

Vinod Ganapathy

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1 RESEARCH INTERESTS

Computer security and privacy, especially in the context of operating systems, cloud computing, Web applications and browsers, and mobile devices. Other areas of research include software engineering and program analysis.

2 EDUCATION

- **University of Wisconsin**, Madison, Wisconsin, USA.
 - ▷ *Ph.D. in Computer Science* August 2007
Dissertation title: “Retrofitting Legacy Code for Authorization Policy Enforcement” [T1].
Advisor: Professor Somesh Jha.
 - ▷ *M.S. in Computer Science* May 2003
- **Indian Institute of Technology Bombay**, Mumbai, India.
 - ▷ *B.Tech. in Computer Science & Engineering* August 2001
Thesis title: “Efficient Verification of Synchronous Programs” [T2].

3 CURRENT EMPLOYMENT

- **Rutgers University**, New Brunswick, New Jersey, USA September 2007 onwards
Assistant Professor of Computer Science.

4 PREVIOUS WORK EXPERIENCE

- **University of Wisconsin-Madison** September 2001–August 2007
Graduate Research Assistant
- **IBM T.J. Watson Research Center** May 2005–August 2005
Intern (Secure Systems Department)
- **Microsoft Research, Redmond** May 2004–August 2004
Intern (Runtime Analysis and Design Group)
- **Indian Institute of Technology Bombay** July 2000–May 2001
Undergraduate Research Assistant
- **Tata Institute of Fundamental Research** May 2000–July 2000
Intern (Visiting Students’ Research Program)

5 DISTINCTIONS

- NSF Faculty Early Career Development (CAREER) Award, 2010.
- Outstanding Student Paper Award at the 25th Annual Computer Security Applications Conference (December 2009, for paper [C8]).
- Outstanding Student Paper Award at the 24th Annual Computer Security Applications Conference (December 2008, for paper [C13]).
- Visiting Students’ Research Scholarship, awarded by Tata Institute of Fundamental Research, Mumbai (May 2000).

6 SCIENTIFIC PUBLICATIONS

Theses

- [T1] “Retrofitting Legacy Code for Authorization Policy Enforcement,” Vinod Ganapathy, PhD dissertation, University of Wisconsin-Madison, Madison, Wisconsin, USA, August 2007, Supervised by Professor Somesh Jha.
- [T2] “Efficient Verification of Synchronous Programs,” Vinod Ganapathy, Senior thesis, Indian Institute of Technology Bombay, Powai, Mumbai, May 2001, Supervised by Professor S. Ramesh.

Book Chapters

- [B1] “Dynamic Analysis,” Mihai Christodorescu, and Vinod Ganapathy, In *Encyclopedia of Cryptography and Security (2nd Edition)*, H. C. A. van Tilborg and S. Jajodia, editors. Springer, 2011, pages 365–367. DOI:10.1007/978-1-4419-5906-5.
- [B2] “Identifying Systemic Threats to Kernel Data: Attacks and Defense Techniques,” Arati Baliga, Pandurang Kamat, Vinod Ganapathy, and Liviu Iftode, In *Advanced Operating Systems and Kernel Applications: Techniques and Technologies*, Y. Wiseman and S. Jiang, editors. Information Science Reference (IGI Global), September 2009, Chapter 3, pages 46–70. DOI:10.4018/978-1-60566-850-5.ch003.
- [B3] “Analysis of COTS for Security Vulnerability Remediation,” Gogul Balakrishnan, Mihai Christodorescu, Vinod Ganapathy, Jonathon T. Giffin, Shai Rubin, Hao Wang, Somesh Jha, Barton P. Miller, and Thomas Reps, In *Department of Defence Sponsored Information Security Research: New Methods for Protecting against Cyber Threats*, C. Wang, S. King, R. Wachter, R. Herklotz, C. Arney, G. Toth, D. Hislop, S. Heise, and T. Combs, editors. Wiley Publishing Inc., July 2007, pages 375–380.

Journal Articles

- [J1] “Fast, Memory-efficient Regular Expression Matching with NFA-OBDDs,” Liu Yang, Rezwana Karim, Vinod Ganapathy, and Randy Smith, *Computer Networks*, Volume 55, Number 15, October 2011, 3376–3393, Elsevier BV. DOI:10.1016/j.comnet.2011.07.002.
- [J2] “Detecting Kernel-Level Rootkits using Data Structure Invariants,” Arati Baliga, Vinod Ganapathy, and Liviu Iftode, *IEEE Transactions on Dependable and Secure Computing*, Volume 8, Number 5, September/October 2011, 670–684, IEEE Computer Society Press. DOI:10.1109/TDSC.2010.38.

