine Technology for our Future: Global and Local Challenges*. Biloxi, Mississippi: IEEE Computer Society, October 2009, pages 1–9.
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- [262] Chung-Wei Hang and Munindar P. Singh. “Selecting Trustworthy Services: Learning a Bayesian Network.” *Proceedings of the 12th AAMAS Workshop on Trust in Agent Societies (Trust)*. 2009.
- [263] Derek J. Sollenberger and Munindar P. Singh. “Architecture for Affective Social Games.” *Proceedings of the 1st AAMAS Workshop on Agents for Games and Simulation (AGS)*. volume 5920. Lecture Notes in Computer Science. Springer, 2009, pages 79–94.
- [264] Yathiraj B. Udupi and Munindar P. Singh. “Design Patterns for Policy-Based Service Engagements.” *Proceedings of the 9th IEEE International Workshop on Policies for Distributed Systems and Networks (POLICY 2008)*. Palisades, New York: IEEE Computer Society, June 2008, pages 97–100.
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- [270] Nirmal Desai, Ashok U. Mallya, Amit K. Chopra, and Munindar P. Singh. “OWL-P: A Methodology for Business Process Modeling and Enactment.” *Proceedings of the AAMAS Workshop on Agent Oriented Information Systems (AOIS)*. Utrecht, The Netherlands, July 2005.
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- [278] E. Michael Maximilien and Munindar P. Singh. “Agent-Based Architecture for Autonomic Web Service Selection.” *Proceedings of the 1st International Workshop on Web Services and Agent-Based Engineering (WSABE)*. Refereed position paper. Melbourne: AAMAS, July 2003, pages 1–10.
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4.8 Book Chapters

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- [325] Manuel Aparicio IV and Munindar P. Singh. “Concepts and Practice of Personalization.” *Practical Handbook of Internet Computing*. Edited by Munindar P. Singh. Baton Rouge: Chapman Hall & CRC Press, 2005. Chapter 18, pages 1–14.
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- [331] Darrell Woelk, Philip Cannata, Michael N. Huhns, Nigel Jacobs, Tomasz Ksiezzyk, Greg Lavender, Greg Meredith, Kayliang Ong, Wei-Min Shen, Munindar Singh, and Christine Tomlinson. “Carnot Prototype.” *Object-Oriented Multidatabase Systems: A Solution for Advanced Applications*. Edited by Omran A. Bukhres and Ahmed K. Elmagarmid. Prentice-Hall, 1996. Chapter 18, pages 621–648.
- [332] Michael N. Huhns, Nigel Jacobs, Tomasz Ksiezzyk, Wei-Min Shen, Munindar P. Singh, and Philip E. Cannata. “Enterprise Information Modeling and Model Integration in Carnot.” *Enterprise Integration Modeling*. Edited by Charles J. Petrie Jr. MIT Press, 1992, pages 290–299.
- [333] Munindar P. Singh. “Group Ability and Structure.” *Decentralized Artificial Intelligence, Volume 2*. Edited by Yves Demazeau and Jean-Pierre Müller. Revised proceedings of the 2nd European Workshop on Modeling Autonomous Agents in a Multi Agent World (MAAMAW), St. Quentin en Yvelines, France, August 1990. Amsterdam: Elsevier/North-Holland, 1991, pages 127–145.

4.9 Bulletin and Magazine Articles

These publications are refereed, but not as intensively as journals.

- [334] Laura Zavala, Pradeep K. Murukannaiah, Nithyananthan Poosamani, Tim Finin, Anupam Joshi, Injong Rhee, and Munindar P. Singh. “Platys: From Position to Place-Oriented Mobile Computing.” *AI Magazine* 36(2), Summer Summer 2015, pages 50–62.
- [335] E. Michael Maximilien and Munindar P. Singh. “Conceptual Model of Web Service Reputation.” *ACM SIGMOD Record* 31(4), December 2002, pages 36–41.
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4.10 Short Papers and Research Prototype Abstracts

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- [338] Özgür Kafalı, Nirav Ajmeri, and Munindar P. Singh. “Formal Understanding of Tradeoffs among Liveness and Safety Requirements.” *Proceedings of the 3rd International Workshop on Artificial Intelligence for Requirements Engineering (AIRE)*. Extended abstract. Beijing: IEEE Computer Society, September 2016, pages 17–18.
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- [340] Özgür Kafalı, Munindar P. Singh, and Laurie Williams. “Toward a Normative Approach for Forensicability: Poster.” *Proceedings of the 3rd International Symposium and Bootcamp on the Science of Security (HotSoS)*. Pittsburgh: ACM, April 2016, pages 65–67.
- [341] Jiaming Jiang, Nirav Ajmeri, Rada Y. Chirkova, Jon Doyle, and Munindar P. Singh. “Expressing and Reasoning about Conflicting Norms in Cybersecurity: Poster.” *Proceedings of the 3rd International Symposium and Bootcamp on the Science of Security (HotSoS)*. Pittsburgh: ACM, April 2016, pages 63–64.
- [342] Matteo Baldoni, Cristina Baroglio, Amit K. Chopra, and Munindar P. Singh. “Social Contexts and Social Pragmatics.” *Proceedings of the 14th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Extended Abstract. Istanbul: IFAAMAS, May 2015, pages 1739–1740.
- [343] Anup K. Kalia, Zhe Zhang, and Munindar P. Singh. “Estimating Trust from Agents’ Interactions via Commitments.” *Proceedings of the 21st European Conference on Artificial Intelligence (ECAI)*. Prague, August 2014, pages 1043–1044.
- [344] Pradeep K. Murukannaiah, Ricard López Fogués, and Munindar P. Singh. “Platys: A Framework for Supporting Context-Aware Personal Agents (Demonstration).” *Proceedings of the 13th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Paris: IFAAMAS, May 2014, pages 1689–1690.

- [345] Anup K. Kalia, Pankaj R. Telang, and Munindar P. Singh. “Protos: A Cross-Organizational Business Modeling Tool (Demonstration).” *Proceedings of the 11th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Valencia, Spain: IFAAMAS, June 2012, pages 1489–1490.
- [346] Yathiraj B. Udupi and Munindar P. Singh. “Formal Aspects of Classifying and Selecting Business Services.” *Proceedings of the 8th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Budapest: IFAAMAS, 2009, pages 1247–1248. Acceptance ratio: 40.6%.
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- [349] Chung-Wei Hang, Yonghong Wang, and Munindar P. Singh. “An Adaptive Probabilistic Trust Model and its Evaluation.” *Proceedings of the 7th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Short paper. Estoril, Portugal: IFAAMAS, May 2008, pages 1485–1488. Acceptance ratio: 37.2%.
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- [356] E. Michael Maximilien and Munindar P. Singh. “Self-Adjusting Trust and Selection for Web Services.” *Proceedings of the 2nd International Conference on Autonomic Computing (ICAC)*. Seattle: IEEE Computer Society, June 2005, pages 385–386. Acceptance ratio: 42.7%.
- [357] Ashok U. Mallya, Nirmal Desai, Amit K. Chopra, and Munindar P. Singh. “OWL-P: OWL for Protocols and Processes.” *Proceedings of the 4th International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Demonstration abstract. Utrecht, The Netherlands: ACM Press, July 2005, pages 139–140. Acceptance ratio: 81.8%.
- [358] Amit K. Chopra and Munindar P. Singh. “Commitments for Flexible Business Processes.” *Proceedings of the 3rd International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Poster paper. New York: IEEE Computer Society Press, July 2004, pages 1362–1363. Acceptance ratio: 50%.
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- [361] Bin Yu, Cuihong Li, Katia Sycara, and Munindar P. Singh. “Dynamic Pricing Mechanisms for Peer-to-Peer Systems.” *Proceedings of the 3rd International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Poster paper. New York: IEEE Computer Society Press, July 2004, pages 1426–1427. Acceptance ratio: 50%.
- [362] Ashok U. Mallya and Munindar P. Singh. “A Semantic Approach for Designing Business Protocols.” *Proceedings of the 13th International World Wide Web Conference (WWW)*. Poster paper. New York: ACM Press, May 2004, pages 308–309. Acceptance ratio: 57%.
- [363] Pinar Yolum and Munindar P. Singh. “Ladders of Success: An Empirical Approach to Trust.” *Proceedings of the 2nd International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. Poster paper. Melbourne: ACM Press, July 2003, pages 1168–1169. Acceptance ratio: 56.9%.
- [364] Bin Yu and Munindar P. Singh. “An Agent-Based Approach to Knowledge Management.” *Proceedings of the ACM International Conference on Information and Knowledge Management (CIKM)*. Poster. November 2002, pages 642–644.
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- [369] Munindar P. Singh, Christine Tomlinson, and Darrell Woelk. “Relaxed Transaction Processing.” *Proceedings of the 1994 ACM International Conference on Management of Data (SIGMOD)*. Research prototype demonstration description. Minneapolis, May 1994, page 505.

4.11 Technical Columns

Natural Web Interfaces The following are articles from the Natural Web Interfaces department, which I edit for *IEEE Internet Computing*.

- [370] Muhammad Shahzad and Munindar P. Singh. “Continuous Authentication and Authorization for the Internet of Things.” *IEEE Internet Computing* 21(2), March 2017, pages 86–90.
- [371] Christopher J. Hazard and Munindar P. Singh. “Privacy Risks in Intelligent User Interfaces.” *IEEE Internet Computing* 20(6), November 2016, pages 57–61.
- [372] Pradeep K. Murukannaiah, Nirav Ajmeri, and Munindar P. Singh. “Engineering Privacy in Social Applications.” *IEEE Internet Computing* 20(2), March 2016, pages 72–76.
Selected for inclusion in IEEE Computer Society’s ComputingEdge, August 2016.
- [373] Pradeep K. Murukannaiah and Munindar P. Singh. “Understanding Location-Based User Experience.” *IEEE Internet Computing* 18(6), November 2014, pages 72–76.
- [374] Mona Singh and Munindar P. Singh. “Augmented Reality Interfaces.” *IEEE Internet Computing* 17(6), November 2013, pages 66–70.

Being Interactive The following are articles from this bimonthly column, which I wrote while serving as the editor-in-chief of *IEEE Internet Computing* (from January 1999 to December 2002).

- [375] Munindar P. Singh. “Who You Gonna Call?” *IEEE Internet Computing* 6(6), November 2002. Instance of the column *Being Interactive*, pages 4–5.
- [376] Munindar P. Singh. “Deep Web Structure.” *IEEE Internet Computing* 6(5), September 2002. Instance of the column *Being Interactive*, pages 4–5.
- [377] Munindar P. Singh. “Treating Health Care.” *IEEE Internet Computing* 6(4), July 2002. Instance of the column *Being Interactive*, pages 4–5.
- [378] Munindar P. Singh. “The Pragmatic Web.” *IEEE Internet Computing* 6(3), May 2002. Instance of the column *Being Interactive*, pages 4–5.
- [379] Munindar P. Singh. “Working the Flow.” *IEEE Internet Computing* 6(2), March 2002. Instance of the column *Being Interactive*, pages 4–5.
- [380] Munindar P. Singh. “Managing Network Privacy.” *IEEE Internet Computing* 6(1), January 2002. Instance of the column *Being Interactive*, pages 4–5.
- [381] Munindar P. Singh. “Privacy and Open Services.” *IEEE Internet Computing* 5(6), November 2001. Instance of the column *Being Interactive*, pages 4–5.

