

# INDRAKSHI RAY

## Office Address

Computer Science Department  
Colorado State University  
1873 Campus Delivery  
Fort Collins, CO 80523-1873  
Office Ph.: (970) 491-7986  
Email: iray@cs.colostate.edu  
WWW: <http://www.cs.colostate.edu/~iray>

---

## Education

1997 Ph.D., School of Information Technology, George Mason University, Fairfax, Virginia.  
1991 Master of Computer Science and Engineering, Jadavpur University, Calcutta, India.  
1988 Bachelor of Engineering, Bengal Engineering and Science University, Howrah, India.

## Dissertation

Using Formal Methods in Semantics-Based Decomposition of Transactions

## Ph.D. Advisors

Professor Sushil Jajodia and Professor Paul Ammann

## Research Interests

Database Systems, Computer Security, Formal Methods in Software Engineering, E-Commerce Protocols

## Academic Positions

July 2014 – present, Professor, Computer Science Department, Colorado State University.  
July 2006 – June 2014, Associate Professor, Computer Science Department, Colorado State University.  
June 2014 – August 2014, Senior Summer Faculty Fellow, Naval Research Laboratory.  
June 2013 – August 2013, Senior Summer Faculty Fellow, Naval Research Laboratory.  
June 2012 – July 2012, Visiting Faculty, Air Force Research Laboratory.  
September 2009 – February 2010, Visiting Professor, INRIA Rocquencourt, France.  
August 2001 – June 2006, Assistant Professor, Computer Science Department, Colorado State University.

May 2002 – August 2002, Visiting Faculty, Air Force Research Laboratory.

August 1997 – July 2001, Assistant Professor, Computer and Information Science Department, University of Michigan-Dearborn.

August 1993 – July 1997, Research Assistant, Information and Software Engineering Department, George Mason University.

### **Other Positions**

March 1991 – August 1991, Systems Engineer, ORG Systems, Calcutta, India.

June 1988 – August 1989, Systems Engineer, ORG Systems, Calcutta, India.

### **Honors and Awards**

2002, Best Paper Award ICECCS Conference, IEEE, USA.

1996 – 1997, George Mason University Fellowship Award, George Mason University.

1982 National Scholar, Govt. of India, India.

### Refereed Journal Publications

1. Paul Ammann, Sushil Jajodia and Indrakshi Ray “Applying Formal Methods to Semantic-Based Decomposition of Transactions”, *ACM Transactions on Database Systems*, Vol 22(2), June 1997, pages 215–254.
2. Indrakshi Ray, Paul Ammann and Sushil Jajodia “A Semantic Model for Multilevel Transactions”, *Journal of Computer Security*, Vol 6(3), 1998, pages 181–217.
3. Indrakshi Ray, Paul Ammann and Sushil Jajodia, “Using Semantic Correctness in Multidatabases to Achieve Local Autonomy, Distribute Coordination, and Maintain Global Integrity”, *Information Sciences*, Vol 129(1-4), November 2000, pages 155–195.
4. Indrakshi Ray, “Real-Time Update of Access Control Policies”, *Data and Knowledge Engineering*, 49(3), June 2004, pages 287–309.
5. Indrakshi Ray, Robert France, Na Li and Geri Georg, “An Aspect-Based Approach to Modeling Access Control Concerns”, *Information and Software Technology*, 46(9), July 2004, pages 557-633.
6. Robert France, Indrakshi Ray, Geri Georg and Sudipto Ghosh, “An Aspect-Oriented Approach to Design Modeling”, *IEEE Proceedings – Software, Special Issue on Early Aspects: Aspect-Oriented Requirements Engineering and Architecture Design*, 151(4), August 2004, pages 173–185.
7. Indrajit Ray, Indrakshi Ray and Narasimhamurthi Natarajan, “An Anonymous and Failure Resilient Fair-Exchange E-Commerce Protocol using Off-line Third Parties”, *Decision Support Systems*, 39(5), May 2005, pages 267–292.
8. Indrakshi Ray, “Applying Semantic Knowledge to Real Time Update of Access Control Policies”, *IEEE Transactions on Knowledge and Data Engineering*, 17(6), June 2005, pages 844-858.
9. Indrakshi Ray and Mahendra Kumar, “Towards a Location-Based Mandatory Access Control Model”, *Computers and Security*, 25(1), February 2006, pages 36-44.
10. Anna Cinzia Squicciarini, Elisa Bertino, Elena Ferrari, and Indrakshi Ray “Achieving Privacy with an Ontology-Based Approach in Trust Negotiations”, *IEEE Transactions on Dependable and Secure Computing*, 3(1), January - March 2006, pages 13 -30.
11. Indrakshi Ray and Tai Xin, “Analysis of Dependencies for Advanced Transactions”, *Distributed and Parallel Databases*, 20(1), July 2006, pages 5-27.
12. Eunjee Song, Shuxin Yin and Indrakshi Ray, “Using UML to Model Relational Database Operations”, *Computer Standards and Interfaces*, 29(3), March 2007, pages 343-354.
13. Tai Xin and Indrakshi Ray, “A Lattice-Based Approach for Updating Access Control Policies in Real-Time”, *Information Systems*, 32(5), July 2007, pages 755-772.
14. Indrakshi Ray, Indrajit Ray and Sudip Chakraborty, “An Interoperable Context-Sensitive Model of Trust”, *Journal of Intelligent Information Systems*, 32(1), February 2009, pages 75-104.
15. Nayot Poolsappasit and Indrakshi Ray, “Towards Achieving Personalized Privacy for Location-Based Services”, *Transactions on Data Privacy – Special Issue on Security and Privacy in GIS and LBS*, 2(1), 2009, pages 77-99.
16. Geri Georg, Indrakshi Ray, Kyriakos Anastasakis, Behzad Bordbar, Manachai Toahchoodee and Siv Hilde Houmb, “An Aspect-Oriented Methodology for Designing Secure Applications”, *Information and Software Technology – Special Issue on Model Based Development*

- for *Secure Information Systems*, 51(5), May 2009, pages 846-864.
17. Manachai Toahchoodee and Indrakshi Ray, "Using Alloy to Analyze a Spatio-Temporal Access Control Model Supporting Delegation", *IET Information Security*, 3(3), September 2009, pages 75-127.
  18. Kyriakos Anastasakis, Behzad Bordbar, Geri Georg and Indrakshi Ray, "On Challenges of Model Transformation from UML to Alloy", *Software and Systems Modeling*, 9(1), January 2010, pages 69-86.
  19. Geri Georg, Kyriakos Anastasakis, Behzad Bordbar, Siv Hilde Houmb, Indrakshi Ray and Manachai Toahchoodee, "Verification and Trade-off Analysis of Security Properties in UML System Models", *IEEE Transactions on Software Engineering*, 36(3), May-June 2010, pages 338-356.
  20. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, "Real Time Stochastic Scheduling in Broadcast Systems with Decentralized Data Storage", *Real-Time Systems*, 45(3), August 2010, pages 143-175.
  21. Manachai Toahchoodee, Indrakshi Ray, and Ross McConnell, "Using Graph Theory to Formalize a Spatio-Temporal Role-Based Access Control Model", *International Journal of Next Generation Computing*, 1(2), November 2010.
  22. Tristan Allard, Nicolas Anciaux, Luc Bougamin, Yanli Guo, Lionel Le Folgoc, Benjamin Nguyen, Philippe Pucheral, Indrajit Ray, Indrakshi Ray and Shaoyi Yin, "Secure Personal Data Servers: A Vision Paper", *Proceedings of the VLDB Endowment*, 3(1), September 2010, pages 25-35.
  23. Manachai Toahchoodee and Indrakshi Ray, "On the Formalization and Analysis of a Spatio-Temporal Role-Based Access Control Model", *Journal of Computer Security*, 19(3), 2011, pages 399-452.
  24. Parvathi Chundi, Tai Xin, and Indrakshi Ray, "When Does a Workflow Complete?", *Computer Standards and Interfaces*, 33(3), March 2011, pages 292-300.
  25. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, " $k$ -Anonymization in the Presence of Publisher Preferences", *IEEE Transactions on Knowledge and Data Engineering*, 23(11), November 2011, pages 1678-1690.
  26. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, "Exploring Privacy versus Data Utility Tradeoffs in Anonymization Techniques using Multi-objective Optimization", *Journal of Computer Security*, 19(5), 2011, pages 935-974.
  27. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, "Utility Driven Optimization of Real Time Data Broadcast Schedules", *Applied Soft Computing*, 12(7), July 2012, pages 1832-1846.
  28. Raman Adaikkalavan, Xing Xie, and Indrakshi Ray, "Multilevel Secure Data Stream Processing: Architecture and Implementation", *Journal of Computer Security*, 20(5), 2012, pages 547-581.
  29. Ramadan Abdunabi, Mustafa Al-Lail, Indrakshi Ray, and Robert France, "Specification and Validation of a Generalized Spatio-Temporal Role-Based Access Control Model", *IEEE Systems Journal*, 7(3), 2013, pages 501-515.
  30. Ramadan Abdunabi, Wuliang Sun, and Indrakshi Ray, "Enforcing Spatio-Temporal Access Control for Mobile Applications", *Computing*, 96(4), 2014, pages 313-353.
  31. Ping Yang, Xing Xie, Indrakshi Ray, and Shiyong Lu, "Satisfiability Analysis of Workflows with Control-Flow Patterns", *IEEE Transactions on Services Computing*, 7(2), 2014, pages

- 237-251.
32. Wuliang Sun, Benoît Combemale, Robert B. France, Arnaud Blouin, Benoit Baudry, and Indrakshi Ray, “Using Slicing to Improve the Performance of Model Invariant Checking”, *Journal of Object Technology*, 14(4), 2015, pages 1-28.
  33. Constance Heitmeyer, Marc Pickett, Elizabeth Leonard, Myla Archer, Indrakshi Ray, David Aha, and Gregory Trafton, “Building High Assurance Human-Centric Decision Systems”, *Automated Software Engineering*, 22(2), 2015, pages 159-197.