Refereed Conference Papers

- [C1] “Enhancing JavaScript with Transactions,” Mohan Dhawan, Chung-chieh Shan, and Vinod Ganapathy, In *ECOOP’12: Proceedings of the 26th European Conference on Object-Oriented Programming*, Beijing, China, June 2012, Volume TBD of *Lecture Notes in Computer Science (LNCS)*, Springer, pages TBD. Accepted 30 out of 140 submissions (21.4%).
- [C2] “An Analysis of the Mozilla Jetpack Extension Framework,” Rezwana Karim, Mohan Dhawan, Vinod Ganapathy, and Chung-chieh Shan, In *ECOOP’12: Proceedings of the 26th European Conference on Object-Oriented Programming*, Beijing, China, June 2012, Volume TBD of *Lecture Notes in Computer Science (LNCS)*, Springer, pages TBD. Accepted 30 out of 140 submissions (21.4%).
- [C3] “Monitoring Data Structures using Hardware Transactional Memory,” Shakeel Butt, Vinod Ganapathy, Arati Baliga, and Mihai Christodorescu, In *RV’11: Proceedings of the 2nd International Conference on Runtime Verification*, San Francisco, California, September 2011, Volume 7186 of *Lecture Notes in Computer Science (LNCS)*, Springer, pages 345–359. Accepted 32 out of 75 submissions (42.4%).
- [C4] “K2C: Cryptographic Cloud Storage With Lazy Revocation and Anonymous Access,” Saman Zarandioon, Danfeng Yao, and Vinod Ganapathy, In *SecureComm’11: Proceedings of the 7th International ICST Conference on Security and Privacy in Communication Networks*, London, UK, September 2011, Volume 96 of *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering (LNICST)*, Springer, pages 491–510. Accepted 23 full and 13 short papers out of 95 submissions (24.2%).
- [C5] “Security versus Energy Tradeoffs in Host-based Mobile Malware Detection,” Jeffrey Bickford, H. Andrés Lagar-Cavilla, Alexander Varshavsky, Vinod Ganapathy, and Liviu Iftode, In *MobiSys’11: Proceedings of the 9th International Symposium on Mobile Systems, Applications, and Services*, Bethesda, Maryland, USA, June/July 2011, ACM Press, pages 225–238. DOI:10.1145/1999995.2000017, Accepted 25 out of 141 submissions (17.7%).
- [C6] “Improving NFA-based Signature Matching using Ordered Binary Decision Diagrams,” Liu Yang, Rezwana Karim, Vinod Ganapathy, and Randy Smith, In *RAID’10: Proceedings of the 13th International Symposium on Recent Advances in Intrusion Detection*, Ottawa, Canada, September 2010, Volume 6307 of *Lecture Notes in Computer Science*, Springer, pages 58–78, Journal version appears as [J1]. DOI:10.1007/978-3-642-15512-3_4, Accepted 24 out of 102 submissions (23.5%).