- [382] Munindar P. Singh. "Services and Situations." *IEEE Internet Computing* 5(5), September 2001. Instance of the column *Being Interactive*, pages 4–5.
- [383] Munindar P. Singh. "The Invisible Wireless Web." *IEEE Internet Computing* 5(4), July 2001. Instance of the column *Being Interactive*, pages 6–7.
- [384] Munindar P. Singh. "Physics of Service Composition." *IEEE Internet Computing* 5(3), May 2001. Instance of the column *Being Interactive*, pages 6–7.
- [385] Munindar P. Singh. "An Evolutionary Look at E-Commerce." *IEEE Internet Computing* 5(2), March 2001. Instance of the column *Being Interactive*, pages 4–5.
- [386] Munindar P. Singh. "Peering at Peer-to-Peer Computing." *IEEE Internet Computing* 5(1), January 2001. Instance of the column *Being Interactive*, pages 4–5.
- [387] Munindar P. Singh. "The Intelligence Within." *IEEE Internet Computing* 4(6), November 2000. Instance of the column *Being Interactive*, pages 6–7.
- [388] Munindar P. Singh. "Beyond Geography." *IEEE Internet Computing* 4(5), September 2000. Instance of the column *Being Interactive*, pages 4–5.
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- [390] Munindar P. Singh. "Engineering Interoperation." *IEEE Internet Computing* 4(3), May 2000. Instance of the column *Being Interactive*, pages 4–5.
- [391] Munindar P. Singh. "Trusting our Personal Assistants." *IEEE Internet Computing* 4(2), March 2000. Instance of the column *Being Interactive*, pages 4–5.
- [392] Munindar P. Singh. "In the Thick of Things." *IEEE Internet Computing* 4(1), January 2000. Instance of the column *Being Interactive*, pages 4–5.
- [393] Munindar P. Singh. "The End of the Supply Chain?" *IEEE Internet Computing* 3(6), November 1999. Instance of the column *Being Interactive*, pages 4–5.
- [394] Munindar P. Singh. "The E-Commerce Inversion." *IEEE Internet Computing* 3(5), September 1999. Instance of the column *Being Interactive*, pages 4–5.
- [395] Munindar P. Singh. "Degrees of Separation." *IEEE Internet Computing* 3(4), July 1999. Instance of the column *Being Interactive*, pages 4–5.
- [396] Munindar P. Singh. "Value-Oriented Electronic Commerce." *IEEE Internet Computing* 3(3), May 1999. Instance of the column *Being Interactive*, pages 6–7.
- [397] Munindar P. Singh. "Write Asynchronous, Run, Synchronous." *IEEE Internet Computing* 3(2), March 1999. Instance of the column *Being Interactive*, pages 4–5.
- [398] Munindar P. Singh. "The True Meaning of Analog." *IEEE Internet Computing* 3(1), January 1999. Instance of the column *Being Interactive*, pages 6–7.

Agents on the Web The following are articles of this bimonthly column, which I coauthored with Michael N. Huhns over 1997–1998.

- [399] Michael N. Huhns and Munindar P. Singh. “Cognitive Agents.” *IEEE Internet Computing* 2(6), November 1998. Instance of the column *Agents on the Web*, pages 87–89.
- [400] Michael N. Huhns and Munindar P. Singh. “Personal Assistants.” *IEEE Internet Computing* 2(5), September 1998. Instance of the column *Agents on the Web*, pages 90–92.
- [401] Michael N. Huhns and Munindar P. Singh. “Workflow Agents.” *IEEE Internet Computing* 2(4), July 1998. Instance of the column *Agents on the Web*, pages 94–96.
- [402] Michael N. Huhns and Munindar P. Singh. “All Agents are not Created Equal.” *IEEE Internet Computing* 2(3), May 1998. Instance of the column *Agents on the Web*, pages 94–96.
- [403] Michael N. Huhns and Munindar P. Singh. “Agent Jurisprudence.” *IEEE Internet Computing* 2(2), March 1998. Instance of the column *Agents on the Web*, pages 90–91.
- [404] Michael N. Huhns and Munindar P. Singh. “Anthropoid Agents.” *IEEE Internet Computing* 2(1), January 1998. Instance of the column *Agents on the Web*, pages 94–95.
- [405] Michael N. Huhns and Munindar P. Singh. “Ontologies for Agents.” *IEEE Internet Computing* 1(6), November 1997. Instance of the column *Agents on the Web*, pages 81–83.
- [406] Michael N. Huhns and Munindar P. Singh. “The Agent Test.” *IEEE Internet Computing* 1(5), September 1997. Instance of the column *Agents on the Web*, pages 78–79.
- [407] Michael N. Huhns and Munindar P. Singh. “Mobile Agents.” *IEEE Internet Computing* 1(3), May 1997. Instance of the column *Agents on the Web*, pages 80–82.
- [408] Michael N. Huhns and Munindar P. Singh. “Conversational Agents.” *IEEE Internet Computing* 1(2), March 1997. Instance of the column *Agents on the Web*, pages 73–75.
- [409] Michael N. Huhns and Munindar P. Singh. “Agents are Everywhere.” *IEEE Internet Computing* 1(1), January 1997. Instance of the column *Agents on the Web*, page 87.

4.12 Invited Forewords

- [410] Munindar P. Singh. “Foreword.” *Crowdsourcing: Cloud-Based Software Development*. Edited by Wei Li, Michael N. Huhns, Wei-Tek Tsai, and Wenjun Wu. Progress in IS. Berlin: Springer, 2015, pages v–vi.
- [411] Munindar P. Singh. “Coordination and the Internet.” *Coordination of Internet Agents: Models, Technologies, and Applications*. Edited by Andrea Omicini, Franco Zambonelli, Matthias Klusch, and Robert Tolksdorf. Foreword. Berlin: Springer, 2001, pages V–VII.

4.13 Book Reviews

- [412] Munindar P. Singh. “Book review of Michael Schroeder, *Autonomous, Model-Based Diagnosis Agents*.” *ACM Computing Reviews* 39, December 1998.
- [413] Munindar P. Singh. “Agents Misunderstood.” *IEEE Spectrum* 33(2), February 1996. Book review of Peter Wayner, *Agents Unleashed*, Academic Press, 1995, pages 10, 12.

- [414] Munindar P. Singh. “Distributed AI in Action: Book review of Thies Wittig, editor, *ARCHON: An Architecture for Multi-Agent Systems*.” *ACM SIGART Bulletin* 7(1), January 1996, pages 9–10.

4.14 Editorials

- [415] Özgür Kafalı and Munindar P. Singh. “Improving Cybersecurity: User Accountability and Sociotechnical Systems.” *IEEE Computing Now*, April 2017. Guest editorial. URL: <https://www.computer.org/web/computingnow/archive/improving-cybersecurity-april-2017-introduction>.
- [416] Munindar P. Singh. “Vision for TOIT.” *ACM Transactions on Internet Technology* 12(4), July 2013. Editor-in-chief’s column, 10:1–10:2.
- [417] Rino Falcone and Munindar P. Singh. “Introduction to the Special Section on Trust in Multiagent Systems.” *ACM Transactions on Internet Technology* 4(2), March 2013. Guest editorial, 23:1–23:2.
- [418] Munindar P. Singh. “Toward a Science of Security.” *IEEE Computing Now*, January 2013. Guest editorial. URL: <http://www.computer.org/portal/web/computingnow/archive/january2013>.
- [419] Munindar P. Singh. “Self-Renewing Applications.” *IEEE Internet Computing* 15(4), July 2011, pages 3–5.
- [420] Vinton G. Cerf and Munindar P. Singh. “2010 Computing Outlook.” *IEEE Computing Now*, January 2010. Guest editorial. URL: <http://www.computer.org/portal/web/computingnow/archive/january2010>.
- [421] Vinton G. Cerf and Munindar P. Singh. “Internet Predictions.” *IEEE Internet Computing* 14(1), January 2010. Guest editorial, pages 10–11.
- [422] Matei Ripeanu, Munindar P. Singh, and Sudharshan Vazhkudai. “Virtual Organizations.” *IEEE Internet Computing* 12(2), March 2008. Guest editorial, pages 10–12.
- [423] Anupam Joshi and Munindar P. Singh. “Multiagent Systems on the Net.” *Communications of the ACM (CACM)* 42(3), March 1999. Guest editorial, pages 38–40.
- [424] Wolfgang Klas and Munindar P. Singh. “Selected Papers from CoopIS-97.” *International Journal of Cooperative Information Systems (IJCIS)* 6(3–4), September 1997. Guest editorial, pages 217–218.
- [425] Munindar P. Singh and Michael N. Huhns. “Internet-Based Agents: Applications and Infrastructure.” *IEEE Internet Computing* 1(4), July 1997. Introduction to the theme issue on *Agents*, pages 8–9.
- [426] Michael N. Huhns and Munindar P. Singh. “Formal Methods in Cooperative Information Systems: Multiagent Systems.” *International Journal of Cooperative Information Systems (IJCIS)* 6(1), January 1997. Guest editorial, pages 1–2.
- [427] Michael N. Huhns and Munindar P. Singh. “Formal Methods in Cooperative Information Systems: Heterogeneous Databases.” *International Journal of Cooperative Information Systems (IJCIS)* 5(4), December 1996. Guest editorial, pages 365–366.

4.15 Miscellaneous External Publications

These are position statements, short encyclopedia articles, and such.

- [428] Chung-Wei Hang, Nirav Ajmeri, Munindar P. Singh, and Simon Parsons. “Argumentation, Evidence, and Schemes: Abstract.” *Proceedings of the 10th International Workshop on Argumentation in Multi-Agent Systems (ArgMAS 2013)*. May 2013, page 37.
- [429] Munindar P. Singh and Nirmal Desai. “Multidisciplinary Views of Business Contracts.” *Proceedings of the 8th International Conference on Service-Oriented Computing (ICSOC)*. volume 6470. Lecture Notes in Computer Science. Springer, 2010, page 730.
- [430] Sven Koenig, Sarit Kraus, Munindar P. Singh, and Michael Wooldridge. “Report on the Fourth International Joint Conference on Autonomous Agents and Multiagent Systems.” *AI Magazine* 27(1), 2006, pages 103–107.
- [431] Michael N. Huhns, Munindar P. Singh, Mark H. Burstein, Keith S. Decker, Edmund H. Durfee, Timothy W. Finin, Les Gasser, Hrishikesh J. Goradia, Nicholas R. Jennings, Kiran Lakkaraju, Hideyuki Nakashima, H. Van Dyke Parunak, Jeffrey S. Rosenschein, Alicia Ruvinsky, Gita Suktankar, Samarth Swarup, Katia P. Sycara, Milind Tambe, Thomas Wagner, and Rosa Laura Zavala Gutierrez. “Research Directions for Service-Oriented Multiagent Systems.” *IEEE Internet Computing* 9(6), November 2005, pages 65–70.
- [432] Munindar P. Singh. “Business Process Management: A Killer App for Agents?” *Proceedings of the 3rd International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*. New York: ACM Press, July 2004, page 26.
- [433] Munindar P. Singh. “Peer-to-Peer Computing for Information Systems.” *Proceedings of the 1st International Workshop on Agents and Peer-to-Peer Computing (AP2PC 2002)*. Volume 2530. Lecture Notes in Computer Science. Springer, July 2003, pages 15–20.
- [434] Munindar P. Singh. “Agents.” *Computer Sciences Encyclopedia*. Edited by Roger R. Flynn. Farmington Hills, Michigan: Macmillan, 2002.
- [435] Munindar P. Singh. “Embedded Technology (Ubiquitous Computing).” *Computer Sciences Encyclopedia*. Edited by Roger R. Flynn. Farmington Hills, Michigan: Macmillan, 2002.
- [436] Munindar P. Singh. “Internet Technology.” *IEEE Concurrency* 8(1), January 2000. Part of a *Trend Wars* collection of interviews conducted by Dejan Milojevic that appears on pages 70–81, pages 79–81.
- [437] Munindar P. Singh and Mona Singh. “Deconstructing the “Any” Key.” *Communications of the ACM (CACM)* 43(4), April 2000, pages 107–108.
- [438] Munindar P. Singh, Daniel G. Bobrow, Michael N. Huhns, Margaret King, Hiroaki Kitano, and Ray Reiter. “The Next Big Thing: Position Statements.” *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*. August 1997, pages 1511–1522.
- [439] Munindar P. Singh. *Principles of Standardization. Foundation of Intelligent Physical Agents (FIPA)*, Palo Alto, position statement. January 1998.
- [440] Munindar P. Singh. “Interaction-Oriented Programming for the Web.” *Proceedings of the 2nd IFCIS International Conference on Cooperative Information Systems (CoopIS)*. Position statement in a panel on *Cooperative Multiagent Systems for the Web*. Charleston, June 1997.