### Book Chapters

1. Paul Ammann, Sushil Jajodia and Indrakshi Ray, “Semantics-Based Decomposition of Transactions”, *Advanced Transaction Models and Architectures*, Sushil Jajodia and Larry Kerschberg editors, Kluwer Academic Publishers, 1997, pages 153–180.
2. Indrakshi Ray, “Secure Transaction Processing”, *Encyclopedia of Database Systems*, Tamer Ozsu and Ling Liu editors, Springer, 2009, pages 2540–2546.
3. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, “Multi-objective Evolutionary Optimization in Statistical Disclosure Control”, *Advances in Artificial Intelligence for Privacy Protection and Security*, Agusti Solanas and Antoni Martinez-Balleste editors, Imperial College Press, 2009, pages 117–144.
4. Indrajit Ray, Indrakshi Ray and Sudip Chakraborty, “A Context-Aware Model of Trust for Facilitating Secure Ad Hoc Collaborations”, *Trust Modeling and Management in Digital Environments: From Social Concept to System Development*, Zheng Yan editor, IGI Global, January 2010.
5. Siv Hilde Houmb, Geri Georg, Dorina C. Petriu, Behzad Bordbar, Indrakshi Ray, Kyriakos Anastasakis and Robert France, “Balancing Security and Performance Properties During System Architectural Design”, *Software Engineering for Secure Systems: Industrial and Research Perspectives*, Haralambos Mouratidis editor, IGI Global, October 2010.
6. Sharma Chakravarthy, Raman Adaikkalavan, Indrakshi Ray, Qingchun Jiang, and Xing Xie, “Sensor Technology and Data Streams Management”, *Fundamental of Pervasive Information Management Systems*, Vijay Kumar editor, John Wiley & Sons, September 2013.

### Refereed Proceedings

1. Paul Ammann, Sushil Jajodia and Indrakshi Ray “Using Formal Methods to Reason About Semantic-Based Decomposition of Transactions”, *Proceedings of the 21st International Conference on Very Large Databases*, Zurich, September 1995, Morgan-Kaufmann, pages 218–227. (Acceptance ratio 52/297)
2. Paul Ammann, Sushil Jajodia and Indrakshi Ray “Ensuring Atomicity of Multilevel Transactions”, *Proceedings of the IEEE Symposium on Security and Privacy*, Oakland, CA, May 1996, IEEE Computer Society Press, pages 74–84. (Acceptance ratio 20/69)
3. Indrakshi Ray and Paul Ammann, “Using the B-Toolkit to Ensure Safety in SCR Specifications”, *Proceedings of the 12th Annual Conference on Computer Assurance*, Gaithersburg, MD, June 1997, IEEE Computer Society Press, pages 1–12.

4. Sushil Jajodia, Indrakshi Ray and Paul Ammann, "Implementing Semantic-Based Decomposition of Transactions", *Proceedings of the 9th International Conference on Advanced Information Systems Engineering*, Barcelona, Catalonia, June 1997. Published as Lecture Notes in Computer Science, Vol. 1250, 1997, editors A. Olive and J. A. Pastor, Springer-Verlag, pages 75–88. (Acceptance ratio 30/112)
5. Indrakshi Ray and Indrajit Ray, "Failure Analysis of an E-commerce Protocol Using Model Checking", *Proceedings of the 2nd International Workshop on Advanced Issues of E-Commerce and Web-based Information Systems*, Milpitas, CA, June 2000, IEEE Computer Society Press, pages 176–183.
6. Indrakshi Ray and Indrajit Ray, "An Optimistic Fair-exchange E-commerce Protocol with Automated Dispute Resolution", *Proceedings of the 1st International Conference on Electronic Commerce and Web Technologies*, Greenwich, UK, September 2000. Published as Lecture Notes in Computer Science, Vol. 1875, 2000, editors K. Bauknecht, S. K. Madria, and G. Pernul, Springer-Verlag, pages 84–93. (Acceptance ratio 43/120)
7. Indrajit Ray, Indrakshi Ray and Natarajan Narasimhamurthi, "A Fair Exchange E-Commerce Protocol with Automated Dispute Resolution", *Proceedings of the 14th Annual IFIP WG 11.3 Working Conference on Database Security*, Schoorl, The Netherlands, August 2000. Published in Data and Applications Security: Developments and Directions, 2001, editors B. Thuraisingham, R. van de Riet, K. Dittrich and Z. Tari, Kluwer Academic Publishers, pages 27–38. (Acceptance ratio 23/54)
8. Indrakshi Ray and Indrajit Ray, "An Anonymous Fair-Exchange E-commerce Protocol", *Proceedings of the 15th International Parallel and Distributed Processing Symposium (First International Workshop on Internet Computing and E-Commerce)*, San Francisco, CA, April 2001, IEEE Computer Society Press, pages 1790–1797.
9. Indrajit Ray, Indrakshi Ray and Natarajan Narasimhamurthi, "An Anonymous Electronic Voting Protocol for Voting over the Internet", *Proceedings of the 3rd International Workshop on Advanced Issues of E-Commerce and Web-based Information Systems*, San Jose, CA, June 2001, IEEE Computer Society Press, pages 188–190.
10. Indrakshi Ray and Indrajit Ray, "Detecting Termination of Active Database Rules using Symbolic Model Checking", *Proceedings of the 5th East-European Conference on Advances in Databases and Information Systems*, Vilnius, Lithuania, September 2001. Published as Lecture Notes in Computer Science, Vol. 2151, 2001, editors A. Caplinskis and J. Eder, Springer-Verlag, pages 266–289. (Acceptance ratio 25/74)
11. Indrakshi Ray and Indrajit Ray, "Using Compatible Keys for Secure Multicasting in E-commerce", *Proceedings of the 16th International Parallel and Distributed Processing Symposium (Second Workshop on Internet Computing and E-Commerce)*, Fort Lauderdale, FL, April 2002, IEEE Computer Society Press, pages 225–232. (Acceptance ratio 16/43)
12. Indrakshi Ray, Indrajit Ray and Natarajan Narsimhamurthi, "A Cryptographic Solution to Implement Access Control in a Hierarchy and More", *Proceedings of the 7th ACM Symposium on Access Control Models and Technologies*, Monterey, CA, June 2002, ACM Press, pages 65–73. (Acceptance ratio 17/53)
13. Indrajit Ray and Indrakshi Ray, "Anonymous and Secure Multicast Subscription", *Proceedings of the 16th Annual IFIP WG 11.3 Working Conference on Database and Applications Security*, Cambridge, U.K., July 2002. Published in Research Directions in Data and Applications Security, 2003, editors E. Gudes and S. Sheno, Kluwer Academic Publishers, pages