- [C7] “Protecting Commodity Operating System Kernels from Vulnerable Device Drivers,” Shakeel Butt, Vinod Ganapathy, Michael M. Swift, and Chih-Cheng Chang, In *ACSAC’09: Proceedings of the 25th Annual Computer Security Applications Conference*, Honolulu, Hawaii, December 2009, IEEE Computer Society Press, pages 301–310. DOI:10.1109/ACSAC.2009.35, Accepted 44 out of 226 submissions (19.6%).
- [C8] “Analyzing Information Flow in JavaScript-based Browser Extensions,” Mohan Dhawan, and Vinod Ganapathy, In *ACSAC’09: Proceedings of the 25th Annual Computer Security Applications Conference*, Honolulu, Hawaii, December 2009, IEEE Computer Society Press, pages 382–391, **Outstanding Student Paper Award**. DOI:10.1109/ACSAC.2009.43, Accepted 44 out of 226 submissions (19.6%).
- [C9] “Detecting Identity Spoofs in 802.11e Wireless Networks,” Gayathri Chandrashekar, John Austen Francisco, Vinod Ganapathy, Marco Gruteser, and Wade Trappe, In *GLOBECOM’09: Proceedings of the IEEE Global Communications Conference*, Honolulu, Hawaii, November/December 2009, IEEE Press, pages 1–6. DOI:10.1109/GLOCOM.2009.5426152, Acceptance rate: 34.8%.
- [C10] “Privately Querying Location-based Services with SybilQuery,” Pravin Shankar, Vinod Ganapathy, and Liviu Iftode, In *UbiComp’09: Proceedings of the 11th International Conference on Ubiquitous Computing*, Orlando, Florida, September/October 2009, ACM Press, pages 31–40. DOI:10.1145/1620545.1620550, Accepted 31 out of 251 submissions (12.35%).
- [C11] “Working Set-Based Access Control for Network File Systems,” Stephen Smaldone, Vinod Ganapathy, and Liviu Iftode, In *SACMAT’09: Proceedings of the 14th ACM Symposium on Access Control Models and Technologies*, Stresa, Italy, June 2009, ACM Press, pages 207–216. DOI:10.1145/1542207.1542241, Accepted 24 out of 75 submissions (32%).
- [C12] “OMOS: A Framework for Secure Communication in Mashup Applications,” Saman Zarandioon, Danfeng Yao, and Vinod Ganapathy, In *ACSAC’08: Proceedings of the 24th Annual Computer Security Applications Conference*, Anaheim, California, USA, December 2008, IEEE Computer Society Press, pages 355–364. DOI:10.1109/ACSAC.2008.25, Accepted 42 out of 173 papers (24.8%).
- [C13] “Automatic Inference and Enforcement of Kernel Data Structure Invariants,” Arati Baliga, Vinod Ganapathy, and Liviu Iftode, In *ACSAC’08: Proceedings of the 24th Annual Computer Security Applications Conference*, Anaheim, California, USA, December 2008, IEEE Computer Society Press, pages 77–86, **Outstanding Student Paper Award**. Journal version appears as [J2]. DOI:10.1109/ACSAC.2008.29, Accepted 42 out of 173 papers (24.8%).
- [C14] “Enforcing Authorization Policies using Transactional Memory Introspection,” Arnar Birgisson, Mohan Dhawan, Úlfar Erlingsson, Vinod Ganapathy, and Liviu Iftode, In *CCS’08: Proceedings of the 15th ACM Conference on Computer and Communications Security*, Alexandria, Virginia, USA, October 2008, ACM Press, pages 223–234. DOI:10.1145/1455770.1455800, Accepted 51 out of 281 submissions (18.1%).
- [C15] “The Design and Implementation of Microdrivers,” Vinod Ganapathy, Matthew J. Renzelmann, Arini Balakrishnan, Michael M. Swift, and Somesh Jha, In *ASPLOS’08: Proceedings of the Thirteenth International Conference on Architectural Support for Programming Languages and Operating Systems*, Seattle, Washington, USA, March 2008, ACM Press, pages 168–178. DOI:10.1145/1346281.1346303, Accepted 31 out of 127 submissions (24.4%).
- [C16] “Mining Security-Sensitive Operations in Legacy Code using Concept Analysis,” Vinod Ganapathy, David King, Trent Jaeger, and Somesh Jha, In *ICSE’07: Proceedings of the 29th ACM/IEEE International Conference on Software Engineering*, Minneapolis, Minnesota, USA, May 2007, IEEE Computer Society Press, pages 458–467. DOI:10.1109/ICSE.2007.54, Accepted 50 out of 334 submissions (15%).
- [C17] “NetSpy: Automatic Generation of Spyware Signatures for NIDS,” Hao Wang, Somesh Jha, and Vinod Ganapathy, In *ACSAC’06: Proceedings of the 22nd Annual Computer Security Applications Conference*, Miami Beach, Florida, USA, December 2006, IEEE Computer Society Press, pages 99–108. DOI:10.1109/ACSAC.2006.34, Accepted 40 out of 132 submissions (30.3%).
- [C18] “HeapMD: Identifying Heap-based Bugs using Anomaly Detection,” Trishul M. Chilimbi, and Vinod Ganapathy, In *ASPLOS’06: Proceedings of the Twelfth International Conference on Architectural Support for Programming Languages and Operating Systems*, San Jose, California, USA, October 2006, ACM Press, pages 219–228. DOI:10.1145/1168857.1168885, Accepted 38 out of 158 submissions (24%).