4.16 Tutorial Notes

I list only the major variants of the notes, which I hand out to tutorial attendees. These are sometimes cited in the literature.

- [441] (Munindar P. Singh and Amit K. Chopra), “The Internet of Things and Multiagent Systems.” Tutorial notes. July 2015, July 2016.
- [442] (Amit K. Chopra and Munindar P. Singh), “Decentralized Multiagent Systems.” Tutorial notes. March 2015.
- [443] (Amit K. Chopra and Munindar P. Singh), “Commitments in Software Engineering.” Tutorial notes. May 2013.
- [444] (Munindar P. Singh and Nirmal Desai), “Multidisciplinary Views of Business Contracts.” Tutorial notes. December 2010.
- [445] (Munindar P. Singh and Michael N. Huhns) “Fundamentals of Web Services.” Tutorial notes. 2002.
- [446] (Munindar P. Singh and Michael N. Huhns) “Service Composition Techniques.” Tutorial notes. 2002.
- [447] (Munindar P. Singh and Michael N. Huhns) “Agent Technology and Electronic Commerce.” Tutorial notes. 1999.
- [448] (Munindar P. Singh and Michael N. Huhns) “Principles of Agents and Multiagent Systems: Social, Ethical, and Legal Abstractions and Reasoning.” Tutorial notes. 1999.
- [449] (Munindar P. Singh and Michael N. Huhns) “Agents and Multiagents in Information-Rich Applications.” Tutorial notes. 1997–1998.
- [450] (Michael N. Huhns and Munindar P. Singh) “Cooperative Information Systems.” Tutorial notes. 1994–1996.

4.17 Invited Conference Presentations

1. “NoBPM: Supporting Interaction-Oriented Automation via Normative Specifications of Processes.” *13th International Conference on Business Process Management (BPM)*, Innsbruck, Austria, September 2015.
2. “Toward New Foundations for Computational Trust.” *CROSSING: Where Quantum Physics, Cryptography, System Security and Software Engineering Meet*, Darmstadt, Germany, June 2015.
3. “Toward a Science of Security (and Governance) in Service Systems.” *IEEE Services and Big Data Congress*, which combines IEEE Conferences on *Cloud Computing, Big Data, Mobile Services, Service Computing*, and *Web Services*, Anchorage, June 2014.
4. “Honest-to-Goodness Social Computing: Challenges and Opportunities for Multiagent Systems.” *1st International Workshop on Multiagent Foundations of Social Computing (MFSC)*, Paris, May 2014.
5. “The Science of Security: Introduction from the Perspective of Secure Collaboration.” *1st International Workshop on Agents and CyberSecurity (ACySe)*, Paris, May 2014.
6. “Trust and Emotions.” *17th International Workshop on Trust in Agent Societies*, Paris, May 2014.

7. “Honest-to-Goodness Social Computing: Critique of Current Research and a Call to Arms.” *Joint Session of Dagstuhl Seminars on Crowdsourcing and Cloud Services*, Wadern, Germany, September 2013.
8. “Bringing Commitments and Other Norms to Practice.” *InvPresitational Workshop on Norms and Multiagent Systems (NorMAS)*, Leiden, The Netherlands, August 2013.
9. “Can’t We All Just Get Along? Agreement Technologies and the Science of Security.” *International Conference on Agreement Technologies (AT)*, Beijing, August 2013.
10. “Governing Sociotechnical Systems: Combining Norms and Policies.” *13th IEEE International Symposium on Policies for Distributed Systems and Networks (POLICY)*, Chapel Hill, July 2012.
11. “Governing Sociotechnical Systems.” Joint Session of the *International Conferences on Web Intelligence and Intelligent Agent Technologies*, Lyon, August 2011.
12. “Governing Sociotechnical Systems.” *Fifth International iStar Workshop*, Trento, Italy, August 2011.
13. “Trust as a Basis for Social Computing.” *RE Workshop on Requirements Engineering for Social Computing*, Trento, Italy, August 2011.
14. “Institutions as a Basis for Service Engagements.” *AAMAS Workshop on Agent-Oriented Software Engineering (AOSE)*, Taipei, May 2011.
15. “Understanding Identity as a Social Construct: Preliminary Thoughts.” *International Conference on Service-Oriented Computing (ICSOC)*, San Francisco, December 2010.
16. “Understanding Identity: Preliminary Thoughts.” *13th International Workshop on Trust in Agent Societies*, Toronto, May 2010.
17. “Programming MAS without Programming Agents.” *7th International Workshop on Programming Multi-Agent Systems (ProMAS)*, Budapest, May 2009.
18. “Interaction-Oriented Programming: Commitments and Protocols for Business Processes.” Invited lecture at *MALLOW: Multi-Agent Logics, Languages, and Organisations–Federated Workshops*, Durham, UK, September 2007.
19. “Commitment-Based SOA.” Invited lecture at *Workshop on Agents, Web Services and Ontologies: Integrated Methodologies (Awesome)*, Durham, UK, September 2007.
20. “P2P and Service-Oriented Architectures.” *International Workshop on Agents and Peer-to-Peer Computation*, Hawaii, May 2007.
21. “Agent Organizations and Service-Oriented Computing.” *International Workshop on Coordination, Organization, Institutions and Norms in Agent Systems (COIN)*, Hawaii, May 2007.
22. “Service-Oriented Computing Roundtable.” *International Workshop on Coordination, Organization, Institutions and Norms in Agent Systems (COIN)*, Hawaii, May 2007.
23. “Interaction-Oriented Programming for Organizational Computing.” Invited panel presentation in a panel on “Organizational Computing.” *6th International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*, Hawaii, May 2007.

24. "Interaction-Oriented Programming: Concepts, Theories, and Results on Commitment Protocols." Keynote lecture at *Australian Artificial Intelligence Conference (AI)*, Hobart, Tasmania, December 2006.
25. "Governance of Cyberinfrastructure: Motivation, Concepts, Approach, Call to Arms." Keynote lecture at *Workshop on Service Oriented Computing for e-Science*, Toronto, October 2006.
26. "Agents to Bridge the Business-IT Divide." Invited presentation in a panel on "Will Agent-Orientation Reshape IS Theory and Practice?" *International Workshop on Agent-Oriented Information Systems (AOIS)*, Hakodate, Japan, May 2006.
27. "Business Process Adaptations via Protocols." *International Workshop on Agent-Oriented Information Systems (AOIS)*, Hakodate, Japan, May 2006.
28. "An Overview of Commitment Facets and Visibility for Interorganizational Processes." *First International Workshop on Coordination of Inter-Organizational Workflows: Agent and Semantic Web Based Models (CIOW)*, Hakodate, Japan, May 2006.
29. "Understanding Policies in Commitment Protocols." *International Workshop on Declarative Agent Languages and Technologies (DALT)*, Hakodate, Japan, May 2006.
30. "From Protocols to Processes." *International Workshop on Agent-Oriented Information Systems (AOIS)*, New York, July 2004.
31. "From Protocols to Processes." *Web Services and Agent-Based Engineering*, New York, July 2004, Keynote lecture.
32. "A Pragmatics Perspective on Web Services." Joint panel session of the workshops on *Challenges in Open Agent Systems*, *Ontologies in Agent Systems*, and *Web Services and Agent-Based Engineering*, July 2003.
33. "Referrals for Reputation." *1st Interdisciplinary Symposium on Online Reputation Mechanisms*, Cambridge, Massachusetts, April 2003. Sponsored by the National Science Foundation and the MIT Center for e-Business.
34. (Munindar P. Singh and Pinar Yolum) "Trust Roundtable." *International Workshop on Agents and Peer-to-Peer Computation*, Bologna, July 2002.
35. "A Model for P2P Computation." *International Workshop on Agents and Peer-to-Peer Computation*, Bologna, July 2002.
36. "The Pragmatic Web: Preliminary Thoughts." *NSF-OntoWeb Workshop on Database and Information Systems Research for Semantic Web and Enterprises*, Amicalola Falls State Park, Georgia, April 2002.
37. (Pinar Yolum and Munindar P. Singh) "Commitment Machines." *International Workshop on Agent-Oriented Information Systems (AOIS)*, Montreal, June 2001.
38. "Agents and Multiagent Systems: Concepts and Directions." *Fifth International Congress on Computer Science Research*, Aguascalientes, Mexico, November 1998. Sponsored by the Mexican National Academy of Computer Science Research.
39. "The Dialectic of Practical Reasoning." *ECAI Workshop on Practical Reasoning*, Brighton, August 1998.

40. "Agent Mobility Considered Harmful." Invited presentation in a panel on "The Future of Adaptive and Mobile Information Agents-Travelling Bandits on the Information Highway, or Powerful Information Providers?" *2nd International Workshop on Cooperative Information Agents (CIA)*, Paris, July 1998.
41. "A Social View of Rationality." Invited presentation in a panel on "Is Rationality an Objective or a Subjective Notion?" *ECAI Workshop on Practical Representation and Reasoning*, Brighton, August 1998.
42. "Challenges in Empirical Studies of Multiagent Systems." Invited presentation in a panel on "Design of Computational Experiments." *ECAI Workshop on Empirical Artificial Intelligence*, Brighton, August 1998.
43. "The Dialectic of Science: Interaction-Oriented Programming Applied." *Third NSF-CONACyT Computer Science Workshop*, Universidad de las Americas, Puebla, Mexico, June 1998.
44. "Multiagent Systems in Information-Rich Environments." *2nd International Workshop on Cooperative Information Agents (CIA)*, Paris, July 1998. Invited talk.
45. "Conceptual Modeling for Multiagent Systems." *ER-97 Symposium on Conceptual Modeling: Historical Perspectives and Future Directions*, Los Angeles, November 1997. Invited talk.
46. "Challenges for Mobile Agents." *Workshop of Mobile Agents and Security (MAAS)*, Maryland Center for Telecommunications Research, University of Maryland Baltimore County, Baltimore, October 1997. Invited talk.
47. "Business Applications of Multiagent Systems." *IJCAI Workshop on Business Applications of Artificial Intelligence*, Nagoya, Japan, August 1997. Invited talk.
48. "Interaction-Oriented Programming for the Web." Invited presentation in a panel on "Cooperative Multiagent Systems for the Web." *2nd IFCIS International Conference on Cooperative Information Systems (CoopIS)*, Charleston, June 1997.
49. "Challenges to Machine Learning in Cooperative Information Systems." *ECAI Workshop on Learning in Distributed Artificial Intelligence Systems*, Budapest, August 1996. Invited talk.
50. *International Conference on Multiagent Systems (ICMAS) Workshop on Norms, Obligations, and Conventions*, Kyoto, December 1996. Invited panel presentation.
51. "Commitments in Multiagent Systems." *International Conference on Multiagent Systems (ICMAS)*, San Francisco, June 1995. Invited panel presentation.

4.18 Other Invited Presentations

1. "Honest-to-Goodness Social Computing: Challenges and Opportunities for Multiagent Systems" and "The Science of Security: Introduction from the Perspective of Secure Collaboration." Technical University of Delft, Delft, The Netherlands, February 2015.
2. "The Science of Security: Ensuring Secure Collaboration." Keynote at Annual Research Review, University of Georgia, Athens, April 2014.
3. "The Science of Security: Introduction from the Perspective of Secure Collaboration." University of Lancaster, Lancaster, UK, February 2014.