- 313–327.
14. Geri Georg, Robert France and Indrakshi Ray, “Designing High Integrity Systems using Aspects”, *Proceedings of the 5th Annual IFIP WG 11.5 Working Conference on Integrity and Internal Control in Information Systems*, Bonn, Germany, November 2002. Published in *Integrity and Internal Control in Information Systems V*, 2003, editor M. Gertz, Kluwer Academic Publishers, pages 37–57. (Acceptance rate 50%)
  15. Geri Georg, Indrakshi Ray and Robert France, “Using Aspects to Design a Secure System”, *Proceedings of the 8th IEEE International Conference on Engineering of Complex Computer Systems*, Greenbelt, Maryland, December 2002, IEEE Computer Society Press, pages 117–128. (Winner of the Best Paper Award) (Acceptance ratio 23/49)
  16. Indrakshi Ray, “Multi-level Secure Rules and Its Impact on the Design of Active Databases”, *Proceedings of the 20th British National Conference on Databases*, Coventry, U.K., July 2003. Published as *Lecture Notes in Computer Science*, Vol. 2712, 2003, editors A. James, B. Lings and M. Younas, Springer-Verlag, pages 226–244. (Acceptance rate 30%)
  17. Indrakshi Ray and Tai Xin, “Concurrent and Real-Time Update of Access Control Policies”, *Proceedings of the 14th International Conference on Database and Expert Systems*, Prague, Czech Republic, September 2003. Published in *Lecture Notes in Computer Science*, Vol. 2736, 2003, editors V. Marik, W. Retschitzegger and O. Stepankova, Springer-Verlag, pages 330–339. (Acceptance ratio 91/236)
  18. Indrakshi Ray, Na Li, Dae-Kyoo Kim and Robert France, “Using Parameterized UML to Specify and Compose Access Control Models”, *Proceedings of the 6th IFIP WG 11.5 Conference on Integrity and Internal Control in Information Systems*, Lausanne, Switzerland, November 2003. Published in *Integrity and Internal Control in Information Systems VI*, 2004, editors S. Jajodia and L. Strouss, Kluwer Academic Publishers, pages 49–65.
  19. Nitin Prabhu, Vijay Kumar, Indrakshi Ray and Gi-Chul Yang, “Concurrency Control in Mobile Database Systems”, *Proceedings of the 18th International Conference on Advanced Networking and Applications*, Fukuoka, Japan, March 2004, IEEE Computer Society Press, pages 83–86. (Acceptance ratio 223/402)
  20. Dae-Kyoo Kim, Indrakshi Ray, Robert France and Na Li, “Modeling Role-Based Access Control Using Parameterized UML Models”, *Proceedings of the 7th Conference on Fundamental Approaches to Software Engineering*, Barcelona, Spain, March 2004. Published in *Lecture Notes in Computer Science* series, Vol. 2984, 2004, editors M. Wermelinger and T. Margaria-Steffen, Springer-Verlag, pages 180–193. (Acceptance rate 23%)
  21. Indrakshi Ray, Na Li, Robert France and Dae-Kyoo Kim, “Using UML to Visualize Role-Based Access Control Constraints”, *Proceedings of the 9th ACM Symposium on Access Control Model and Technologies*, Yorktown Heights, NY, June 2004, ACM Press, pages 115–124. (Acceptance ratio 18/61)
  22. Nitin Prabhu, Vijay Kumar and Indrakshi Ray, “Periodic Scheduling in On-Demand Broadcast System”, *Proceedings of the 3rd International Conference on Information Systems Technology and its Applications*, Salt Lake City, Utah, July 2004. Published in *Lecture Notes in Informatics* series, Vol. 48, 2004, editors A. E. Doroshenko, T. A. Halpin, S. W. Liddle, and H.C. Mayr, GI, pages 107–121. (Acceptance ratio 15/43)
  23. Indrakshi Ray, Ross McConnell, Monte Lunacek and Vijay Kumar, “Reducing Damage Assessment Latency in Survivable Databases”, *Proceedings of the 21st British National Conference on Databases* (Short Paper), Edinburgh, Scotland, July 2004. Published in *Lecture*

- Notes in Computer Science series, Vol. 3112, 2004, editors H. Williams, L. MacKinnon, Springer-Verlag, pages 106–111. (Acceptance ratio 18/70)
24. Indrakshi Ray and Tai Xin, “Implementing Real-Time Update of Access Control Policies”, *Proceedings of the 18th IFIP WG 11.3 Working Conference on Data and Application Security*, Sitges, Spain, July 2004. Published in Research Directions in Data and Applications Security XVIII, 2004, editors C. Farkas and P. Samarati, Kluwer Academic Publishers, pages 65–80. (Acceptance ratio 24/45)
  25. Indrakshi Ray, Tai Xin and Yajie Zhu, “Ensuring Task Dependencies During Workflow Recovery”, *Proceedings of the 15th International Conference on Database and Expert Systems Applications*, Zaragoza, Spain, August 2004. Published in Lecture Notes in Computer Science series, Vol. 3180, 2004, editors F. Galindo, M. Takizawa and R. Traunmuller, Springer, pages 24–33. (Acceptance ratio 92/304)
  26. Indrakshi Ray and Mariana Muller, “Using Schemas to Simplify Access Control for XML Documents”, *Proceedings of the 1st International Conference on Distributed Computing and Internet Technology* (Short Paper), Bhubaneswar, India, December 2004. Published in Lecture Notes in Computer Science series, Vol. 3347, 2004, editors R.K. Ghosh and H. Mohanty, Springer, pages 363–368. (Acceptance ratio 51/211)
  27. Shuxin Yin and Indrakshi Ray, “Relational Database Operations Modeling with UML”, To appear in *Proceedings of the IEEE 19th International Conference on Advanced Information Networking and Applications*, Taipei, Taiwan, March 2005, IEEE Computer Society Press, pages 927–932. (Acceptance rate 33%)
  28. Indrakshi Ray, Elisa Bertino, Anna C. Squicciarini, and Elena Ferrari, “Anonymity Preserving Techniques in Trust Negotiations”, *Proceedings of the Workshop on Privacy Enhancing Technologies*, Dubrovnik, Croatia, May 2005. To be published in Lectures Notes in Computer Science series. (Acceptance ratio 18/74)
  29. Eunjee Song, Raghu Reddy, Robert France, Indrakshi Ray, Geri Georg and Roger Alexander, “Verifiable Composition of Access Control and Application Features”, *Proceedings of the 10th ACM Symposium on Access Control Methodologies and Technologies*, Stockholm, Sweden, June 2005, ACM Press, pages 120–129. (Acceptance ratio 19/90)
  30. Tai Xin and Indrakshi Ray, “Detecting Dependency Conflicts in Advanced Transaction Models”, *Proceedings of the 9th International Database Engineering and Applications Symposium*, Montreal, Canada, July 2005, IEEE Computer Society Press, pages 17–26. (Acceptance ratio for full papers 30/144)
  31. Tai Xin, Yajie Zhu, and Indrakshi Ray, “Reliable Scheduling of Advanced Transactions”, *Proceedings of the 19th IFIP WG 11.3 Working Conference on Data and Applications Security*, Storrs, Connecticut, August 2005. Published in Lecture Notes in Computer Science series, Vol. 3654, 2005, editors S. Jajodia and D. Wijesekera, Springer, pages 124–138. (Acceptance ratio 24/54)
  32. Yajie Zhu, Tai Xin, and Indrakshi Ray, “Recovering from Malicious Attacks in Workflow Systems”, *Proceedings of the 16th International Conference on Database and Expert Systems*, Copenhagen, Denmark, August 2005. Published in Lecture Notes in Computer Science series, Vol. 3588, 2005, editors K.V. Anderson, J. Debenham, and R. Wagner, Springer, pages 14–23. (Acceptance ratio 92/390)
  33. Dan Matheson, Indrakshi Ray, Indrajit Ray, and Siv Hilde Houmb, “Building Security Requirement Patterns for Increased Effectiveness Early in the Development Process”, *Proceed-*



- ings of the Symposium on Requirements Engineering for Information Security (Short Paper), Paris, France, August 2005. (Acceptance ratio 16/40)
34. Indrakshi Ray and Lijun Yu, "Short Paper: Towards a Location-Aware Role-Based Access Control Model", *Proceedings of the 1st IEEE Conference on Security and Privacy for Emerging Areas in Communication Networks* (Short Paper), Athens, Greece, September 2005, IEEE Computer Society Press, pages 234–236. (Acceptance ratio 52/164)
  35. Indrajit Ray, Sudip Chakraborty, and Indrakshi Ray, "VTrust: A Trust Management System Based on a Vector Model of Trust", *Proceedings of the 1st International Conference on Information Systems Security*, Kolkata, India, December 2005. Published as Lecture Notes in Computer Science, Vol. 3083, 2005, editors S. Jajodia and C. Mazumdar, Springer, pages 91–105. (Acceptance ratio 20/72)
  36. Indrakshi Ray and Wei Huang, "Event Detection in Multilevel Secure Active Databases", *Proceedings of the 1st International Conference on Information Systems Security*, Kolkata, India, December 2005. Published as Lecture Notes in Computer Science, Vol. 3083, 2005, editors S. Jajodia and C. Mazumdar, Springer, pages 177–190. (Acceptance ratio 20/72)
  37. Manachai Toahchoodee and Indrakshi Ray, "Validation of Policy Integration using Alloy", *Proceedings of the 2nd International Conference on Distributed Computing and Internet Technology*, Bhubaneswar, India, December 2005. Published as Lecture Notes in Computer Science, Vol. 3816, 2005, editor G. Chakraborty, Springer, pages 420–431. (Acceptance ratio for long papers 45/426)
  38. Siv Hilde Houmb, Indrakshi Ray, Indrajit Ray, "Estimating the Relative Trustworthiness of Information Sources in Security Solution Evaluation", *Proceedings of the 4th International Conference on Trust Managaement*, Pisa, Italy, May 2006. Published as Lecture Notes in Computer Science, Vol. 3986, 2006, editors K. Stolen et al., Springer, pages 135–149. (Acceptance ratio 30/88)
  39. Monte Lunacek, Darrell Whitley and Indrakshi Ray, "A Crossover Operator for the K-Anonymity Problem", *Proceedings of the 8th Genetic and Evolutionary Computation Conference*, Seattle, Washington, July 2006, ACM Press, pages 1713–1720. (Acceptance ratio 205/446)
  40. Geri Georg, Siv Hilde Houmb and Indrakshi Ray, "Aspect-Oriented Risk-Driven Development of Secure Applications", *Proceedings of the 20th Annual IFIP Wg 11.3 Working Conference on Data and Applications Security*, Sophia Antipolis, France, July 2006. Published as Lecture Notes in Computer Science, Vol. 4127, 2006, editors E. Damiani and P. Liu, Springer, pages 282–296. (Acceptance ratio 22/56)
  41. Tai Xin, Indrakshi Ray, Parvathi Chundi and Sopak Chaichana, "On the Completion of Workflows", *Proceedings of the 17th International Conference on Database and Expert Systems Applications*, Krakow, Poland, September 2006. Published as Lecture Notes in Computer Science, Vol. 4080, 2006, editors S. Bressan et al., Springer, pages 582–591. (Acceptance ratio 90/388)
  42. Indrakshi Ray, Mahendra Kumar and Lijun Yu, "LRBAC: A Location-Aware Role-Based Access Control Model", *Proceedings of the 2nd International Conference on Information Systems Security*, Kolkata, India, December 2006. Published as Lecture Notes in Computer Science, Vol. 4332, 2006, editors A. Bagchi and V. Atluri, Springer, pages 147–161. (Acceptance ratio 24/79)
  43. Indrakshi Ray and Michael Geisterfer, "A Method for Early Correspondence Discovery Us-