- [C19] “Retrofitting Legacy Code for Authorization Policy Enforcement,” Vinod Ganapathy, Trent Jaeger, and Somesh Jha, In *IEEE SP’06: Proceedings of the 2006 IEEE Symposium on Security and Privacy*, Berkeley/Oakland, California, USA, May 2006, IEEE Computer Society Press, pages 214–229. DOI:10.1109/SP.2006.34, Accepted 32 out of 251 submissions (12.7%).
- [C20] “Towards Automated Authorization Policy Enforcement,” Vinod Ganapathy, Trent Jaeger, and Somesh Jha, In *SELinux’06: Proceedings of the Second Annual Security Enhanced Linux Symposium*, Baltimore, Maryland, USA, March 2006, pages 7–11.
- [C21] “An Auctioning Reputation System Based on Anomaly Detection,” Shai Rubin, Mihai Christodorescu, Vinod Ganapathy, Jonathon T. Giffin, Louis Kruger, Hao Wang, and Nicholas Kidd, In *CCS’05: Proceedings of the 12th ACM Conference on Computer and Communications Security*, Alexandria, Virginia, USA, November 2005, ACM Press, pages 270–279. DOI:10.1145/1102120.1102156, Accepted 38 out of 250 submissions (15.2%).
- [C22] “Automatic Placement of Authorization Hooks in the Linux Security Modules Framework,” Vinod Ganapathy, Trent Jaeger, and Somesh Jha, In *CCS’05: Proceedings of the 12th ACM Conference on Computer and Communications Security*, Alexandria, Virginia, USA, November 2005, ACM Press, pages 330–339. DOI:10.1145/1102120.1102164, Accepted 38 out of 250 submissions (15.2%).
- [C23] “Automatic Discovery of API-Level Exploits,” Vinod Ganapathy, Sanjit A. Seshia, Somesh Jha, Thomas W. Reps, and Randal E. Bryant, In *ICSE’05: Proceedings of the 27th ACM/IEEE International Conference on Software Engineering*, St. Louis, Missouri, USA, May 2005, ACM Press, pages 312–321. DOI:10.1145/1062455.1062518, Accepted 44 out of 313 submissions (14%).
- [C24] “Buffer Overrun Detection using Linear Programming and Static Analysis,” Vinod Ganapathy, Somesh Jha, David Chandler, David Melski, and David Vitek, In *CCS’03: Proceedings of the 10th ACM Conference on Computer and Communications Security*, Washington, DC, USA, October 2003, ACM Press, pages 345–354. DOI:10.1145/948109.948155, Accepted 35 out of 253 submissions (13.8%).

Refereed Workshop Papers

- [W1] “The Case for Energy-aware Trust Establishment in Dynamic Networks of Cyber Physical Devices,” Amruta Gokhale, John McCabe, Vinod Ganapathy, and Ulrich Kremer, In *TrustED’11: First International Workshop on Trustworthy Embedded Devices*, Leuven, Belgium, September 2011.
- [W2] “Position Paper: The Case for JavaScript Transactions,” Mohan Dhawan, Chung-chieh Shan, and Vinod Ganapathy, In *PLAS’10: Proceedings of the ACM SIGPLAN 5th Workshop on Programming Languages and Analysis for Security*, Toronto, Canada, June 2010, ACM Press, pages 1–7. DOI:10.1145/1814217.1814223.
- [W3] “Rootkits on Smart Phones: Attacks, Implications and Opportunities,” Jeffrey Bickford, Ryan O’Hare, Arati Baliga, Vinod Ganapathy, and Liviu Iftode, In *HotMobile’10: Proceedings of the 11th International Workshop on Mobile Computing Systems and Applications*, Annapolis, Maryland, USA, February 2010, ACM Press, pages 49–54. DOI:10.1145/1734583.1734596, Accepted 15 out of 62 submissions (25%).
- [W4] “Privacy-aware Identity Management for Client-side Mashup Applications,” Saman Zarandioon, Danfeng Yao, and Vinod Ganapathy, In *DIM’09: Proceedings of the 5th ACM Workshop on Digital Identity Management*, Chicago, Illinois, November 2009, ACM Press, pages 21–30. DOI:10.1145/1655028.1655036.
- [W5] “Evaluating Attack Amplification in Online Social Networks,” Blase E. Ur, and Vinod Ganapathy, In *W2SP’09: Web 2.0 Security and Privacy Workshop*, Oakland, California, USA, May 2009.
- [W6] “Microdrivers: A New Architecture for Device Drivers,” Vinod Ganapathy, Arini Balakrishnan, Michael M. Swift, and Somesh Jha, In *HotOS’07: Proceedings of the 11th Workshop on Hot Topics in Operating Systems*, San Diego, California, USA, May 2007, USENIX Association, pages 85–90. Accepted 21 out of 104 submissions (20%).
- [W7] “Slicing Synchronous Reactive Programs,” Vinod Ganapathy, and S. Ramesh, In *Electronic Notes in Theoretical Computer Science (Proceedings of the 1st Workshop on Synchronous Languages, Applications and Programming, Grenoble, France)*, F. Maraninchi, A. Girault, and E. Rutten, editors, Volume 65. Elsevier Press, April 2002. DOI:10.1016/S1571-0661(05)80440-2.

Patents

- [P1] “Heap-Based Bug Identification using Anomaly Detection,” Trishul M. Chilimbi, and Vinod Ganapathy, US Patent Number: US 7,770,153 B2. Issued on August 3, 2010.