4. “Trust (and Commitments) as a Unifying Basis for Social Computing.” INRIA Roquencourt, Paris, August 2013.
5. “Understanding Service Engagements.” Xerox Research Center, Webster, New York, February 2013.
6. “Governing Sociotechnical Systems.” Presentation at the University of Wollongong, Australia, May 2012.
7. “Governing Sociotechnical Systems.” Presentation at the University of Trento, Trento, Italy, April 2012.
8. “LoST: Local State Transfer—An Architectural Style for the Distributed Enactment of Business Protocols.” Presentation at University of Trento, Trento, Italy, April 2012.
9. “LoST: Local State Transfer—An Architectural Style for the Distributed Enactment of Business Protocols.” Presentation at Rochester Institute of Technology, Rochester, New York, October 2012.
10. “Modeling and Analyzing Contracts.” Hewlett-Packard Research Laboratories, Palo Alto, March 2010.
11. “Trust as a Unifying Basis for Social Computing.” *Interdisciplinary Workshop on Trust*, Paris, December 2010.
12. “Trust as a Basis for Social Computing.” *ARO Workshop on Social Computing*, College Park, Maryland, July 2010.
13. “Trust and Reputation in Multiagent Systems: Rational Agents and Dynamics.” ARL Network Science Collaborative Technology Alliance Kick Off Meeting, Cambridge, Massachusetts, June 2010.
14. “Community Standards for Agent Communication: A Manifesto.” *AAMAS Workshop on Agent Communication*, Toronto, May 2010.
15. “Trust and Reputation in Multiagent Systems: Rational Agents and Dynamics.” University of Luxembourg, Luxembourg, April 2010.
16. “Governing Cross-Organizational Service Agreements: A Policy-Based Approach.” Invited lecture at *Southampton University*, Southampton, UK, September 2007.
17. “Putting Services Back in Service Orientation: Commitments in Architecture and Governance.” Invited lecture at *ChannelAdvisor Inc.*, Morrisville, North Carolina, June 2007.
18. “Interaction-Oriented Programming: Concepts, Theories, and Results on Commitment Protocols.” Invited lecture at *IBM TJ Watson Research Laboratory*, Hawthorne, New York, November 2006.
19. “Referral Systems: Applications in Knowledge Management and Emergent Properties.” Invited lecture at *Université de Montréal*, Montréal, November 2006.
20. “Referral Systems: Formulation and Emergent Properties.” University of Otago, Dunedin, New Zealand, July 2006.
21. “Referral Systems: Formulation and Emergent Properties.” Hewlett-Packard Research Laboratories, Palo Alto, March 2006.
22. “Commitments for Business Processes: Overview of Concepts, Protocols, Machines, Compliance.” Hewlett-Packard Research Laboratories, Palo Alto, August 2002.

23. “Agents Meet Databases: Steps Toward Interaction-Oriented Programming.” Presentation at the Department of Mathematical Sciences, University of North Carolina, Greensboro, April 1998.
24. “Agents Meet Databases: Introduction to Interaction-Oriented Programming.” Presentation at the Center for Advanced Computing, University of Southwestern Louisiana, Lafayette, April 1998.
25. “Principles of Standardization for Agent Communication.” Presentation to the 5th Meeting of the Foundation for Intelligent Physical Agents (FIPA), Palo Alto, January 1998.
26. “Steps Toward Interaction-Oriented Programming.” Presentation at the Information Sciences Institute (ISI), University of Southern California, Marina del Rey, November 1997.
27. “Interaction-Oriented Programming: Agent Technology for Virtual Enterprises and Electronic Commerce.” Presentation at the Center for Communication and Information Sciences (CCIS) Lecture Series on Electronic Commerce and High Performance Computing, University of Nebraska, Lincoln, October 1997.
28. “Steps Toward Interaction-Oriented Programming.” Presentation at the NTT Communication Science Laboratories, Kyoto, August 1997.
29. “Comments on Agents and Workflows.” Presentation at IBM, RTP, North Carolina, June 1997.
30. “Considerations on Agent Communication.” Presentation to the 5th Meeting of the Foundation for Intelligent Physical Agents (FIPA), Reston, Virginia, April 1997.
31. “Agent Techniques for Open Information Environments.” Presentation in the Triangle Public Lectures Series. SAS Institute, Cary, North Carolina, February 1996.
32. International Computer Science Institute (ICSI), Berkeley, California, November 1991.
33. University of Erlangen, Nuremberg, Germany, August 1991.
34. German Research Center for Artificial Intelligence (DFKI), Kaiserslautern, Germany, July 1991.
35. German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany, July 1991.

4.19 Impact of Scholarly Contributions

Invitations to prestigious events.

- NSF “Beyond the Internet” workshop on Software Defined Infrastructure and Software Defined Exchanges, February 2016.
- Microsoft Research’s SemGrail Workshop, June 2007.
- Google Faculty Summit, July 2007.
- Microsoft Faculty Summit, July 2005, 2006 (declined), 2007, 2011 (declined), 2012 (declined).
- NSF IIS/GENI Workshop, November 2006.
- NSF-OntoWeb Workshop on Database and Information Systems Research for Semantic Web and Enterprises, April 2002.
- NSF Workshop on Workflow and Process Automation in Information Systems: State-of-the-art and Future Directions, April 1996.

Inclusion in collection. The following book consists of reprints of three “crucial” papers and several new contributed chapters. My paper [115] is one of the three reprinted papers.

- Marc-Philippe Huget, editor, *Communication in Multiagent Systems*, Lecture Notes in Artificial Intelligence 2650, Springer-Verlag, Berlin, 2003.

Reviews. These are published reviews of my works.

1. José M. Vidal, “Review of Gerhard Weiß (editor), *Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence*.” *Autonomous Agents and Multi-Agent Systems*, volume 2, number 4, December 1999, pages 403–408. I contributed a chapter [52] to the reviewed book; this chapter is discussed on page 407 of the review.
2. Jeff White, “Review of Readings in Agents” (my book [28]). *Journal of the American Society for Information Science*, 49(14):1330–1332, December 1998.
3. Hyacinth S. Nwana, “Review of Readings in Agents” (my book [28]). *Journal of Logic and Computation*, 8(3):448–450, June 1998.

4.20 Research Sponsorship at NCSU

Tables 3, 4, and 5 summarize my funding record to help see how much of my funding is external and how much would be my prorated share for grants with multiple investigators.

Table 1: Funding by type.

External cash	External equipment	Internal cash	Total
\$12,951,981	\$26,500	\$90,099	\$13,068,580

Table 2: Funding by role.

Role	Amount
As principal investigator	\$5,630,832
As co-principal investigator	\$7,437,748
Total	\$13,068,580

Table 3: Prorated share of funding.

Number of PIs	Aggregate	Prorated share
As sole investigator	\$5,130,566	\$5,130,566
As one of two investigators	\$7,507,704	\$3,753,852
As one of three investigators	\$430,310	\$143,437
Totals	\$13,068,580	\$9,027,855

1. (sole PI) “Realizing Cyber Inception: Toward a Science of Personalized Deception for Cyber Defense.” US Department of Defense. Funded June 2017–May 2022 for \$660,000.
2. (sole PI) “Analytic Component System.” National Security Agency through the Laboratory for Analytic Sciences. Funded January 2017–December 2017 for \$102,336.
3. (sole PI) “User Experience (Tools for Intelligence Analytics).” National Security Agency through the Laboratory for Analytic Sciences. Funded January 2016–December 2016 for \$96,341.
4. (co-PI with Dr. Laurie Williams) “Growing the Science of Security through Analytics.” National Security Agency. Funded March 2016–March 2017 for \$2,207,905.
5. (sole PI) “Informatics for Analytics.” National Security Agency through the Laboratory for Analytic Sciences. Funded April 2015–December 2015 for \$128,002.

6. (co-PI with Dr. Laurie Williams) “Growing the Science of Security through Analytics.” National Security Agency. Funded March 2015–March 2016 for \$2,224,102.
7. (sole PI) “Mission Enabling.” National Security Agency through the Laboratory for Analytic Sciences. Funded May 2014–May 2015 for \$271,901.
8. (sole PI) “Knowledge Representation and Management.” National Security Agency through the Laboratory for Analytic Sciences. Funded May 2014–May 2015 for \$80,116.
9. (sole PI) “Analytic Workflow.” National Security Agency through the Laboratory for Analytic Sciences. Funded May 2014–May 2015 for \$61,570.
10. (co-PI with Dr. Laurie Williams) “Growing the Science of Security through Analytics.” National Security Agency. Funded February 2014–March 2015 for \$2,255,237.
11. (sole PI) “Analytic Workflow.” National Security Agency through the Laboratory for Analytic Sciences. Funded September 2013–September 2014 for \$43,889.
12. (sole PI) “Quality of Information-Aware Networks for Tactical Applications (QUANTA).” Army Research Laboratory under the Network Science Collaborative Technology Alliance. Funded October 2009–September 2014 for \$577,847.
13. (sole PI) “Policy-Based Governance for the OOI Cyberinfrastructure.” Joint Oceanographic Institutions. Funded September 2009–November 2013 for \$471,430.
14. (sole PI) “Social Media Relationship Analytics.” Whodini Inc. Funded March 2013–May 2013 for \$4,026.
15. (PI: John P. Streck) “Business Process Reengineering.” NC Division of Employment Security. Funded December 2012–February 2013 for \$30,000.
16. (sole PI) “Social Computing and Community Engagements for Collaborative Service Marketplace.” Xerox Corporation. Funded December 2012–November 2013 for \$55,000.
17. (sole PI) “On the Influence of Norms and Sanctions on Socio-Technical Systems Governance-An Agent-Based Simulation Approach.” University Global Partnership Network (UGPN). Funded March 2013–February 2014 for \$10,000.
18. (sole PI) “Normative Trust: Toward a Principled Basis for Enabling Trustworthy Decision Making.” National Security Agency. Funded May 2012–May 2013 for (NCSU’s share) \$101,410.
19. (sole PI with external subcontractor) “Argumentation as a Basis for Reasoning about Security.” National Security Agency. Funded May 2012–May 2015 for (NCSU’s share for the first year) \$120,682.
20. (sole PI) “Social Computing and Services.” Xerox Corporation. Funded October 2011–September 2012 for \$55,000.
21. (co-PI with Dr. Injong Rhee) “Platys: From Position to Place in Next Generation Networks.” National Science Foundation under the Network Science and Engineering Program. Funded September 2009–August 2013 for \$706,167.
22. (sole PI) “Policy-Based Governance for the OOI Cyberinfrastructure.” Joint Oceanographic Institutions. Funded January 2009–September 2009 for \$83,161.

23. (sole PI) “Policy-Based Governance for the OOI Cyberinfrastructure.” Joint Oceanographic Institutions. Funded June 2008–December 2008 for \$44,345.
24. (sole PI) “Policy-Based Governance for Virtual Computing.” Center for Advanced Computing and Communication. Funded July 2008–June 2009 for \$40,000.
25. (sole PI) “Policy-Based Governance for the OOI Cyberinfrastructure.” Joint Oceanographic Institutions. Funded September 2007–May 2008 for \$63,600.
26. (sole PI) “Service-Oriented Computing in Managed IT Environments.” IBM. Funded July 2007–June 2008 for \$30,000.
27. (sole PI) “Collaborative Argumentation System for Business Process Development.” Intel Research Council. Funded June 2007–December 2007 for \$20,000.
28. (sole PI) “Agent-Based Conceptual Model and Policy Architecture for Virtual Organizations.” Center for Advanced Computing and Communication. Funded July 2006–June 2007 for \$40,000.
29. (sole PI) “Protocols for Processes.” Defense Advanced Research Projects Agency Information Exploitation Office. Funded July 2005–September 2005 for \$60,000.
30. (sole PI) “Computational Principles of Trust.” National Science Foundation Information Technology Research Program. Funded September 2004–August 2006 for \$90,900.
31. (sole PI) “Computational Principles of Trust.” National Science Foundation Information Technology Research Program. Research Experiences for Undergraduates supplement. Funded September 2004–May 2005 for \$6,000.
32. (sole PI) “Protocols for Processes.” Defense Advanced Research Projects Agency Information Exploitation Office. Funded February 2004–December 2004 for \$160,000.
33. (PI: Mladen A. Vouk; co-PI: Munindar P. Singh) “Construction of Context-Based Services.” Center for Advanced Computing and Communication. Funded July 2002–June 2003 for \$44,337.
34. (sole PI) “Principles of Commitment Protocols.” National Science Foundation under the Digital Society and Technologies Program. Funded May 2002–May 2005 for \$345,000.
35. (sole PI) “Multiagent Systems for Networking and Telecommunications.” Cisco University Research Grant. Funded January 2001–December 2001 for \$68,000.
36. (sole PI) “Computational Principles of Trust.” National Science Foundation under the Information Technology Research Program. Funded September 2000–August 2006 for \$476,574.
37. (sole PI) “Multiagent Referral Systems for Knowledge Management.” IBM Partnership Award. Funded October 2000–September 2001 for \$40,000.
38. (PI: Munindar P. Singh; co-PIs: Robert A. St. Amant and Alan L. Tharp) “Intelligent Support for On-line Shopping.” O3C, Inc. Supplement to previous grant. Funded January 2000–May 2000 for \$66,789 (\$56,789 external plus \$10,000 (estimated) in cost sharing from NCSU).
39. (PI: Munindar P. Singh; co-PIs: Robert A. St. Amant and Alan L. Tharp) “Intelligent Support for On-line Shopping.” Lichtin Corporation and Centennial Venture Partners. Supplement to previous grant. Funded October 1999–December 1999 for \$38,250 (\$30,000 external plus \$8,250 in cost sharing from NCSU).