- ing Instance Data”, *Proceedings of the 9th International Conference on Enterprise Information Systems*, Funchal, Portugal, June 2007, pages 258–263. (Acceptance rate 35%)
44. Lijun Yu, Robert France, Indrakshi Ray and Kevin Lano, “A Light-weight Approach to Analyzing UML Behavioral Properties”, *Proceedings of the 12th IEEE International Conference on Engineering of Complex Computer Systems*, Auckland, New Zealand, July 2007, IEEE Computer Society Press, pages 56–63. (Acceptance ratio 20/70)
  45. Kyriakos Anastasakis, Behzad Bordbar, Geri Georg and Indrakshi Ray, “UML2Alloy: A Challenging Model Transformation”, *Proceedings of the 10th International Conference on Model Driven Engineering Languages and Systems*, Nashville, Tennessee, October 2007. Published as Lecture Notes in Computer Science, Vol. 4735, 2007, editors G. Engels, B. Opdyke, D. C. Schmidt and F. Weil, Springer, pages 436–450. (Acceptance rate 28%)
  46. Eunjee Song, Robert France, Indrakshi Ray and Hanil Kim, “Checking Policy Enforcement in an Access Control Aspect Model”, *Proceedings of the International Conference on Convergence Technology and Information Convergence*, Anaheim, California, November 2007.
  47. Jinyoo Kim, Yashwant Malaiya and Indrakshi Ray, “Vulnerability Discovery in Multi-Version Software Systems”, *Proceedings of the 10th IEEE High Assurance Systems Engineering Symposium*, Dallas, Texas, November 2007, IEEE Computer Society Press, pages 141 – 148. (Acceptance ratio 33/100)
  48. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, “Optimizing On-Demand Data Broadcast Scheduling in Pervasive Computing Environments”, *Proceedings of the 11th International Conference on Extending Database Technology*, Nantes, France, March 2008, pages 559–569. (Acceptance ratio 52/311)
  49. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, “On the Optimal Selection of K in the K-Anonymity Problem” (Accepted as a poster paper), *Proceedings of the 24th IEEE International Conference on Data Engineering*, Cancun, Mexico, April 2008, pages 1364–1366. (Acceptance ratio for Research Track including full-length, short and poster papers 191/615)
  50. Rinku Dewri, Darrell Whitley, Indrajit Ray and Indrakshi Ray, “Evolution Strategy Based Optimization of On-Demand Dependent Data Broadcast Scheduling” (Accepted as a poster paper), *Proceedings of the Genetic and Evolutionary Computation Conference*, Atlanta, Georgia, July 2008, pages 1699–1700. (Acceptance ratio for the Real-World Applications Track 34/75)
  51. Manachai Toahchoodee and Indrakshi Ray, “On the Formal Analysis of a Spatio-Temporal Role-Based Access Control Model”, *Proceedings of the 22nd Annual IFIP WG 11.3 Working Conference on Data and Applications Security*, London, U.K., July 2008, pages 17–32. (Acceptance ratio 22/56)
  52. Indrakshi Ray and Manachai Toahchoodee, “A Spatio-Temporal Role-Based Access Control Model Supporting Delegation for Pervasive Computing Applications”, *Proceedings of the 5th International Conference on Trust, Privacy, and Security in Digital Business*, Turin, Italy, September 2008, pages 48–58. (Acceptance ratio 18/34)
  53. Indrakshi Ray and Wei Huang, “Increasing Expressiveness of Composite Events Using Parameter Contexts”, *Proceedings of the 12th East-European Conference on Advances in Databases and Information Systems*, Pori, Finland, September 2008, pages 215–230. (Acceptance ratio 21/63)
  54. Rinku Dewri, Darrell Whitley, Indrajit Ray and Indrakshi Ray, “Optimizing Real-Time

- Ordered-Data Broadcasts in Pervasive Environments using Evolution Strategy”, *Proceedings of the 10th International Conference on Parallel Problem Solving from Nature*, Dortmund, Germany, September 2008, pages 991–1000. (Acceptance ratio 114/206)
55. Lijun Yu, Robert France and Indrakshi Ray, “Scenario-based Static Analysis of UML Behavioral Properties”, *Proceedings of the ACM/IEEE 11th Conference on Model Driven Engineering Languages and Systems*, Toulouse France, September 2008, pages 234–248. (Acceptance ratio 58/274)
  56. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, “Security Provisioning in Pervasive Environments Using Multi-objective Optimization”, *Proceedings of the 13th European Symposium on Research in Computer Security*, Malaga, Spain, October 2008, pages 349–363. (Acceptance ratio 37/168)
  57. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, “On the Comparison of Microdata Disclosure Control Algorithms”, *Proceedings of the 12th International Conference on Extending Database Technology*, Saint-Petersburg, Russia, March 2009, pages 240–251. (Acceptance ratio 92/283)
  58. Manachai Toahchoodee, Indrakshi Ray, Kyriakos Anastasakis, Geri Georg and Behzad Bordbar, “Ensuring Spatio-Temporal Access Control for Real World Applications”, *Proceedings of the 14th Symposium on Access Control Models and Technologies*, Stresa, Italy, June 2009, pages 19–22. (Acceptance ratio 24/75)
  59. Lijun Yu, Robert France, Indrakshi Ray and Sudipto Ghosh, “A Rigorous Approach to Uncovering Security Policy Violations in UML Designs”, *Proceedings of the 14th International Conference on Engineering of Complex Computer Systems*, Potsdam, Germany, June 2009, pages 126–135. (Acceptance ratio 19/65)
  60. Rinku Dewri, Darrell Whitley, Indrajit Ray and Indrakshi Ray, “A Multi-Objective Approach to Data Sharing with Privacy Constraints and Preference Based Objectives”, *Proceedings of the Genetic and Evolutionary Computation Conference*, Montreal, Canada, July 2009, pages 1499–1506. (Acceptance ratio 220/531)
  61. Manachai Toahchoodee, Ramadan Abdunabi, Indrakshi Ray and Indrajit Ray, “A Trust-Based Access Control Model for Pervasive Computing Applications”, *Proceedings of the 23rd Annual IFIP WG 11.3 Working Conference on Data and Applications Security*, Montreal, Canada, July 2009, pages 307–314. (Acceptance ratio 23/41)
  62. Manachai Toahchoodee, Xing Xie and Indrakshi Ray, “Towards Trustworthy Delegation in Role-Based Access Control Models”, *Proceedings of the 12th Information Security Conference*, Pisa, Italy, September 2009, pages 379–394. (Acceptance ratio 29/105)
  63. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, “POkA: Identifying Pareto-Optimal k-Anonymous Nodes in a Domain Hierarchy Lattice”, *Proceedings of the 18th ACM Conference on Information and Knowledge Management*, Hong Kong, China, November 2009, pages 1037–1046. (Acceptance ratio 123/847)
  64. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, “Query m-Invariance: Preventing Query Disclosures in Continuous Location-Based Services”, *Proceedings of the 11th International Conference on Mobile Data Management*, Kansas City, Missouri, May 2010, pages 95–104. (Acceptance ratio 16/63)
  65. Rinku Dewri, Indrajit Ray, Indrakshi Ray and Darrell Whitley, “On the Identification of Property Based Generalizations in Microdata Anonymization”, *Proceedings of the 24th Annual IFIP WG 11.3 Working Conference on Data and Applications Security*, Rome, Italy,