Refereed Posters

- [O1] “Enhancing Mobile Malware Detection with Social Collaboration (poster paper),” Liu Yang, Vinod Ganapathy, and Liviu Iftode, In *SocialCom’11: Proceedings of the 3rd International Conference on Social Computing*, Boston, Massachusetts, USA, October 2011, IEEE Press, pages 572–576. DOI:10.1109/PASSAT/SocialCom.2011.176.
- [O2] “Analyzing Information Flow in JavaScript-based Browser Extensions (poster),” Mohan Dhawan, and Vinod Ganapathy, In *2009 IEEE Symposium on Security and Privacy*, Oakland, California, USA, May 2009.
- [O3] “Rootkits: Now a Threat to Smart Phones (poster),” Ryan O’Hare, Jeffrey Bickford, Arati Baliga, Vinod Ganapathy, and Liviu Iftode, In *Spring Undergraduate Research Symposium: sponsored by Columbia Undergraduate Science Journal and Engineering Student Council*, New York, New York, USA, April 2009, **Best Poster Award**.
- [O4] “Automatic Inference and Enforcement of Kernel Data Structure Invariants (poster),” Arati Baliga, Vinod Ganapathy, and Liviu Iftode, In *17th USENIX Security Symposium*, San Jose, California, USA, July 2008.
- [O5] “Enforcing Authorization Policies using Transactional Memory Introspection (poster),” Arnar Birgisson, Mohan Dhawan, Úlfar Erlingsson, Vinod Ganapathy, and Liviu Iftode, In *17th USENIX Security Symposium*, San Jose, California, USA, July 2008.

Selected Technical Reports

- [TR1] “Ensuring System Integrity using Limited Local Memory,” Yuki Kinebuchi, Shakeel Butt, Vinod Ganapathy, Liviu Iftode, and Tatsuo Nakajima, Technical Report DCS-TR-693, Department of Computer Science, Rutgers University, Piscataway, New Jersey, USA, December 2011.
- [TR2] “Evaluating the Security Risks of Freedom on Social Networking Websites,” Blase E. Ur, Crystal Maung, and Vinod Ganapathy, Technical Report DCS-TR-646, Department of Computer Science, Rutgers University, Piscataway, New Jersey, USA, January 2009.

7 RESEARCH GRANTS

Grants from Federal Agencies

- “Information Flow Integrity for Systems of Independently-Developed Components,” US AFOSR: Air Force Office of Scientific Research Multi-University Research Initiative (MURI); PI: Trent Jaeger (Pennsylvania State University), **co-PIs**: Vinod Ganapathy, Patrick McDaniel (Pennsylvania State University), and Somesh Jha (University of Wisconsin-Madison); January 2012-December 2014; **\$265,000** (Rutgers share).
- “STIR: Detecting Malicious Software on Mobile Devices,” US Army RDECOM: Research, Development, and Engineering Command (60583-CS-II); **PI**: Vinod Ganapathy, **co-PI**: Liviu Iftode; December 2011-September 2012; **\$50,000**.
- “TC: Small: Exploring Malware Detection on Mobile Platforms,” NSF Cross-Cutting Programs/Trustworthy Computing (CNS-1117711); **PI**: Liviu Iftode, **co-PI**: Vinod Ganapathy; September 2011-August 2014; **\$457,750**.
- “CAREER: Improving Software Assurance using Transactions,” NSF Faculty Early Career Development Program (CNS-0952128); **PI**: Vinod Ganapathy; September 2010-August 2015; **\$400,000**.
- “CPS:Small:Collaborative Research: Establishing Integrity in Dynamic Networks of Cyber Physical Devices,” NSF Cyber Physical Systems Program (CNS-0931992); **PI**: Vinod Ganapathy, **co-PIs**: Ulrich Kremer and Trent Jaeger (Pennsylvania State University); September 2009-August 2013; **\$355,000** (Rutgers share; total award amount was \$540,000).
- “TC:Small:Collaborative Research: Protecting Commodity Operating Systems from Vulnerable Device Drivers,” NSF Cross-Cutting Programs/Trustworthy Computing (CNS-0915394); **PI**: Vinod Ganapathy, **co-PI**: Michael M. Swift (University of Wisconsin); September 2009-August 2013; **\$250,000** (Rutgers share; total award amount was \$500,000).

- “CT-ISG: Advanced Techniques to Detect Kernel-Level Rootkits,” NSF Cyber Trust Program (CNS-0831268); **PI:** Vinod Ganapathy, co-PI: Liviu Iftode; September 2008-August 2012; **\$450,001**. (Original award amount of \$400,000 for CNS-0831268 was supplemented by \$50,001 via grant CNS-1063674 in September 2010).