40. (PI: Munindar P. Singh; co-PIs: Robert A. St. Amant and Alan L. Tharp) “Intelligent Support for On-line Shopping.” Lichtin Corporation and Centennial Venture Partners. Supplement and extension to previous grant. Funded September 1999—June 2000 for \$87,613 (\$68,662 external plus \$18,951 in cost sharing from NCSU).
41. (sole PI) “Cooperative Information Systems.” National Science Foundation Computational and Social Systems (CSS) program. Supplement to Career Award. Funded August 1999—July 2000 for \$21,950.
42. (PI: Munindar P. Singh; co-PIs: Robert A. St. Amant and Alan L. Tharp) “Intelligent Support for On-line Shopping.” Lichtin Corporation and Centennial Venture Partners. Funded June 1999—December 1999. \$207,658 (\$169,760 external plus \$37,898 in cost sharing from NCSU).
43. (sole PI) “Multiagent Workflow Management.” Rational Software Corporation. Equipment (commercial software) grant for \$11,000.
44. (sole PI) “Multiagent Systems for a Network of Mobile Communicators.” Ericsson. Funded August 1998—May 1999 for a budget of \$66,424.
45. (sole PI) “Cooperative Agent-Based Systems.” IBM Partnership Award. Funded October 1998—September 1999 for \$24,500 (\$20,000 cash plus equipment, whose university price is about \$4,500).
46. (sole PI) “Healthcare Enterprise Information Management: Temporal and Modal Queries.” MCC (a subcontract awarded from a National Institute for Standards and Technology (NIST) contract). Funded January 1997—February 1998 for a budget of \$47,339.
47. (sole PI) “Cooperative Agent-Based Systems.” IBM Partnership Award. Funded October 1997—September 1998 for \$40,000.
48. (sole PI) “Cooperative Information Systems.” National Science Foundation Information Technology and Organizations (ITO) program. Supplement to Career Award. Funded August 1996—July 1997 for \$24,959.
49. (sole PI) “Cooperative Agent-Based Systems.” IBM Partnership Award. Funded October 1996—September 1997 for \$51,000 (\$40,000 cash plus equipment, whose university price is about \$11,000).
50. (sole PI) “Cooperative Information Systems.” National Science Foundation Information Technology and Organizations (ITO) program. Funded August 1996—July 2000 for a total budget of \$214,276.
51. (sole PI) “Principles of Semantic Interoperation.” National Science Foundation Database and Expert Systems (DBES) program. Funded May 1996—May 1999 for a total budget of \$216,988.
52. (sole PI) “Information Search via Intelligent Agents.” NCSU Faculty Research and Professional Development (FRPD) Award. Funded January 1996—May 1996 for a budget of \$5,000.
53. (PI: Munindar P. Singh; co-PI: Mona Singh) “Healthcare Enterprise Information Modeling.” MCC (a subcontract awarded from a National Institute for Standards and Technology (NIST) contract). Funded December 1995—December 1996 for a budget of \$69,956.

4.21 Research Sponsorship Obtained Prior to Joining NCSU

1. “Scalable Information Management via Intelligent Mediation.” Proposal in response to ARPA Broad Area Announcement (BAA) 94-01 *Advanced Computing Systems: Intelligent Integration of Information*. Accepted, February 1994. Funded at MCC, August 1995 (effective after I left MCC).
2. “Clinical Associate Consortium (CAC).” Proposal in response to ARPA BAA 94-13 *Health Information Infrastructure*. Accepted, April 1994.
3. “Intelligent, Scalable Interoperation for NIE.” White paper in response to ARPA BAA 94-28 *National-Scale Information Enterprises (NIE)*. Accepted, July 1994. Merged with the ARPA 94-01 proposal above.
4. The Carnot Project at MCC (January 1991–December 1994) was sponsored by ATT-GIS, Bellcore, Andersen Consulting, Eastman Chemical, DoD, Motorola, ARPA, and EPA.
5. The InfoSleuth Project at MCC (January 1995–June 1997) was sponsored by Eastman Chemical, DoD, Texas Instruments, Motorola, Hughes, ARPA, and EPA.

5 Patents

1. (Munindar P. Singh and Mona Singh) *Method and Apparatus for Providing a Contextual Description of an Object*. US Patent #9,396,185, awarded July 2016.
2. (Munindar P. Singh) *Automatic Generation of Metadata for a Digital Image Based on Ambient Conditions*. US Patent #8,842,197, awarded September 2014.
3. (Munindar P. Singh and Mona Singh) *System and Method for Naming a Location Based on User-Specific Information*. US Patent #8,750,892, awarded June 2014.
4. (Munindar P. Singh and Mona Singh) *System and Method for Identifying a Location of Interest to be Named by a User*. US Patent #8,407,213, awarded March 2013.
5. (Munindar P. Singh and Mona Singh) *Methods, Systems, and Computer Program Products for Role- and Locale-Based Mobile User Device Feature Control*. US Patent #8,145,241, awarded March 2012.
6. (Munindar P. Singh and Mona Singh) *System and Method for Providing a Descriptor for a Location to a Recipient*. US Patent #8,099,086, awarded January 2012.
7. (Munindar P. Singh and Mona Singh) *Method, System, and Computer Program Product for Creating Smart Services*. US Patent #8,099,084, awarded January 2012.
8. (Munindar P. Singh and Mona Singh) *Policy-Based Controls for Wireless Cameras*. US Patent #7,869,790, awarded January 2011.
9. (Munindar P. Singh and Mona Singh) *Method, System, and Computer Program Product for Delivering Smart Services*. US Patent #7,765,173, awarded July 2010.
10. (Munindar P. Singh and Mona Singh) *System and Method for Providing a Task Reminder Based on Historical Travel Information*. US Patent #7,649,454, awarded January 2010.
11. (Munindar P. Singh and Mona Singh) *Method, System, and Computer Program Product for Adaptively Learning User Preferences for Smart Services*. US Patent #7,647,283, awarded January 2010.
12. (Munindar P. Singh and Mona Singh) *Methods, Systems, and Computer Program Products for Presenting Topical Information Referenced during a Communication*. US Patent #7,606,856, awarded October 2009.
13. (Munindar P. Singh and Mona Singh) *Apparatus and Method for Providing a Task Reminder Based on Travel History*. US Patent #7,528,713, awarded May 2009.
14. (Munindar P. Singh and Billy G. Moon) *Stored Data Object Management and Archive Control*. US Patent #6,490,597, awarded December 2002.
15. *Lazy Updates of Profiles in a System of Communication Devices*. US Patent #6,298,228, awarded October 2001.

6 Professional Activities

6.1 Advisory Boards of Research Projects

- *Turtles: Protocol-Based Foundations for Distributed Multiagent Systems*, Nobuko Yoshida and Amit K. Chopra, Principal Investigators, Imperial College London and Lancaster University, United Kingdom, 2016–present. This is a five-year, million Pound Sterling project funded by the Engineering and Physical Sciences Research Council of UK.
- *CROSSING Collaborative Research Center on CyberSecurity*, Johannes Buchmann, Principal Investigator, Technische Universität Darmstadt, Germany (and affiliated schools), 2016–present. This is a ten-year, multimillion Euro project funded by the German Research Foundation (Deutsche Forschungsgemeinschaft DFG).
- *Lucretius: Foundations for Software Evolution*, John Mylopoulos, Principal Investigator, University of Trento, Italy, 2011–2016. This was a European Research Council “advanced” (for senior researchers) grant.
- *Liquid Publications: Scientific Publications meet the Web (LiquidPub)*, Fabio Casati, Carles Sierra, and others, Principal Investigators, 2010–2012. This was a multiinstitution, multimillion Euro project funded by the European Union.

6.2 Service on Expert Panels

- Member, Science Foundation Ireland’s progress review of *Lero—The Irish Software Research Centre*, May 2017.
- Member, Strategy Workshop, ARO Computing Sciences Division, May 2011.
- Member, expert panel on *Ensuring Cross-Enterprise Semantic Interoperability in Synoptic (Templated) Clinical Reporting*. Sponsored by the Office of the Assistant Secretary for Planning & Evaluation (ASPE) (US Department of Health and Human Services) and the Pathology Electronic Reporting Committee of the College of American Pathologists. 2008–2009.

6.3 Editorial Activities

1. Editor-in-Chief, *ACM Transactions on Internet Technology (TOIT)*, December 2012–present.
2. Charter Member of the Editorial Board, *Journal of Trust Management*, December 2013–present. Published by Springer.
3. Member of the Editorial Board, *IEEE Transactions on Services Computing (TSC)*, September 2012–August 2015.
4. Member of the Editorial Board, *ACM Transactions on Intelligent Systems and Technology (TIST)*, March 2012–February 2015.
5. Member of the Editorial Board, *Journal of Artificial Intelligence Research (JAIR)*, July 2011–June 2014. Published by the AI Access Foundation.
6. Charter Member of the Editorial Board, *Journal of Service Oriented Computing and Applications (SOCA)*, June 2006–December 2010. Published by Springer.

7. Charter Member of the Editorial Board, *International Journal of Agent-Oriented Software Engineering (IJAOSE)*, March 2005–February 2011. Published from 2006 by Inderscience.
8. Charter Member of the Editorial Board, *Journal of Web Semantics: Science, Services and Agents on the World Wide Web*, October 2002–October 2010 (began publication in 2003). Published by Elsevier.
9. Editor-in-Chief, *IEEE Internet Computing*, January 1999–December 2002. Associate Editor-in-Chief, *IEEE Internet Computing*, January 1998–December 1998. Charter Member of the Editorial Board, December 1996–December 1997 (first published January 1997) and January 2003–present. URL: <http://www.computer.org/internet/>
10. Charter Member of the Editorial Board, *Journal of Autonomous Agents and Multiagent Systems*, November 1997–present (first appeared July 1998). Published by Springer.
11. Guest Editorships:
 - *IEEE Internet Computing*, the *Natural Web Interfaces* department, 2013–present. This department consists of an article in every other issue that introduces new work on emerging user interfaces.
 - (with Rino Falcone) *ACM Transactions on Intelligent Systems and Technology*, special theme on *Trust in Multiagent Systems*, volume 4, number 2, March 2013.
 - (with Vinton G. Cerf) *IEEE Internet Computing*, special theme on *Internet Predictions*, volume 14, number 1, January-February 2010, pages 10–42.
 - (with Matei Ripeanu and Sudharshan Vazhkudai) *IEEE Internet Computing*, special theme on *Virtual Organizations*, volume 12, number 2, March-April 2008, pages 10–36.
 - *IEEE Internet Computing*, the *Spotlight* department, volumes 11 and 12, 2007–2008. This department consists of an article in each issue that introduces a relevant Internet computing technology.
 - *IEEE Internet Computing*, track on *Service-Oriented Computing*, volume 9, 2005. The track consisted of an article in each issue of this volume.
 - (with Michael Fisher, Diana Spears, Michael Wooldridge) *Journal of Applied Logic*, special issue on *Logics for Multiagent Systems*, volume 5, number 2, June 2007, pages 193–388.
 - *Communications of the ACM (CACM)*, special section on *Multiagent Systems on the Net*, volume 42, number 3, March 1999.
 - *International Journal of Cooperative Information Systems (IJCIS)*, special issue on *Selected Papers from CoopIS-97*, volume 6, numbers 3 and 4, September and December 1997.
 - *IEEE Internet Computing*, theme issue on *Agents*, volume 1, number 4, August 1997.
 - *International Journal of Cooperative Information Systems (IJCIS)*, special issues on *Formal Methods in Cooperative Information Systems* with the following themes: *Heterogeneous Databases*, volume 5, number 4, December 1996; *Multiagent Systems*, volume 6, number 1, January 1997.