- June 2010, pages 81–96. (Acceptance ratio 18/61)
66. Siv Hilde Houmb, Sudip Chakraborty, Indrakshi Ray and Indrajit Ray, “Using Trust-Based Information Aggregation for Predicting Security Level of Systems”, *Proceedings of the 24th Annual IFIP WG 11.3 Working Conference on Data and Applications Security*, Rome, Italy, June 2010, pages 241–256. (Acceptance ratio 18/61)
  67. Rinku Dewri, Indrakshi Ray, Indrajit Ray and Darrell Whitley, “On the Formation of Historically  $k$ -Anonymous Anonymity Sets in a Continuous LBS”, *Proceedings of the 6th International Conference on Security and Privacy in Communication Networks*, Singapore, September 2010, pages 71–88. (Acceptance ratio 28/112)
  68. Wuliang Sun, Robert France and Indrakshi Ray, “Rigorous Analysis of UML Access Control Policy Models”, *Proceedings of the IEEE International Symposium on Policies for Distributed Systems and Networks*, Pisa, Italy, June 2011, pages 9–16. (Acceptance ratio for full paper 16%)
  69. Raman Adaikkalavan, Indrakshi Ray and Xing Xie, “Multilevel Stream Data Processing”, *Proceedings of the 25th Annual IFIP WG 11.3 Conference on Data and Applications Security and Privacy*, Richmond, Virginia, July 2011, pages 122–137. (Acceptance ratio for full papers 14/37)
  70. Wuliang Sun, Robert France and Indrakshi Ray, “Supporting Iterative Development of Robust Operation Contracts in UML Requirements Models”, *Proceedings of the 13th IEEE International High Assurance Systems Engineering Symposium*, Boca Raton, FL, November 2011, pages 9–16.
  71. Lijun Yu, Robert B. France, Indrakshi Ray, and Wuliang Sun, “Systematic Scenario-Based Analysis of UML Design Class Models”, *Proceedings of the 17th IEEE International Conference on Engineering of Complex Computer Systems*, Paris, France, July 2012, pages 86–95. (Acceptance rate 29%)
  72. Xing Xie, Indrakshi Ray, Raman Adaikkalavan, and Rose Gamble, “Information Flow Control for Stream Processing in the Clouds”, *Proceedings of the 18th Symposium on Access Control Models and Technologies*, Amsterdam, The Netherlands, June 2013, pages 89–100. (Acceptance ratio 19/62)
  73. Ramadan Abdunabi, Indrakshi Ray, and Robert France, “Specification and Analysis of Access Control Policies for Mobile Applications”, *Proceedings of the 18th Symposium on Access Control Models and Technologies*, Amsterdam, The Netherlands, June 2013, pages 173–184. (Acceptance ratio 19/62)
  74. Mustafa Al-Lail, Ramadan Abdunabi, Robert France, and Indrakshi Ray, “Rigorous Analysis of Temporal Access Control Properties in Mobile Systems (Short Paper)”, *Proceedings of the 18th International Conference on Engineering of Complex Computer Systems*, Singapore, July 2013, pages 246–251. (Acceptance ratio for all papers: 38/102)
  75. Indrajit Ray, Dieudonne Mulamba, Indrakshi Ray, and Keesook Han, “A Model for Trust-based Access Control and Delegation in Mobile Clouds”, *Proceedings of the 27th Annual IFIP WG 11.3 Working Conference on Data and Applications Security and Privacy*, Newark, New Jersey, July 2013, pages 242–257. (Acceptance ratio for full papers: 16/45)
  76. Wuliang Sun, Robert France, and Indrakshi Ray, “Contract-Aware Slicing of UML Class Models”, *Proceedings of the ACM/IEEE 16th International Conference on Model Driven Engineering Languages and Systems*, Miami, Florida, September 2013, pages 724–739. (Acceptance ratio: 30/130)

77. Xing Xie, Indrakshi Ray, and Raman Adaikkalavan, "On the Efficient Processing of Multi-level Secure Continuous Queries (Short Paper)", *Proceedings of the ASE/IEEE International Conference on Privacy, Security, Risk and Trust*, Washington D.C., September 2013, pages 417–422. (Acceptance rate for short papers: 7%)
78. Kirill Belyaev, Indrakshi Ray, Indrajit Ray, and Gary Luckasen, "Personal Health Record Storage on Privacy Preserving Green Clouds", *Proceedings of the 9th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, Austin, TX, October 2013. pages 448–457. (Acceptance rate: 27%)
79. Tarik Moataz, Nora Cuppens-Boulahia, Frederic Cuppens, Indrajit Ray, and Indrakshi Ray, "ELITE: zEro Links Identity management systEm", *Proceedings of the 28th Annual IFIP WG 11.3 Working Conference on Data and Applications Security and Privacy*, Vienna, Austria, July 2014. (Acceptance ratio: 22/63)
80. Tarik Moataz, Benjamin Justus, Nora Cuppens-Boulahia, Frederic Cuppens, and Indrajit Ray, "Privacy-Preserving Multiple Keyword Search on Outsourced Data in the Clouds", *Proceedings of the 28th Annual IFIP WG 11.3 Working Conference on Data and Applications Security and Privacy*, Vienna, Austria, July 2014. (Acceptance ratio: 22/63)
81. Negar Mosharraf, Anura P. Jayasumana, and Indrakshi Ray, "A Responsive Defense Mechanism against DDoS Attacks" (Short Paper), *Proceedings of the 7th International Symposium on Foundations and Practice of Security*, Montreal, Canada, November 2014. (Acceptance ratio including short papers: 25/48)
82. Phillipa Bennett, Indrakshi Ray, Robert B. France, "Analysis of a Relationship-Based Access Control Model", *Proceedings of the 8th International C\* Conference on Computer Science & Software Engineering*, Yokohama, Japan, July 2015.
83. Ibrahim Lazrig, Tarik Moataz, Indrajit Ray, Indrakshi Ray, Toan Ong, Michael G. Kahn, Frederic Cuppens, and Nora Cuppens-Boulahia, "Privacy-Preserving Record Matching Using Automated Semi-trusted Broker", *Proceedings of the 29th Annual IFIP WG 11.3 Working Conference on Data and Applications Security and Privacy*, Fairfax, VA, July 2015. (Acceptance ratio for full papers: 18/45)
84. Indrakshi Ray, Raman Adaikkalavan, Xing Xie, and Rose Gamble, "Stream Processing with Secure Information Flow Constraints", *Proceedings of the 29th Annual IFIP WG 11.3 Working Conference on Data and Applications Security and Privacy*, Fairfax, VA, July 2015. (Acceptance ratio for full papers: 18/45)
85. Kirill Belyaev and Indrakshi Ray, "Towards Efficient Dissemination and Filtering of XML Data Streams", *Proceedings of the 13th IEEE International Conference on Dependable, Autonomous, and Secure Computing*, Liverpool, UK, October 2015. (Acceptance ratio 30%)
86. Phillipa Bennett, Indrakshi Ray, and Robert France, "Modeling of Online Social Network Policies using Attribute-Based Access Control Framework", *Proceedings of the 11th International Conference on Information Systems Security*, Kolkata, India, December 2015.

### **Workshop and Fast Abstracts Publications**

1. Indrajit Ray, Bruce Maxim, Kiumi Akingbehin, Indrakshi Ray and Qiang Zhu, "Design of a Center for Research in Information System Security", *Proceedings of the 18th Annual AoM/IAoM International Conference*, San Antonio, TX, August 2000, pages 131–136.

2. Geri Georg, Robert France and Indrakshi Ray, "An Aspect-Based Approach to Modeling Security Concerns Aspects", *Proceedings of the Workshop on Critical Systems Development using UML*, Dresden, Germany, September 2002, pages 107–120.
3. Robert France, Geri Georg and Indrakshi Ray, "Supporting Multi-Dimensional Separation of Concerns", *Proceedings of the Workshop on Aspect-Oriented Modeling with UML*, Boston, MA, March 2003.
4. Geri Georg, Robert France and Indrakshi Ray, "Creating Security Mechanism Aspect Models from Abstract Aspect Security Models", *Proceedings of the Workshop on Critical Systems Development using UML*, San Francisco, CA, October 2003.
5. Geri Georg, Robert France and Indrakshi Ray, "Composing Aspect Models", *Proceedings of the Workshop on Aspect-Oriented Modeling with UML*, San Francisco, CA, October 2003.
6. Robert France, Sudipto Ghosh, Indrakshi Ray, James Bieman and Roger Alexander, "Evaluating Competing Dependability Concern Realizations in an Aspect-Oriented Modeling Framework", *Supplementary Proceedings of the International Symposium on Software Reliability Engineering*, Denver, CO, November 2003. (Acceptance ratio 40/51)
7. Shuxin Yin, Indrakshi Ray and Indrajit Ray, "A Trust Model for Pervasive Computing Environments", *Proceedings of Workshop on Trusted Collaboration*, November 2006.
8. Indrakshi Ray, Geri Georg and Siv Hilde Houmb, "An Aspect-Oriented Risk-Driven Approach for Developing Mission Critical Applications", Position Paper accepted in *National Workshop on High-Confidence Software Platforms for Cyber-Physical Systems*, Alexandria, Virginia, November 2006.
9. Nayot Poolsappasit and Indrakshi Ray, "Towards a Scalable Model for Location Privacy", *Proceedings of International Workshop on Security and Privacy in GIS and LBS*, Irvine, California, November 2008, pages 46–51.
10. Indrakshi Ray, "Challenges in Securing Pervasive Computing Applications", *Proceedings of the NSF Workshop on Data and Applications Security*, Arlington, Virginia, February 2009.
11. Indrakshi Ray and Indrajit Ray, "Access Control Challenges for Cyber-Physical Systems", *Proceedings of the 1st Workshop on Cyber-physical Systems Security*, Newark, New Jersey, July 2009.
12. Indrakshi Ray, Sanjay Madria, and Mark Linderman, "Query Plan Execution in a Heterogeneous Stream Management System for Situational Awareness", *Proceedings of the 5th Workshop on Dependable Network Computing and Mobile Systems*, Irvine, California, October 2012, pages 424–429.
13. Sarra M. Alqahtani, Rose Gamble, and Indrakshi Ray, "Auditing Requirements for Implementing the Chinese Wall Model in the Service Cloud", *Proceedings of the International Workshop on Cloud Security Auditing*, Santa Clara, California, June 2013, pages 298–305.
14. Xing Xie, Indrakshi Ray, Waruna Ranasinghe, Philips A. Gilbert, Pramod Shashidhara, and Anoop Yadav, "Query Plan Execution in a Heterogeneous Stream Management System for Situational Awareness", *Proceedings of the 12th International Workshop on Assurance in Distributed Systems and Networks*, Philadelphia, July 2013, pages 368–373.
15. Wuliang Sun, Robert France, and Indrakshi Ray, "Analyzing Behavioral Refactoring of Class Models", *Proceedings of the Workshop on Models and Evolution*, Miami, Florida, October 2013, pages 70–79.
16. Mustafa Al-Lail, Ramadan Abdunabi, Robert France and Indrakshi Ray, "An Approach to Analyzing Temporal Properties in UML Class Models", *Proceedings of the 10th Interna-*