Gifts and Donations

- Unrestricted gift from NEC Laboratories America, awarded jointly to Liviu Iftode and Vinod Ganapathy, October 2010; **\$40,000**.
- “Advanced Techniques to Detect Emerging Threats from Rootkit-based Malware,” Grant from the US Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development and Engineering Center (CERDEC)/Space and Terrestrial Communications Directorate (STCD) Cyber Security and Information Assurance Division; September 2009-August 2010; Funding for one graduate student for one calendar year.
- Equipment donation from Sun Microsystems: one Sun T5220 (Niagara 2) machine, July 2009.
- Participant in Microsoft Research Project Hawaii: received ten AT&T Samsung Focus phones for instructional use in the Fall 2011 semester.

Internal Grants

- “Energy-Efficient Security for Dynamic Networks of Resource-Constrained Devices,” Rutgers University Computing Coordination Council (CCC) Green Computing Initiative; **PI:** Vinod Ganapathy, co-PI: Ulrich Kremer; September 2009-August 2010; **\$40,000**.
- “Security Enforcement using Transactional Memory,” Rutgers University School of Arts and Sciences Grant Proposal Development Competition; **PI:** Vinod Ganapathy; July 2008-May 2009; **\$3000**.
- “Security Enforcement using Transactional Memory,” Rutgers University Research Council Grants Program; **PI:** Vinod Ganapathy; July 2008-May 2009; **\$4000**.

8 PRESENTATIONS

Presentations at Universities and Industrial Laboratories

- “Rootkit-based Attacks and Defenses: Past, Present, and Future,”
 - ▷ Pennsylvania State University, State College, Pennsylvania, October 27, 2011.
 - ▷ IEEE North Jersey Chapter, Teaneck, New Jersey, September 29, 2011.
 - ▷ Columbia University, New York, New York, September 21, 2011.
- “Detecting Kernel-Level Rootkits using Data Structure Invariants,”
 - ▷ Symantec Research Laboratories, August 17, 2010.
 - ▷ NEC Laboratories America, Princeton, New Jersey, June 15, 2010.
 - ▷ Security and Privacy Day, Brooklyn Polytechnic Institute, New York, December 4, 2009.
 - ▷ CS Dept., Rutgers University, New Brunswick, New Jersey, November 30, 2009.
- “Analyzing Information Flow in JavaScript-based Browser Extensions,”
 - ▷ Microsoft Research, Redmond, Washington, February 25, 2010.
 - ▷ 2nd ICT FORWARD Workshop, Saint-Jean-Cap-Ferrat, France, May 4, 2009.
- “Enforcing Security Policies using Transactional Memory Introspection,”
 - ▷ Indian Institute of Science, Bangalore, India, August 12, 2009.
 - ▷ NEC Laboratories America, Princeton, New Jersey, February 13, 2009.
 - ▷ NYC area S&P day, IBM TJ Watson Research Center, Hawthorne, New York, December 5, 2008.
 - ▷ UCLA-IPAM Workshop on Applications of Internet Multi-Resolution Analysis to Cyber-Security, Los Angeles, California, October 13, 2008.
 - ▷ State University of New York, Stony Brook, New York, May 16, 2008.
- “Retrofitting Legacy Code for Security,”
 - ▷ Summer School on Cryptography and Software Security, Pennsylvania State University, State College, Pennsylvania, May 30-June 1, 2012.
 - ▷ DIMACS Mixer Series, Bell Labs, Murray Hill, New Jersey, October 23, 2007.

- ▷ Ph.D. thesis defense, Madison, Wisconsin, July 12, 2007.
- ▷ Rutgers University, New Brunswick, New Jersey, April 10, 2007.
- ▷ North Carolina State University, Raleigh, North Carolina, March 30, 2007.
- ▷ Microsoft Research India, Bangalore, India, March 22, 2007.
- ▷ Purdue University, West Lafayette, Indiana, February 26, 2007.
- ▷ Pennsylvania State University, University Park, Pennsylvania, February 21, 2007.
- ▷ IBM T.J. Watson Research Center, Hawthorne, New York, February 8, 2007.
- ▷ IBM Research India, Bangalore, India, July 7, 2006.
- ▷ Google Inc., Bangalore, India, June 28, 2006.
- ▷ Indian Institute of Science, Bangalore, India, June 19, 2006.
- ▷ First Midwest Security Workshop, Chicago, Illinois, May 6, 2006.