6.4 Events Organized or Chaired

1. Track Chair, *Social Networks and Crowdsourcing*, IEEE International Conference on Distributed Computing Systems (ICDCS), Atlanta, June 2017.

2. General Cochair, *International Conference on Service-Oriented Computing (ICSOC)*, Banff, Alberta, Canada, 2016.
3. Program Cochair, International Symposium and Bootcamp on the Science of Security (HotSoS): 2014.
4. Chair, Challenges and Visions track, International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2014.
5. Program Cochair, Second International Conference on Mobile Services (MS), Santa Clara, California, 2013.
6. Member, Organizing Committee, International Workshop on Trust, Privacy, Deception, and Fraud, 2001–2004, 2006–2012.
7. Program Cochair, Sixth IEEE International Conference on Web Services (ICWS), Beijing, 2008.
8. Program Cochair, Third International Workshop on Normative Multiagent Systems (NorMAS), Luxembourg, 2008.
9. General Cochair, Fourth International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), Utrecht, The Netherlands, July 2005.
10. Program Vice Chair, *Internet and Web Computing*, IEEE International Conference on Distributed Computing Systems (ICDCS), Columbus, Ohio, June 2005.
11. Finance Chair, Third International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), New York, July 2004.
12. Program Cochair, Second International Workshop on Agents and Peer-to-Peer Computing (AP2PC), Melbourne, 2003.
13. Member, Organizing International Workshop on Regulated Agent-Based Social Systems: Theories and Applications (RASTA), 2002.
14. Program Cochair, Autonomous Agents Workshop on Deception, Fraud and Trust in Agent Societies, June 2000.
15. Tutorial Program Chair, Fourth International Conference on Multiagent Systems (ICMAS), July 2000.
16. Program Chair (Americas), Fifth International Workshop on Agent Theories, Architectures, and Languages (ATAL), July 1998.
17. General Chair and Americas Program Chair, Fourth International Workshop on Agent Theories, Architectures, and Languages (ATAL), July 1997.
18. Program Chair (Americas), Second IFCIS International Conference on Cooperative Information Systems (CoopIS), June 1997.

6.5 Steering Committee Memberships

1. Member, Steering Committee for Normative Multi-Agent Systems (NorMAS), 2012–present.
2. Member, Steering Committee for PRIMA and Advisory Committee of PRIMA 2010.

3. Member, Board of Directors, International Foundation for Autonomous Agents and Multiagent Systems (IFAAMAS), 2007–2012.
4. Member, Board of Directors, International Foundation for Multiagent Systems (IFMAS), 2004–2006.
5. Chair, Editor-in-Chief Search Committee, *IEEE Internet Computing*, 2003–2004.
6. Member, Steering Committee, *IEEE Transactions on Mobile Computing*, 2001–2004.
7. Steering Committee, International Workshop on Agent Theories, Architectures, and Languages (ATAL), 1999–2007. ATAL was dissolved and merged into IFAAMAS, which was constituted at the same time. I joined the founding IFAAMAS Board of Directors.
8. IEEE Computer Society Magazine Operations Committee, 1999–2002.
9. IEEE Computer Society Publications Board, 1999–2002.

6.6 Tenure and Promotion Reviewing

1. A promotion case for a research institute in France: 2016, 2017.
2. The promotion case of a faculty member at a university in New South Wales, Australia: 2015.
3. The promotion case of a faculty member at a university in Georgia: 2015.
4. The promotion case of a faculty member at a university in California: 2015.
5. The promotion case of a faculty member at a university in Singapore: 2015.
6. The promotion case of a faculty member at a university in Alabama: 2015.
7. The promotion case of a faculty member at a university in Turkey: 2014.
8. The promotion case of a faculty member at a university in New York: 2014.
9. The tenure and promotion case of a faculty member at a university in New York: 2014.
10. The promotion case of a faculty member at a university in Victoria, Australia: 2014.
11. The promotion case of a faculty member at a university in Scotland: 2014.
12. The promotion case of a faculty member at a university in New South Wales, Australia: 2014.
13. The tenure and promotion case of a faculty member at a university in New York: 2013.
14. A directorship case for a research institute in Italy: 2012.
15. The promotion case of a faculty member at a university in Canada: 2012.
16. The reappointment case of a faculty member at a university in New York: 2011.
17. The promotion case of a faculty member at a university in Greece: 2010.
18. The tenure and promotion case of a faculty member at a university in Arizona: 2008, 2010.
19. The professorship case of a faculty member at a university in Kansas: 2010.

20. The professorship case of a faculty member at a university in Maryland: 2010.
21. The tenure and professorship case of a faculty member at a university in Michigan: 2008, 2009.
22. A Deanship candidate at a university in North Carolina: 2009.
23. The tenure and promotion case of a faculty member at a major liberals arts college in the Northeast: 2009.
24. The tenure and promotion case of a faculty member at a university in North Carolina: 2008.
25. The professorship case of a faculty member at a university in the Washington, DC area: 2008.
26. The tenure case of a faculty member at one of the universities in Saskatchewan, Canada: 2007.
27. A full professor appointment at a university in Scotland: 2007.
28. The tenure and promotion case of a faculty member at a university in New York: 2007.
29. The tenure and promotion case of a faculty member at a university in the Washington, DC area: 2005.
30. The tenure and promotion case of a faculty member at a university in Arkansas: 2004.
31. The professorship case of a faculty member at a university in Oklahoma: 2003.
32. The tenure and promotion case of a faculty member at a university in South Carolina: 2003.
33. A scientist at the Research Institute for Advanced Computer Science (RIACS), NASA Ames Research Center, California: 2000, 2002.
34. A Cisco Fellow promotion case, Cisco: 2001.
35. The tenure case of a faculty member at one of the universities in Pennsylvania: 2000.
36. The tenure case of a faculty member at one of the universities in Ontario, Canada: 1999.
37. The reappointment case of a faculty member at one of the campuses of the University of North Carolina System: 1998.

6.7 Research Proposal Reviewing

The following include my reviewing activities for research funding agencies abroad.

1. Austrian Science Fund, Austria: 1999, 2003, 2011, 2017.
2. Natural Sciences and Engineering Research Council, Canada: 2003, 2004, 2005, 2007, 2009, 2010, 2015, 2016, 2017.
3. Research Grants Council, University Grants Committee, Hong Kong, 1998, 2000–2017.
4. Qatar National Research Fund (QNRF): 2014, 2015.
5. The Netherlands Organisation for Scientific Research (NWO): 2005, 2013.
6. Swiss Natural Science Foundation: 2007, 2008.

7. European Science Foundation: 2007, 2009.
8. Israel Science Foundation: 2007.
9. US-Israeli Bi-national Science Foundation (BSF): 2005.
10. Australian Research Council, Australia: 2001.

The following include my reviewing activities for the National Science Foundation and other domestic agencies.

1. Member of a site-review committee (of an industry-university research center) for the Division of Engineering Education and Centers, a division in the Directorate for Engineering, National Science Foundation: 1995.
2. Membership in NSF proposal-review panels.
 - (a) Division of Information and Intelligent Systems (and its precursor division), National Science Foundation: 1996, 1998, 1999, 2001, 2002, 2004, 2007, 2008, 2017.
 - (b) Division of Information and Intelligent System, CISE Research Infrastructure (CRI) program, National Science Foundation: 2017.
 - (c) Division of Computer and Network Systems: 2008.
 - (d) Information Technology Research Program, National Science Foundation: 2001 (preproposals and proposals), 2002 (two).
3. Reviewing for NSF.
 - (a) Division of Information and Intelligent Systems, National Science Foundation: 2006, 2013.
 - (b) Small Business Innovation Research (SBIR) grants program, National Science Foundation: 2002, 2004.
 - (c) Directorate for Biological Sciences (a part of the database activities of the Division for Biological Instrumentation and Resources), National Science Foundation: 1997.
 - (d) Office of International Science and Engineering (OISE), National Science Foundation: 1996, 2012.
4. Army Research Office: 2006.
5. Kansas First Award program, administered by the American Association for the Advancement of Science: 2002.

6.8 Dissertation Reviewing

1. External member of the Ph.D. committee for Fatma Başak Aydemir, Department of Information Engineering and Computer Science, University of Trento, Italy, 2016. *Advisor:* Dr. Paolo Giorgini.
2. External member of the Ph.D. committee for Jie Jiang, Faculty of Technology Policy and Management, Technical University of Delft, Netherlands, 2014–2015. *Advisor:* Dr. Virginia Dignum.
3. External member of the Ph.D. committee for Hongying Du, Department of Computer Science and Engineering, University of South Carolina, Columbia, 2012–2014. *Advisor:* Dr. Michael N. Huhns.

4. External member of the Ph.D. committee for Weimao Ke, School of Information and Library Science, University of North Carolina, Chapel Hill, 2009–2011. *Advisor:* Dr. Javed Mostafa.
5. External member of the Ph.D. committee for Jie Zhang, Department of Computer Science, University of Waterloo, Waterloo, Canada, 2009. *Advisor:* Dr. Robin Cohen.
6. External examiner for the Ph.D. dissertation of Manish Malhotra, Department of Computer Science, Royal Melbourne Institute of Technology, Melbourne, 2009. *Advisor:* Dr. Andrew Jennings.
7. External member of the Ph.D. committee for Viji Avali, Department of Computer Science and Engineering, University of South Carolina, Columbia, 2008–2012. *Advisor:* Dr. Michael N. Huhns.
8. External member of the Ph.D. committee for Li Xiong, College of Computing, Georgia Institute of Technology, Atlanta, 2004–2005. *Advisor:* Dr. Ling Liu.
9. External examiner for the Ph.D. dissertation of Elizabeth Ogston, Vrije Universiteit, Amsterdam, 2004–2005. *Advisors:* Dr. Frances Brazier and Dr. Maarten van Steen.
10. External examiner for the Ph.D. dissertation of Gil Tidhar, *Organization-Oriented Systems: Theory and Practice*, Department of Computer Science, University of Melbourne, Melbourne, 1998. *Advisors:* Dr. Elizabeth A. Sonenberg and Dr. Anand S. Rao.
11. External member of the Ph.D. committee for Marlene D. Morris, *Turning Browsers Into Buyers: Influencing Consumers—Preference Construction and Timing of Product Purchase*, Fuqua School of Business, Duke University, Durham, NC, 1998. *Advisors:* Dr. James Bettman and Dr. John Payne.

6.9 Panels Chaired

1. “Context-Aware Mobile Services.” *IEEE International Conference on Mobile Services (MS)*, Santa Clara, California, June 2013.
2. “Service Ecosystems: Computing from the Human and Organizational Angles.” *IEEE International Conference on Web Services (ICWS)*, Honolulu, June 2012.
3. “Business Process Management: A Killer App for Agents?” *Third International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*, New York, July 2004.
4. “Mind Your P’s: Processes, Policies, and Protocols.” *Thirteenth International Conference on the World-Wide Web (WWW)*, New York, May 2004.
5. “Conducting Business using Peer-to-Peer Computing.” *Third International Workshop on Agents and Peer-to-Peer Computing (AP2PC)*, New York, July 2004.
6. “Future of Multiagent Systems.” *Third International Conference on Multiagent Systems (ICMAS)*, Boston, July 2000.
7. “Standards.” *Third International Conference on Multiagent Systems (ICMAS)*, Paris, July 1998.
8. “The Next Big Thing.” *International Joint Conference on Artificial Intelligence (IJCAI)*, Nagoya, Japan, August 1997.