- tional Workshop on Model Driven Engineering, Verification and Validation*, Miami, Florida, October 2013, pages 77–86.
17. Prabhakaran Murugesan and Indrakshi Ray, “Audit Log Management in MongoDB”, *Proceedings of the International Workshop on Cloud Security Auditing co-located with IEEE World Congress on Services*, Anchorage, Alaska, June 2014, pages 53–57.
  18. Curtis C. R. Busby Earle, Robert B. France and Indrakshi Ray, “Analysing Requirements to Detect Latent Security Vulnerabilities”, *Trustworthy Computing Workshop co-located with International Conference on Software Security and Reliability*, San Francisco, California, June 2014, pages 168–175.
  19. Thilina Buddhika, Indrakshi Ray, Mark Linderman and Anura Jayasumana, “Secure Complex Event Processing in a Heterogeneous and Dynamic Network”, *Proceedings of SPIE 9079, Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR*, Baltimore, Maryland, June 2014.
  20. Phillipa Bennett, Wuliang Sun, Wade Ted, Geri Georg, Indrakshi Ray and Michael Kahni, “Analyzing Regulatory Conformance in Medical Research Systems Using Multi-Paradigm Modeling”, *Proceedings of the 9th International Workshop on Multi-Paradigm Modeling*, Ottawa, Canada, October 2015.
  21. Andy Hsu and Indrakshi Ray, “Specification and Enforcement of Location-Aware Attribute-Based Access Control for Online Social Networks”, *Proceedings of ACM Workshop on Attribute Based Access Control*, New Orleans, March 2016.

### **Other Refereed Publications**

1. Indrajit Ray and Indrakshi Ray, “Fair-Exchange in E-Commerce”, *SIGecom Exchanges*, Volume 3.2, Spring 2002, pages 9–17.

### **Books Edited**

- Editor (with Sabrina De Capitani di Vimercati and Indrajit Ray), *Data and Applications Security XVII: Status and Prospects*, July 2004.
- Editor (with Vijay Atluri), *Journal on Digital Libraries*, Special Issue on Security, Volume 4, Number 3, 2004.
- Editor (with David Ferraiolo), *ACM Symposium on Access Control Models and Technologies*, June 2006.
- Editor, *ACM Transactions on Information and System Security*, Special Issue, Volume 11, Number 1, 2008.
- Editor (with Ninghui Li), *ACM Symposium on Access Control Models and Technologies*, June 2008.
- Editor (with Guojun Wang, Dengguo Feng, Muttukrishnan Rajarajan), *International Symposium on Cyberspace Safety and Security*, November 2013.
- Editor (with Aditya Bagchi), *International Conference on Information Systems and Security*, December 2013.

## **Contracts and Grants**

### **Funded Projects as PI**

- Indrakshi Ray, “EAGER: Collaborative: Toward a Test Bed for Heavy Vehicle Cyber Security Experimentation”, National Science Foundation, 1/16– 12/17, \$129,999 (CSU Budget) with University of Tulsa.
- Indrakshi Ray, Indrajit Ray, and Christos Papadopoulos, “Planning Grant: I/UCRC for Joining Center for Configuration Analytics and Automation”, National Science Foundation, 08/15– 07/16, \$14,500.
- Indrakshi Ray, “Access Control Management in Linux Environments”, National Institute of Standards, 08/15–07/16, \$74,702.
- Indrakshi Ray, “SHF: Small: Scenario-Based Validation of Design Models”, National Science Foundation, (managed after the untimely demise of my colleague Dr. Robert France).
- Indrakshi Ray, “Privacy Preserving Information Disclosure in Social Networks”, National Institute of Standards, 06/14–05/15, \$34,956.
- Indrakshi Ray, “Toward Automated Policy Compliance Checking for Health Databases”, Colorado State University Internal Grant, 01/15–06/15, \$12,000.
- Indrakshi Ray and Indrajit Ray, “Addressing Security Challenges in Pervasive Computing Applications”, Air Force Office of Scientific Research, 12/06–05/10, \$467,952.
- Indrakshi Ray and Robert France, “Specification, Analysis, Integration and Evolution of Security Policies using Aspects”, Air Force Office of Scientific Research, 02/04 – 02/07, \$300,024.
- Indrakshi Ray and Indrajit Ray, “Designing Fail-Soft E-commerce Protocols Using Formal Methods”, Summer Research Grant, University of Michigan-Dearborn, 2000, \$5000.
- Indrakshi Ray, Indrajit Ray and Bruce Maxim, “Design and Verification of Secure E-Commerce Protocol”, Faculty Research Grant, University of Michigan-Dearborn, 1999, \$1,700.

### **Funded Projects as Co-PI**

- Geri Georg and Indrakshi Ray, “Development of ID Source for First Release”, United States Department of Agriculture, 08/09 – 08/10, \$36,749.
- Indrajit Ray and Indrakshi Ray, “A Framework for Secure and Survivable Transaction Processing”, National Science Foundation, 06/03 – 05/06, \$152,228.
- Indrajit Ray and Indrakshi Ray, “A Model of Trust for Developing Trustworthy Systems from Untrustworthy Actors”, Air Force Research Laboratory, 05/03 – 05/06, \$318,498.
- Indrajit Ray, Indrakshi Ray, Kiumi Akingbehin, Bruce Maxim, and Qiang Zhu, “Acquisition of Instruments for Research in Computer and Network Security”, National Science Foundation, Major Research Instrumentation, 09/99–08/01, \$157,937.
- Bruce Maxim, Ken Modesitt, Indrakshi Ray and Indrajit Ray, “High Resolution Portable Multimedia”, Chancellor’s Technology Grant, University of Michigan-Dearborn, 1998, \$1,000.

### **Funded Projects as Senior Personnel**

- James Bieman, Lars Eisen (contact), Sudipto Ghosh, Saul Lozano-Fuentes, “Use of cell phones for field data capture in a Dengue Decision Support System”, National Institute of Health, 07/2009 – 07/2011, \$365,971.



## Professional Presentations

1. 1996 *Ensuring Atomicity of Multilevel Transactions*, IEEE Symposium on Security and Privacy, Oakland, CA.
2. 1997 *Using Formal Methods for Semantics-Based Decomposition of Transactions*, Oakland University, Rochester, MI.
3. 1997 *Using Formal Methods for Semantics-Based Decomposition of Transactions*, University of Michigan–Dearborn, Dearborn, MI.
4. 2001 *Failure Analysis of an E-Commerce Protocol using Model Checking*, International Workshop on Advanced Issues of E-Commerce and Web-based Information Systems, San Jose, CA.
5. 2000 *Designing Failure-Resilient E-Commerce Protocol Using Model Checking*, Georgia State University, Atlanta, GA.
6. 2000 *Designing Failure-Resilient E-Commerce Protocol Using Model Checking*, Colorado State University, Fort Collins, CO.
7. 2001 *Designing Failure-Resilient E-Commerce Protocol Using Model Checking*, University of Texas at Arlington, Arlington, TX.
8. 2001 *Designing Failure-Resilient E-Commerce Protocol Using Model Checking*, Washington State University, Pullman, WA.
9. 2001 *Designing Failure-Resilient E-Commerce Protocol Using Model Checking*, University of Maryland Baltimore County, Baltimore, MD.
10. 2001 *An Anonymous Fair-Exchange E-Commerce Protocol*, International Workshop on Internet Computing and E-Commerce, San Francisco, CA.
11. 2001 *Using Compatible Keys for Secure Multicasting in E-Commerce*, International Workshop on Internet Computing and E-Commerce, Fort Lauderdale, FL.
12. 2002 *Designing High Integrity Systems Using Aspects*, Annual IFIP WG 11.5 Conference on Integrity and Internal Control in Information Systems, Bonn, Germany.
13. 2003 *Multi-level Secure Rules and Its Impact on the Design of Active Databases*, British National Conference on Databases, Coventry, U.K.
14. 2003 *Concurrent and Real-Time Update of Access Control Policies*, International Conference on Databases and Expert Systems, Prague, Czech Republic.
15. 2003 *Using Parameterized UML to Specify and Compose Access Control Models*, Annual IFIP WG 11.5 Conference on Integrity and Internal Control in Information Systems, Lausanne, Switzerland.
16. 2003 *Grand Challenges in Integrity and Data Quality*, Annual IFIP WG 11.5 Conference on Integrity and Internal Control in Information Systems, Panelist, Lausanne, Switzerland.
17. 2004 *Concurrency Control in Mobile Database Systems*, International Conference on Advanced Networking and Applications, Fukuoka, Japan.
18. 2004 *An Aspect-Based Approach for Specification, Validation, Integration and Evolution of Security Policies*, AFOSR PI Meeting, Ithaca, NY.
19. 2004 *Using UML to Visualize Role-Based Access Control Constraints*, ACM Symposium on Access Control Models and Technologies, Yorktown Heights, NY.
20. 2004 *Reducing Damage Assessment Latency in Survivable Databases*, British National Conference on Databases, Edinburgh, Scotland.
21. 2004 *Implementing Real-Time Update of Access Control Policies*, Annual IFIP WG 11.3