Conference Presentations

- “The Case for JavaScript Transactions,” 5th ACM SIGPLAN Workshop on Programming Languages and Analysis for Security, Toronto, Canada, June 10, 2010.
- “Mining Security-Sensitive Operations in Legacy Code using Concept Analysis,” 29th International Conference on Software Engineering, Minneapolis, Minnesota, May 25, 2007.
- “Microdrivers: A New Architecture for Device Drivers,” 11th International Workshop on Hot Topics in Operating Systems, San Diego, California, May 8, 2007.
- “HeapMD: Identifying Heap-based Bugs using Anomaly Detection,” Twelfth International Conference on Architectural Support for Programming Languages and Operating Systems, San Jose, California, October 24, 2006.
- “Retrofitting Legacy Code for Authorization Policy Enforcement,” 2006 IEEE Symposium on Security and Privacy, Oakland, California, May 23, 2006.
- “Towards Automated Authorization Policy Enforcement,” Second Annual Security-enhanced Linux Symposium, Baltimore, Maryland, March 1, 2006.
- “Automatic Placement of Authorization Hooks in the Linux Security Modules Framework,” 12th ACM Conference on Computer and Communications Security, Alexandria, Virginia, November 10, 2005.
- “Automatic Discovery of API-Level Exploits,” 27th International Conference on Software Engineering, St. Louis, Missouri, May 19, 2005.
- “Buffer Overrun Detection Using Linear Programming and Static Analysis,” 10th ACM Conference on Computer and Communications Security, Washington, DC, October 30, 2003.

9 SELECTED MEDIA COVERAGE

- Research on smart phone rootkits covered in over 90 different media outlets (source: Google News), including:
 - ▷ “Can clever hackers target smart phones?,” NSF Press Release 10-052 and Webcast, April 2, 2010.
 - ▷ “Rutgers researchers show new security threat against smart phone users,” Rutgers University News Release, February 22, 2010.
 - ▷ “Smart phones expose users to clever attacks,” National Science Foundation (NSF) News, February 22, 2010.
 - ▷ “Predicting smart phone attacks,” MIT Technology Review, February 22, 2010.
 - ▷ “Hacked smart phones could be used to spy on you,” TechNewsDaily, February 22, 2010.
 - ▷ “New smart phone security threat identified,” United Press International, February 24, 2010.
 - ▷ “Is it time to start thinking about smart phone viruses?,” Los Angeles Times, February 24, 2010.
 - ▷ “Is your mobile phone spying on you?,” National Geographic News, February 22, 2010.
 - ▷ “Software turns your cell phone against you.” ABC News and Discovery News, March 14, 2010.
- Research on device driver security mentioned in the MIT Technology Review: “The Achilles’ Heel of Your Computer,” MIT Technology Review, June 30, 2010.

10 TEACHING AND ADVISING EXPERIENCE

Teaching at Rutgers University

- Spring 2012, Computer Security (01:198:419), 29 students.

- Fall 2011, Seminar in Computer Security^G (16:198:671), 10 students.
- Fall 2010, Computer Security (01:198:419), 30 students.
- Spring 2010, Light Seminar: Mobile Computing (16:198:500), 10 students.
- Spring 2010, Computer Security (01:198:419), 30 students
- Fall 2009, Operating System Design (01:198:416), 48 students.
- Spring 2009, Introduction to Software Security^G (16:198:671), 18 students.
- Fall 2008, Introduction to Computer Security (01:198:442), 18 students.
- Fall 2008, Light Seminar: Browser and Web Security^G (01:198:500), 16 students.
- Spring 2008, Introduction to Computer Security (01:198:442), 16 students.
- Fall 2007, Introduction to Software Security^G (16:198:673), 20 students.
- Fall 2007, Light Seminar: Systems, Networking, and Security Issues in Mobile Personal Computing^G (16:198:500), 16 students.

Note: Course titles superscripted with G are graduate-level courses; the others are undergraduate courses.

Post-doctoral Research Supervision

- Arati Baliga (May 2009–September 2009). First employment: AT&T Security Research Center.

Ph.D. Candidate Supervision

- Saman Zarandioon (co-advised with Professor Danfeng Yao), Ph.D. degree awarded May 2012. *Ph.D. thesis:* “Improving the Security and Usability of Cloud Services with User-Centric Security Models.” *First employment:* Amazon.com, Inc.
- *Current students.* Shakeel Butt (Fall 2007-now), Mohan Dhawan (Fall 2007-now), Amruta Gokhale (Fall 2009-now), Rezwana Karim (Spring 2009-now), Liu Yang (Fall 2009-now).

MS Candidate Supervision

- Jeffrey Bickford (Fall 2009-Fall 2011). *MS thesis:* “Rootkits on Smart Phones: Attacks, Implications, and Optimizing Defense Techniques.” *First employment:* AT&T Security Research Center.
- *Current students.* Yogesh Padmanabhan (Fall 2011-Spring 2012).

Undergraduate Student Supervision

Tyler Neely (Fall 2011-Spring 2012), Kanwar Gill (Fall 2011), David Wong (Spring 2011), Jeffrey Bickford (Fall 2008-Spring 2009), Ryan O’Hare (Fall 2008-Spring 2009), Jan Jajalla (Spring 2009), Nathan Harper (CS, Vassar College, DIMACS REU student, Summer 2009).