6.10 Participation as Invited Panelist

1. (Catherine Pelachaud, chair) “Opportunities and Challenges for Emotion-Aware Multi Agent Systems.” *2nd International Workshop on Emotion and Sentiment in Social and Expressive Media (ESSEM@AAMAS)*, Istanbul, May 2015.
2. (John Morgan, chair) “Incorporating Emotions in Trust and Social Relationships: A Call to Arms.” *UNC-Army Human Domain Analysis Workshop*, Fayetteville, NC, November 2012.
3. (Claudio Bartolini, chair) “Web Service Integration in the Context of Social Systems.” *International Conference on Service-Oriented Computing (ICSOC)*, San Francisco, December 2010.
4. (K. Suzanne Barber, chair) “Identity and Trust from Different Points of View.” *International Workshop on Trust in Agent Societies*, Toronto, May 2010.
5. (Rino Falcone, chair) “Challenges and Trends in Trust Research.” *International Workshop on Trust in Agent Societies*, Budapest, May 2009.
6. (Carl Hewitt, chair) “Organizational Computing.” *6th International Joint Conference on Autonomous Agents and MultiAgent Systems (AAMAS)*, Hawaii, May 2007.
7. (Aditya Ghose, chair) “Will Agent-Oriented Reshape IS Theory and Practice?” *International Workshop on Agent-Oriented Information Systems (AOIS)*, Hakodate, Japan, May 2006.
8. (K. Suzanne Barber, chair) “Trust Competition Testbed Panel.” *AAMAS Trust Workshop*, New York, July 2004. My talk was on “The Trust Competition Testbed: Some Key Requirements.”
9. (David Martin, chair) “Agent Technology and Web Services Standards.” Joint panel session of the workshops on *Challenges in Open Agent Systems*, *Ontologies in Agent Systems*, and *Web Services and Agent-Based Engineering*, July 2003.
10. (Aris Ousksel, chair) “Agents and Peer-to-Peer Computing.” *AAMAS Workshop on Agents and Peer-to-Peer Computing*, Bologna, July 2002.
11. (John Bell, chair) “Is Rationality an Objective or a Subjective Notion?” *ECAI Workshop on Practical Representation and Reasoning*, Brighton, August 1998.
12. (Ian Gent, chair) “Design of Computational Experiments.” *ECAI Workshop on Empirical Artificial Intelligence*, Brighton, August 1998.
13. (Gerhard Weiß, chair) “The Future of Adaptive and Mobile Information Agents- Travelling Bandits on the Information Highway, or Powerful Information Providers?” *2nd International Workshop on Cooperative Information Agents (CIA)*, Paris, July 1998.
14. (Anupam Joshi, chair) “Cooperative Multiagent Systems for the Web.” *2nd IFCIS International Conference on Cooperative Information Systems (CoopIS)*, Kiawah Island, South Carolina, June 1997.
15. (Nick Jennings and Rosaria Conte, chairs) “Agents and Norms.” *International Conference on Multiagent Systems (ICMAS) Workshop on Norms, Obligations, and Conventions*, Kyoto, December 1996.
16. (Cristiano Castelfranchi, chair) “Agents and Commitments.” *International Conference on Multiagent Systems (ICMAS)*, San Francisco, June 1995.

6.11 Magazine Columns

1. (Munindar P. Singh) “Being Interactive.” Bimonthly column, *IEEE Internet Computing*, January 1999–December 2002.
2. (Michael N. Huhns and Munindar P. Singh) “Agents on the Web.” Bimonthly column, *IEEE Internet Computing*, 1997–1998.

6.12 Summer School Lectures

1. “Service-Oriented Computing.” International Summer School on Multiagent Systems, Hyderabad, India, July 2005.
2. “Service-Oriented Computing.” University of Trento International Doctoral School, Trento, Italy, June 2004.

6.13 Conference Tutorials

1. (Munindar P. Singh and Amit K. Chopra) “The Internet of Things and Multiagent Systems.” *International Joint Conference on Artificial Intelligence (IJCAI)*, New York, July 2016.
2. (Munindar P. Singh and Amit K. Chopra) “The Internet of Things and Multiagent Systems.” *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Singapore, May 2016.
3. (Amit K. Chopra and Munindar P. Singh) “Decentralized Multiagent Systems.” *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Singapore, May 2016.
4. (Munindar P. Singh and Amit K. Chopra) “The Internet of Things and Multiagent Systems.” *International Joint Conference on Artificial Intelligence (IJCAI)*, Buenos Aires, July 2015.
5. (Munindar P. Singh and Amit K. Chopra) “The Internet of Things and Multiagent Systems.” *IEEE International Conference on Research Challenges in Information Science (RCIS)*, Athens, May 2015.
6. (Amit K. Chopra and Munindar P. Singh) “Decentralized Multiagent Systems.” *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Istanbul, May 2015.
7. (Munindar P. Singh), “Policy-Governed Secure Collaboration.” *Second Symposium and Bootcamp on the Science of Security (HotSoS)*, April 2015.
8. (Munindar P. Singh and Nirmal Desai), “Multidisciplinary Views of Business Contracts.” *Eighth International Conference on Service-Oriented Computing (ICSOC)*, December 2010.
9. (Munindar P. Singh and Michael N. Huhns) “Agents for Web Services.” *International Joint Conference on Artificial Intelligence (IJCAI)*, Hyderabad, January 2007.
10. (Munindar P. Singh and Michael N. Huhns) “Service-Oriented Computing.” *Nineteenth Annual ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Vancouver, October 2004.
11. (Munindar P. Singh and Michael N. Huhns) “Agents for Web Services.” *Third International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, New York, July 2004.

12. (Munindar P. Singh and Michael N. Huhns) "Foundations of Web Services: Architectures, Description and Engagement." *Thirteenth International World Wide Web Conference (WWW)*, New York, May 2004.
13. (Munindar P. Singh and Michael N. Huhns) "Foundations of Web Services: Engagement, Discovery and Composition." *Thirteenth International World Wide Web Conference (WWW)*, New York, May 2004.
14. (Munindar P. Singh and Michael N. Huhns) "Web Service Composition and Service Composition Techniques." *Second International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Melbourne, July 2003.
15. (Munindar P. Singh and Michael N. Huhns) "Fundamentals of Web Services." *First International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, Bologna, July 2002.
16. (Munindar P. Singh and Michael N. Huhns) "Web Service Composition." *Eleventh International World Wide Web Conference (WWW)*, Honolulu, May 2002.
17. (Munindar P. Singh and Michael N. Huhns) "Service Composition Techniques." *Eleventh International World Wide Web Conference (WWW)*, Honolulu, May 2002.
18. (Munindar P. Singh and Michael N. Huhns) "Principles of Agents and Multiagent Systems: Social, Ethical, and Legal Abstractions and Reasoning." *International Joint Conference on Artificial Intelligence (IJCAI)*, Stockholm, July 1999.
19. (Michael N. Huhns and Munindar P. Singh) "Agents and Multiagents in the Internet and Intranets." *International Joint Conference on Artificial Intelligence (IJCAI)*, Stockholm, July 1999.
20. (Munindar P. Singh and Michael N. Huhns) "Agents and Multiagents in Information-Rich Applications." *International Conference on Multiagent Systems (ICMAS)*, Paris, July 1998.
21. (Munindar P. Singh and Michael N. Huhns) "Cooperative Information Systems: Agents Meet Databases." *International Joint Conference on Artificial Intelligence (IJCAI)*, Nagoya, Japan, August 1997.
22. (Munindar P. Singh and Michael N. Huhns) "Cooperative Information Systems." *European Conference on Artificial Intelligence (ECAI)*, Budapest, August 1996.
23. (Munindar P. Singh and Michael N. Huhns) "Agents at Work: Promises, Paradigms, Problems." *IEEE International Conference on Data Engineering (ICDE)*, New Orleans, February 1996.
24. (Michael N. Huhns and Munindar P. Singh) "Cooperative Information Systems." *International Joint Conference on Artificial Intelligence (IJCAI)*, Montreal, August 1995.
25. (Munindar P. Singh and Michael N. Huhns) "Cooperative Information Systems." *IEEE International Conference on Distributed Computing Systems (ICDCS)*, Vancouver, May 1995.
26. (Munindar P. Singh and Michael N. Huhns) "Cooperative Information Systems." *International Conference on Management of Data (COMAD)*, Bangalore, December 1994.
27. (Michael N. Huhns and Munindar P. Singh) "Distributed Artificial Intelligence." *International Conference on Cooperative Information Systems (CoopIS)*, Toronto, May 1994.

6.14 Conference Senior Program Committee Memberships

1. International Joint Conference on Artificial Intelligence (IJCAI): 2009, 2016.
2. AAAI Conference on Artificial Intelligence (AAAI): 2012, 2013.
3. Challenges and Visions track, International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2013.
4. International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2002, 2003, 2007, 2008, 2011.
5. Blue Sky (née Vision and Challenges) Track, International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2012, 2014, 2015, 2016.
6. International Conference on Principles and Practice of Multi-Agent Systems, 2010, 2011.
7. Area Chair for *Internet Technology and Informatics*, International Symposium on Parallel Architectures, Algorithms, and Networks (ISPAN), Melbourne: 2008.
8. Area Coordinator for *Service Assembly*, International Conference on Service Oriented Computing (ICSOC): 2006.

6.15 Conference Program Committee Memberships

1. International Conference on Artificial Intelligence and Law (ICAIL): 2017.
2. International Joint Conference on Artificial Intelligence (IJCAI): 2017.
3. International Symposium and Bootcamp on the Science of Security (HotSoS): 2015, 2016.
4. International Conference on Service Oriented Computing (ICSOC): 2004, 2008, 2010, 2012.
5. IEEE International Conference on Web Services (ICWS): 2004, 2006, 2007, 2010, 2011, 2012.
6. IEEE Conference on Commerce and Enterprise Computing (CEC), 2011.
7. International Conference on Semantic Systems (ISEM): 2010.
8. International Conference on Business Information Systems (BIS): 2010.
9. International Conference on Electronic Commerce (ICEC): 2007, 2008, 2010.
10. International Conference on Knowledge Representation (KR): 2010.
11. European Semantic Web Conference (ESWC): 2007, 2008, 2009.
12. International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2009.
13. World Wide Web Conference (WWW): 2008, 2009.
14. IEEE International Conference on High Performance Computing and Communications (HPCC): 2009.
15. International Semantic Web Conference (ISWC): 2003, 2006, 2008.
16. AAAI Conference on Artificial Intelligence, Nectar Papers Program Committee, (AAAI): 2006, 2007, 2008.

17. AAAI Conference on Artificial Intelligence (AAAI): 1994, 2007, 2008.
18. IEEE/WIC International Conference on Intelligent Agent Technology (IAT): 2003, 2007.
19. International Conference on Autonomous Agents (AA): 1997, 1998, 1999, 2001.
20. Third International and Interdisciplinary Conference on Modeling and Using Context (CONTEXT): 1999, 2001.
21. International Conference on Multiagent Systems (ICMAS): 1996, 1998, 2000.
22. IEEE International Conference on Distributed Computing Systems (ICDCS): 1998.
23. Third IFCIS International Conference on Cooperative Information Systems (CoopIS): 1996, 1998.
24. Fourteenth IEEE International Conference on Data Engineering (ICDE): 1998.
25. Third International Conference on Cooperating Knowledge-Based Systems: 1994.