- Conference on Data and Applications Security, Sitges, Spain.
22. 2004 *Ensuring Task Dependencies During Workflow Recovery*, International Conference on Database and Expert Systems, Zaragoza, Spain.
  23. 2004 *An Anonymous Fair-Exchange E-Commerce Protocol*, Invited Talk at IBM Boulder, Boulder, CO.
  24. 2004 *An Anonymous Fair-Exchange E-Commerce Protocol*, Invited Talk at Purdue University, West Lafayette, IN.
  25. 2004 *Using Schemas to Simplify Access Control for XML Documents*, International Conference on Distributed Computing and Internet Technologies, Bhubaneswar, India.
  26. 2005 *Relational Database Operations Modeling with UML*, IEEE International Conference on Advanced Information Networking and Applications, Taipei, Taiwan.
  27. 2005 *Detecting Dependency Conflicts in Advanced Transaction Models*, International Database Engineering and Applications Symposium, Montreal, Canada.
  28. 2005 *Specification, Analysis, Integration and Evolution of Security Policies using Aspects*, AFOSR PI Meeting, Rome, NY.
  29. 2005 *Recovering from Malicious Attacks in Workflow Systems*, International Conference on Database and Expert Systems, Copenhagen, Denmark.
  30. 2005 *Towards a Location-Aware Role-Based Access Control Model*, IEEE Conference on Security and Privacy for Emerging Areas in Communication Networks, Athens, Greece.
  31. 2005 *Event Detection in Multilevel Secure Active Databases*, International Conference on Information Systems Security, Kolkata, India.
  32. 2005 *Validation of Policy Integration using Alloy*, International Conference on Distributed Computing and Internet Technologies, Bhubaneswar, India.
  33. 2006, *An Anonymous Fair-Exchange E-Commerce Protocol*, Invited Talk at University of Pittsburgh, Pittsburgh, PA.
  34. 2006 *An Aspect-Based Approach for Specification, Analysis, Integration and Evolution of Security Policies*, AFOSR PI Meeting, Verona, NY.
  35. 2006 *On the Completion of Workflows*, International Conference on Database and Expert Systems Applications, Krakow, Poland.
  36. 2006 *An Aspect-Based Approach for Developing Secure Applications*, Invited Talk at Hogeschool Utrecht, Utrecht, The Netherlands.
  37. 2006 *LRBAC: A Location-Aware Role-Based Access Control Model*, International Conference on Information Systems Security, Kolkata, India.
  38. 2006 *An Aspect-Oriented Risk-Driven Development of Critical Applications*, National Workshop on High-Confidence Software Platforms for Cyber-Physical Systems, Alexandria, VA.
  39. 2006 *An Aspect-Based Approach for Specification, Analysis, Integration and Evolution of Security Policies*, Keynote Talk, International Conference on Advanced Computing and Communications, Mangalore, India.
  40. 2007 *A Framework for Developing Secure Systems*, Cyber Defense Conference, Rome, New York.
  41. 2007 *A Method for Early Correspondence Detection Using Instance Data*, International Conference on Enterprise Information Systems, Funchal, Portugal.
  42. 2007 *Addressing Security Challenges in Pervasive Computing Applications*, AFOSR PI meeting, Rome, New York.
  43. 2008 *Optimizing On-Demand Data Broadcast Scheduling in Pervasive Environments*, Inter-

- national Conference on Extending Database Technology, Nantes, France.
44. 2008 *Security Provisioning in Pervasive Environments Using Multi-Objective Optimizations*, Cyber Defense Conference, Rome, New York.
  45. 2008 *Addressing Security Challenges in Pervasive Computing Applications*, AFOSR PI meeting, Arlington, VA.
  46. 2008 *On the Formal Analysis of a Spatio-Temporal Role-Based Access Control Model*, IFIP WG 11.3 Conference on Data and Applications Security, London, U.K.
  47. 2008 *Securing Pervasive Computing Applications*, Keynote Talk at the International Symposium on Trusted Computing, Zhang Jia Jie, China.
  48. 2009 *Access Control in Computing Systems*, Invited Talk at Information Security Education and Awareness Workshop, Guwahati, India.
  49. 2009 *Challenges in Securing Pervasive Computing Applications*, NSF Workshop on Data and Applications Security, Arlington, VA.
  50. 2009 *Ensuring Spatio-Temporal Access Control for Real-World Applications*, ACM Symposium on Access Control Models and Technologies, Stresa, Italy.
  51. 2009 *Addressing Security Challenges in Pervasive Computing Applications*, AFOSR PI meeting, Arlington, VA.
  52. 2009 *Access Control Challenges for Cyber-Physical Systems*, DHS: S&T Workshop on Future Directions in Cyber-physical Systems Security, Newark, New Jersey.
  53. 2009 *Towards Trustworthy Delegation in Role-Based Access Control Model*, Information Security Conference, Pisa, Italy.
  54. 2009 *Information Security Research at Colorado State University*, PSG Tech, Coimbatore, India.
  55. 2010 *Computer Science Research at Colorado State University*, Jadavpur University, Kolkata, India.
  56. 2010 *Computer Science Research at Colorado State University*, Bengal Engineering and Science University, Kolkata, India.
  57. 2011 *Multilevel Secure Data Stream Processing*, Richmond, VA.
  58. 2012 *Query Plan Execution in a Heterogeneous Stream Management System for Situational Awareness*, Air Force Research Laboratory, Rome, NY.
  59. 2013 *Specification and Analysis of Access Control Policies for Mobile Applications*, ACM Symposium on Access Control Models and Technologies, Amsterdam, The Netherlands.
  60. 2013 *Information Flow Control for Stream Processing in the Clouds*, ACM Symposium on Access Control Models and Technologies, Amsterdam, The Netherlands.
  61. 2013 *Distributed Multilevel Secure Data Stream Processing*, International Workshop on Assurance in Distributed Systems and Networks, Philadelphia, PA.
  62. 2013 *Secure Real-Time Auditing in the Clouds*, Air Force Research Laboratory, Rome, NY.
  63. 2014 *Secure Complex Event Processing in a Heterogeneous and Dynamic Network*, SPIE Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR, Baltimore, MD.
  64. 2014 *Information Security Research at Colorado State University*, Industrial Advisory Board Meeting Center for Configuration Analytics and Automation, Charlotte, NC.
  65. 2015 *Information Security Research at Colorado State University*, Industrial Advisory Board Meeting Center for Configuration Analytics and Automation, Fairfax, VA.
  66. 2015 *Stream Processing with Information Flow Constraints*, IFIP WG 11.3 Working Con-

- ference on Data and Applications Security, Fairfax, VA.
67. 2015 *Information Security Research at Colorado State University*, Industrial Advisory Board Meeting Center for Configuration Analytics and Automation, Charlotte, NC.

## Professional Affiliations and Activities

**Professional Affiliations** ACM, ACM SIGSAC, IFIP WG 11.3, UPE, IEEE (Senior)

**Editorship** Associate Editor, IEEE Transactions on Secure and Dependable Computing.

Editorial Board Member, Journal of Autonomic and Trusted Computing, American Scientific Publishers.

Editorial Board Member, Computer Standards and Interfaces, Elsevier.

Editor (with Vijay Atluri), Special Issue on Security, Journal on Digital Libraries, Springer-Verlag, Volume 4, Number 3, November 2004.

Editor, Special Issue, ACM Transactions on Information and System Security, Volume 11, Number 1, February 2008.

**Conference/Workshop Chair** Program Co-Chair, 9th International Conference on Security, Privacy, and Anonymity in Computation, Communication and Storage, Zhangjiajie, China, November 2016.

Program Co-Chair, 9th International Conference on Information Systems Security, Kolkata, India, December 2013.

Program Co-Chair, The 5th International Symposium on Cyberspace Safety and Security, Zhangjiajie, China, November 2013.

Program Co-Chair, The 3rd International Symposium on Security and Privacy in Internet of Things, Melbourne, Australia, July 2013.

Program Co-Chair, The 1st International Workshop on Cloud Security Auditing (in association with the 9th IEEE World Congress on Services), July 2013.

Program Co-Chair, The 2nd International Symposium on Security and Privacy in Internet of Things, Liverpool, U.K., June 2012.

Program Co-Chair, The IEEE/IFIP International Symposium on Trust, Security and Privacy for Pervasive Applications, Shanghai, China, December 2008.

General Chair, 13th ACM Symposium on Access Control Models and Technologies, Estes Park, CO, June 2008.

Program Chair, 11th ACM Symposium on Access Control Models and Technologies, Lake Tahoe, CA, June 2006.

Program Co-Chair, 14th International Conference on Advanced Computing and Communications, Mangalore, India, December 2006.

Program Co-Chair, IEEE International Workshop on Trusted and Autonomic Computing Systems, Vienna, Austria, April 2006.

Program Co-Chair, 17th Conference on IFIP WG 11.3 on Data and Applications Security, Estes Park, CO, August 2003.

**Track Chair** The 4th International Conference on Future Internet of Things and Cloud, Vienna, Austria, August 2016.

The 8th International Conference on Mobile Web Information Systems, Niagara Falls, Canada, September 2011, 2012.

The IEEE 23rd International Conference on Advanced Information Networking and Applications, Bradford, U.K., May 2009.

International Conference on Distributed Computing and Internet Technology, Bhubaneswar, India, December 2004.

**Steering Committee Member** ACM Symposium on Access Control Models and Technologies (SACMAT) 2008–present.

**International Liaison Chair** Third International Conference on Autonomic and Trusted Computing, Wuhan and Three Gorges, China, September 2006.

**Program Committee Member** ACM Symposium on Access Control Models and Technologies (SACMAT) 2004 – 2016.

WG 11.3 Working Conference on Data and Applications Security (DBSec) 2004 – 2015.

WG 11 International Conference on Information Security and Privacy (SEC) 2014 – 2016.

International Conference on Distributed Computing Systems (ICDCS) (Security and Privacy) 2014.

European Symposium on Research in Computer Security (ESORICS) 2008, 2011 – 2014.

International Conference on Network and System Security (NSS) 2009 – 2015.

International Symposium on Security in Collaboration Technology and Systems (SECOTS) 2012, 2014.

International Workshop on Security in Information Systems (WOSIS) 2005 – 2015.

International Workshop on Assurance in Distributed Systems and Network (ADSN) 2014.

ACM International Conference on Distributed Event-Based Systems (DEBS) (Poster and Demo Track) 2013.

IEEE International Conference on e-Business Engineering (ICEBE) (Software Engineering for e-Business) 2013 – 2014.

International Workshop on Information Systems Security Engineering (WISSE) 2012 – 2013.

International Conference on Mobile Web Information Systems (MobiWIS) 2013.

Workshop on Redefining and Integrating Security Engineering (RISE) 2012.

International Workshop on Risk and Trust in Safety Critical Systems (RTW) 2012.

International Conference on Collaborative Computing: Networking, Applications and Work-sharing (CollaborateComm) 2010 - 2011.

ACM GIS International Workshop on Security and Privacy in GIS and LBS (SPRINGL), 2010.

International Workshop on Privacy and Anonymity in the Information Society (PAIS) 2009 – 2011.

Information Security Conference (ISC) 2009.

International Conference on Data Engineering (ICDE) 2008.

International Workshop on Adaptive Systems in Heterogeneous Environments (ASHEs) 2008 – 2010.

International Conference on Database Systems for Advanced Applications (DASFAA) 2007 – 2008.

IEEE International Conference on Advanced Information Networking and Applications (AINA) 2006 – 2008.

International Conference on Intelligent Pervasive Computing (IPC) 2007.

International Workshop on Mobile and Ubiquitous Context Aware Systems and Applications (MUBICA) 2007.

International Conference on Self-Organization and Autonomous Systems in Computing and Communications (SOAS) 2007.

International Conference on Information Systems Security (ICISS) 2005 – 2007.

International Conference on E-commerce and Web Technologies (EC-Web) 2003 – 2008.

International Workshop on Self-Adaptive and Autonomic Systems (SAACS) 2003 – 2007.

International Conference on Autonomic and Trusted Computing (ATC) 2008.

International Workshop on Secure Systems Methodologies Using Patterns (SPattern) 2007 – 2009.

IEEE International Conference on Information Reuse and Integration (IRI) 2006 – 2007.

International Conference on Security and Cryptography (SECRYPT) 2006 – 2009.

Workshop on Trusted Collaboration (TrustCol) 2006.

International Symposium on Ubiquitous Intelligence and Smart Worlds (UISW) 2005.

International Conference on Distributed Computing and Internet Technology (ICDCIT) 2005.

ACM Conference on Computer and Communications Security (CCS) 2003 – 2004.

International Workshop on P2P Data Management, Security and Trust (PDMST) 2004.

Conference on Extending Database Technology (EDBT) 2004.

IFIP TC-11 WG 11.5 Working Conference on Integrity and Internal Control in Information Systems (IICIS) 2002 – 2004.

International Conference on Data Warehousing and Knowledge Discovery (DaWaK) 2003.

International Conference on Mobility in Databases and Distributed Systems (MDDS) 2003.

IEEE Conference on Electronic Commerce, (CEC) 2003.

Program Committee Member, Design Analysis and Simulation of Distributed Systems, Orlando, FL, March 2003.

International Conference on Security and Management (SAM) 2002.

**Publications Chair** Fourteenth International Symposium on Software Reliability Engineering (IS-SRE) 2003.

## **Review Activities**

**Grants** Panelist, National Science Foundation, 2002 – 2007, 2012, 2014, 2015.

Reviewer, Air Force Office of Scientific Research, 2007 – 2009.

Reviewer, Aides a La Formation Recherche, Luxembourg, 2010.

**Journals** ACM Transactions on Information and System Security

ACM Transactions on Internet Technology

IEEE Proceedings Information Security

IEEE Transactions on Dependable and Secure Computing

IEEE Transactions on Knowledge and Data Engineering

IEEE Transactions on Mobile Computing

IEEE Transactions on Parallel and Distributed Systems

Distributed and Parallel Databases: An International Journal

International Journal of Cooperative Information Systems

Information Systems

Journal of Computer Security  
Journal on Digital Libraries  
Software and Systems Modeling Journal

### **University Service**

AY 97–01: Member, Graduate Committee, CIS Department, University of Michigan – Dearborn.  
AY 00–01: Member, Chair Search Committee, CIS Department, University of Michigan – Dearborn.  
AY 01–02: Member, Undergraduate Committee, CS Department, Colorado State University.  
AY 02–03: Member, Chair Search Committee, CS Department, Colorado State University.  
AY 02–04: Member, Graduate Committee, CS Department, Colorado State University.  
AY 04–05: Member, Undergraduate Committee, CS Department, Colorado State University.  
AY 05–06: Member, Graduate Committee, CS Department, Colorado State University.  
AY 07–08: Member, Faculty Search Committee, CS Department, Colorado State University.  
AY 08–09: Member, Graduate Committee, CS Department, Colorado State University.  
AY 02–04: Member, Graduate Committee, CS Department, Colorado State University.  
AY 04–05: Member, Natural Sciences Learning Task Force Committee, College of Natural Sciences, Colorado State University.  
AY 06: Member, Research Advisory Committee, Information Science & Technology Center, Colorado State University.  
AY 06–07: Chair, Research Committee, CS Department, Colorado State University.  
AY 08–09: Member, Graduate Committee, CS Department, Colorado State University.  
AY 09–11: Chair, Graduate Recruitment Committee, CS Department, Colorado State University.  
AY 11–12: Chair, Policy and Procedures Committee, CS Department, Colorado State University.  
AY 12–14: Member, Graduate Recruitment Committee, CS Department, Colorado State University.  
AY 10–14: Executive Committee Member, CS Department, Colorado State University.  
AY 14–16: Diversity Committee Chair, CS Department, Colorado State University.

**Undergraduate Students** Steven Dibenedetto (Summer 2006 – 2007), Daniel Owens (Summer 2006), Eric Rotaru (Summer 2009)

### **Current Graduate Advisees**

1. Mustafa Al Lail Ph.D.
2. Majdi Alnnfai Ph.D.
3. Kirill Belyaev Ph.D.
4. Negar M. Ghahfarokhi Ph.D. (Co-advisee)
5. Ibrahim Lazrig Ph.D.
6. Tarik Moataz Ph.D. (Co-advisee)

### **Graduate Advisees (Completed)**



1. Greg Turgeon, 2001, (M.S.) University of Michigan Dearborn
2. Nayot Poolsappasit, 2004, (M.S.) Colorado State University
3. Yajie Zhu, 2005, (M.S.) Colorado State University
4. Wei Huang, 2006, (M.S.) Colorado State University
5. Mariappan Rajaram (Co-advisee), 2008, (M.S.) Colorado State University
6. Kyle Haefner, 2009 (M.S.) Colorado State University
7. Tai Xin, 2006, (Ph.D.) Colorado State University
8. Eunjee Song (Co-advisee), 2007, (Ph.D.) Colorado State University
9. Sudip Chakraborty (Co-advisee), 2008, (Ph.D.) Colorado State University
10. Nayot Poolsappasit (Co-advisee), 2010, (Ph.D.) Colorado State University
11. Manachai Toahchoodee, 2010, (Ph.D.) Colorado State University
12. Kevin Burnett (Co-advisee), 2012, (M.S.) Colorado State University
13. Ramadan Abdunabi, 2013, (Ph.D.) Colorado State University
14. Xing Xie, 2013, (Ph.D.) Colorado State University
15. Wuliang Sun, 2015, (Ph.D.) Colorado State University

### **Visiting Scholars**

Anna Cinzia Squicciarini, Ph.D. Student, University of Milan (March 2004 – July 2004).

Ivan Paloscia, Undergraduate Student, University of Milan (May 2004 – August 2004).