6.16 Symposia and Workshop Program Committee Memberships

1. SPLASH Workshop on Programming Systems, Languages, and Applications based on Agents, Actors, and Decentralized Control (AGERE!): 2011, 2012.
2. ECAI Workshop on Rights and Duties of Autonomous Agents (RDA2), 2012.
3. Informatik Workshop on Protocol based Modelling of Business Interactions (PMBI), 2011.
4. International Workshop on Programming Multiagent Systems (ProMAS): 2010, 2011.
5. International Workshop on Coordination, Organization, Institutions and Norms in Agent Systems (COIN): 2010, 2011.
6. International Workshop on Multi-Agent Systems and Collaborative Technologies: 2011, 2011.
7. International Pragmatic Web Conference Track at I-SEMANTICS (PragWEB): 2010.
8. International Workshop on Agent Communication (AC): 2010.
9. International Workshop on Service-Oriented Computing: Agents, Semantics, and Engineering (SO-CASE): 2010.
10. International Conference on the Virtual Computing Initiative, (ICVCI): 2007, 2008, 2009.
11. International Workshop on Agents, Web Services and Ontologies, Integrated Methodologies (AWE-SOME) as part of Multi-Agent Logics, Languages, and Organisations Federated Workshops (MALLOW): 2009.
12. IEEE International Workshop on Scientific Workflows (SWF): 2008, 2009.
13. International Workshop on Agents for Autonomic Computing (AAC): 2008, 2009.
14. International Conference on Practical Applications of Agents and Multi-Agent Systems (PAAMS): 2009.
15. International Conference on Reputation (ICORE): 2009.

16. International Conference on Computer Mediated Social Networking (ICCMSN): 2008.
17. Workshop on Community-Based Evolution of Knowledge-intensive Systems (COMBEK): 2008.
18. European Workshop on Multi-Agent Systems (EUMAS): 2007.
19. International Workshop on Declarative Agent Languages and Technologies (DALT): 2007.
20. Workshop on Global Service Delivery Platforms at the Conference on Electronic Commerce: 2006.
21. International Workshop on Coordination of Inter-Organizational Workflow: Agent and Semantic Web Based Models (CIOW): 2006.
22. International Workshop on Artificial Intelligence and Service-Oriented Computing: 2006.
23. First Workshop on Semantics Enabled Networks and Services (SeNS): 2006.
24. Fifth International Workshop on Engineering Societies in the Agents' World (ESAW): 2001, 2003, 2004.
25. VLDB Workshop on Semantic Web and Databases: 2003.
26. First International Workshop on Computational Autonomy– Potential, Risks, Solutions (AUTONOMY): 2003.
27. Third International Symposium on Electronic Commerce (ISEC): October 2002.
28. First International Workshop on Internet Computing and E-Commerce (ICEC): 2001.
29. FORTE/PSTV Workshop on Interaction Protocol Engineering: 2002.
30. Third IEEE/IPSJ Symposium on Applications and the Internet (SAINT): 2003. Sponsored by the IEEE Computer Society and the Information Processing Society of Japan.
31. Agent Communication Languages and Conversation Policies, Autonomous Agents and Multi-Agent Systems Conference: 2002.
32. ECAI Workshop on Model Checking and Artificial Intelligence (MoChArt): 2002.
33. Sixth International Workshop on Cooperative Information Agents (CIA): 2001, 2002.
34. Seventh International Workshop on Agent Theories, Architectures, and Languages (ATAL): 1994, 1999, 2000, 2001.
35. Autonomous Agents Workshop on Agent Communication: 2000.
36. Autonomous Agents Workshop on Norms and Institutions in Multi-Agent Systems: 2000.
37. AAI Workshop on Negotiation: Settling Conflicts and Identifying Opportunities: 1999.
38. AAI Workshop on Agents' Conflicts: 1999.
39. Third Workshop on the Semantics and Pragmatics of Dialogue (Amstelogue): 1999.
40. IJCAI Workshop on Agent Communication Languages: 1999.

41. International Conference on Autonomous Agents Workshop on Deception, Fraud and Trust in Agent Societies: 1999.
42. International Conference on Autonomous Agents Workshop on Specifying and Implementing Conversation Policies: 1999.
43. International Workshop on Intelligent Agents for Telecommunications Applications (IATA): 1998.
44. International Conference on Autonomous Agents Workshop on Deception, Fraud and Trust in Agent Societies: 1998.
45. International Workshop on Intelligent Agents on the Internet and Web: 1998.
46. Second International Workshop on Cooperative Information Agents (CIA): 1998.
47. Workshop on Theoretical and Practical Foundations of Intelligent Agents: 1997.
48. International Conference on Multiagent Systems Workshop on Norms, Obligations, and Conventions: 1996.
49. First Workshop on Theoretical and Practical Foundations of Intelligent Agents: 1996.
50. European Conference on Artificial Intelligence Workshop on Agent Theories, Architectures, and Languages (ATAL): 1996.
51. International Joint Conference on Artificial Intelligence Workshop on Agent Theories, Architectures, and Languages (ATAL): 1995.
52. European Conference on Artificial Intelligence Workshop on Agent Theories, Architectures, and Languages (ATAL): 1994.

6.17 Other Peer Reviewing

Book proposals

1. Undergraduate textbook proposal on agent programming, Wiley, 2005.
2. Research monograph proposal on multiagent systems, Wiley, 2005.
3. Undergraduate textbook manuscript on databases, Addison Wesley, 2004.
4. Undergraduate textbook manuscript on databases, Addison Wesley Longman, 2001.
5. Undergraduate textbook manuscript on databases, Prentice Hall, 2001.
6. Edited research collection proposal, John Wiley & Sons, 2000.
7. Undergraduate textbook proposal on data structures, Addison Wesley Longman, 2000.
8. Undergraduate textbook manuscript on databases, Addison Wesley Longman, 2000.
9. Proposed undergraduate textbook on databases, Addison Wesley Longman, 2000.
10. Proposed undergraduate textbook on data structures, McGraw-Hill, 1999.
11. Proposed undergraduate textbook on data structures, Prentice Hall, 1999.

12. Proposed undergraduate textbook on databases, Addison Wesley Longman, 1999.
13. *The Encyclopedia of Electrical and Electronics Engineering*, John Wiley & Sons, 1998.
14. Proposed 2nd edition of an undergraduate textbook on databases, Addison Wesley Longman, 1998.
15. Book proposal for the *International Series on Advances in Database Systems*, Kluwer, 1997.

Journal submissions Excluding reviews I completed while an editorial board member.

1. *Ethics and Information Technology*, special issue on Ethics and Artificial Intelligence, Springer: 2017.
2. *Journal of AI Research*, JAIR Foundation: 2006, 2007, 2010, 2015, 2016.
3. *Artificial Intelligence*, Elsevier: 2010–2012.
4. *Synthese*, Springer: 2016.
5. *Frontiers in Psychology*, Springer: 2014.
6. *Science of Computer Programming*, Elsevier: 2013.
7. *IEEE Computer*, IEEE: 2007, 2010, 2012.
8. *ACM Transactions on Autonomous and Adaptive Systems (TAAS)*, ACM, 2010, 2012.
9. *Computational Intelligence (CI)*, Basil Blackwell. Founded by the National Research Council of Canada (NRCC): 2004, 2008, 2011.
10. *ACM Transactions on the Web (TWEB)*, ACM: 2007, 2008, 2010.
11. *IEEE Transactions on Dependable and Secure Computing (TDSC)*, IEEE: 2010, 2011.
12. *MIS Quarterly*: 2009, 2010.
13. *Decision-Support Systems*: 2009, 2010.
14. *Mind*, 2010.
15. *International Journal of Parallel, Emergent and Distributed Systems*, Taylor & Francis, 2010.
16. *ACM Transactions on Internet Technology (TOIT)*, ACM: 2006, 2009.
17. *IEEE Transactions on Services Computing (TSC)*, IEEE: 2008, 2009.
18. *IEEE Transactions on Software Engineering (TSE)*, IEEE: 2004, 2009.
19. *WWW Journal*, Springer: 2008, 2009.
20. *IEEE Transactions on Knowledge and Data Engineering*, IEEE: 2003, 2004, 2008.
21. *IEEE Transactions on Systems, Man, and Cybernetics, Part A (TSMC-A)*: 2008.
22. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (TSMC-C)*: 2006, 2008.
23. *Multi-Agent and Grid Systems*, IOS Press: 2008.

24. *Journal of Computer Security*, IOS Press: 2008.
25. *Communications of the ACM (CACM)*, ACM: 2002, 2004, 2006, 2008.
26. *Frontiers of Computer Science in China*, Springer: 2007.
27. *IEEE Software*, IEEE: 2007.
28. *ACM Computing Surveys*: 2007.
29. *IBM Systems Journal*: 2007.
30. *AI Journal*, Elsevier: 2007.
31. *VLDB Journal*, VLDB Foundation: 2007.
32. *Web Intelligence and Agent Systems*: 2007.
33. *ACM Transactions on Computational Logic*, ACM: 2005, 2006.
34. *IEEE Transactions on Parallel and Distributed Systems*, IEEE.
35. *Theoretical Computer Science*, Elsevier.
36. *IEE Proceedings—Software*: 2001. IEE is the Institute of Electrical Engineers.
37. *Information Technology and Management*, Baltzer.
38. *IBM Systems Journal*, IBM.
39. *Information Systems—Databases: Their Creation, Management and Utilization*, Pergamon.
40. *Computers and Artificial Intelligence*, Slovak Academy of Sciences.
41. *Journal of Intelligent Information Systems*, Kluwer.
42. *Knowledge and Information Systems (KAIS): An International Journal*, Springer-Verlag.
43. *Applied Artificial Intelligence: An International Journal*, Taylor & Francis.
44. *IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-PAMI)*, Institute of Electrical and Electronics Engineers Computer Society.
45. *Journal of Logic and Computation*, Oxford University Press.
46. *Trends in Cognitive Science*, Elsevier.
47. *Machine Learning*, Kluwer.
48. *Journal of Computing and Information Technology (CIT)*, University of Zagreb, Croatia. ISSN 1330-1136.
49. *Journal of Experimental and Theoretical Artificial Intelligence (JETAI)*, Taylor & Francis.
50. *Distributed and Parallel Databases (DAPD)*, Kluwer.
51. *Computers and Mathematics with Applications (CAM)*, Pergamon Press.

52. *ACM Transactions on Information Systems (TOIS)*, ACM.
53. *IEEE Expert: Intelligent Systems & Their Applications*, Institute of Electrical and Electronics Engineers Computer Society.
54. *International Journal of Cooperative Information Systems (IJCIS)*, World Scientific.
55. *IEEE Transactions on Systems, Man, and Cybernetics (IEEE-SMC)*, Institute of Electrical and Electronics Engineers Computer Society.
56. *International Journal of Intelligent Systems (IJIS)*, John Wiley.
57. *Journal of Organizational Computing (JOC)*, Ablex.
58. *Journal of Applied Intelligence (APIN)*, Kluwer.

Conference submissions Excluding conferences for which I was a program committee member.

1. International ACM Conference on Electronic Commerce (EC): 1999, 2008.
2. International Joint Conference on Artificial Intelligence (IJCAI): 1991, 1993, 1995, 1997, 1999, 2001, and 2003.
3. ACM Symposium on the Principles of Distributed Computing, 2000.
4. 7th CSLI Workshop on Logic, Language and Computation (LLC): 1998.
5. IEEE Symposium on Logic in Computer Science (LICS): 1995.
6. International Conference on Database Systems for Advanced Applications (DASFAA): 1995.
7. Conference of the American Association for Artificial Intelligence (AAAI): 1990.
8. International Conference on Data Engineering (ICDE): 1994.
9. International Conference on Intelligent and Cooperative Information Systems (ICICIS): 1993.
10. International Conference on Distributed Artificial Intelligence (DAI): 1990 and 1992.
11. International Conference on Logic Programming Workshop on Deductive Databases: 1993.
12. International Workshop on Cooperation Among Knowledge-Based Systems (CKBS): 1990.
13. International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems (IEA/AIE): 1991.
14. American Association for Artificial Intelligence Workshop on Cooperation Among Heterogeneous Intelligent Systems (CHIS): 1991 and 1992.