Ph.D. Qualifying Exam/Thesis Defense Committees

Kevin Sanik (advisor: Professor Doug DeCarlo), Joseph Wegehaupt (advisor: Professor Chung-chieh Shan), Andrey Chudnov (Stevens Institute of Technology, advisor: Professor David Naumann), Pravin Shankar (advisor: Professor Liviu Iftode), John Asmuth (advisor: Professor Michael Littman), Nitya Vyas (advisor: Professor Danfeng Yao), Gayathri Chandrashekar (advisor: Professor Richard Martin), Vivek Pathak (advisor: Professor Liviu Iftode), Arati Baliga (advisor: Professor Liviu Iftode), Gang Xu (advisor: Professor Liviu Iftode), Xiaoxu Wang (advisor: Professor Dimitris Metaxas), Bruno Dufour (advisor: Professor Barbara Ryder), Weiqing Sun (State University of New York-Stony Brook, advisor: Professor R. Sekar), Yuchi Huang (advisor: Professor Dimitris Metaxas), Stephen Smaldone (advisor: Professor Liviu Iftode).

Other Pedagogical Activities

- Participant, New Jersey Governor’s School for Engineering and Technology (July 2012). Supervised three high-school students from New Jersey in their research on analyzing the Android application permission model.
- Participant, New Jersey Governor’s School for Engineering and Technology (July 2011). Supervised three high-school students from New Jersey in their research on Android applications.
- Participant, New Jersey Governor’s School for Engineering and Technology (July 2010). Supervised four high-school students from New Jersey in their research on browser extensions.
- Keynote speaker, 2010 Northern New Jersey JSHS: Junior Science and Humanities Symposium (March 2010). Spoke to a group of about 100 high-school students on the threat of malware and malware detection technologies.
- Participant, New Jersey Governor’s School for Engineering and Technology (July 2008). Supervised four high-school students from New Jersey in their research on malware analysis.

11 PROFESSIONAL ACTIVITIES

Program Committee Member

- ICISS 2012: 8th International Conference on Information System Security, Guwahati, India, December 15-19, 2012.
- SecureComm 2012: 8th International Conference on Security and Privacy in Communication Networks, Padua, Italy, September 3-6, 2012.
- W2SP 2012: 2012 Workshop on Web-2.0 Security and Privacy, San Francisco, California, May 2012.
- CCS-SSPM 2011: 1st ACM Workshop on Security and Privacy in Smartphones and Mobile Devices, Chicago, Illinois, October 17, 2011.
- SecureComm 2011: 7th International Conference on Security and Privacy in Communication Networks, London, UK, September 7-9, 2011.
- ICDCS 2011: 31st International Conference on Distributed Computing Systems – Security and Privacy Track, Genoa, Italy, June 21-25, 2010.
- ESSoS 2011: 3rd International Symposium on Engineering Secure Software and Systems, Madrid, Spain, February 9-10, 2011.
- CCS 2010: 17th ACM Conference on Computer and Communications Security, Chicago, Illinois, October 4-8 2010.
- SSS 2010: 12th International Symposium on Stabilization, Safety, and Security of Distributed Systems, New York City, New York, September 20-22, 2010.
- Security 2010: 19th USENIX Security Symposium, Washington, DC, August 9-13, 2010.
- ICDCS 2010: 30th International Conference on Distributed Computing Systems – Security and Privacy Track, Genoa, Italy, June 21-25, 2010.
- NDSS 2010: 17th Annual Networked and Distributed Systems Security Symposium, San Diego, California, February 28-March 3, 2010.
- ICISS 2009: 5th International Conference on Information System Security, Calcutta, India, December 14-18, 2009.
- ACSAC 2009: 25th Annual Computer Security Applications Conference, Honolulu, Hawaii, December 7-11, 2009.
- ASIAN 2009: 13th Annual Asian Computing Science Conference, Urumqi, China, October 8-10, 2009.
- SESS 2009: 5th International Workshop on Software Engineering for Secure Systems, Vancouver, Canada, May 19, 2009.
- Security 2009: 18th USENIX Security Symposium, Montreal, Canada, August 10-14, 2009.
- ASIACCS 2009: 4th ACM Symposium on Information, Computer and Communication Security, Sydney, Australia, March 17-19, 2009.
- NDSS 2009: 16th Annual Networked and Distributed Systems Security Symposium, San Diego, California, February 8-11, 2009.
- ICISS 2008: 4th International Conference on Information Systems Security, Hyderabad, India, December 16-20, 2008.
- ACSAC 2008: 24th Annual Computer Security Applications Conference, Anaheim, California, December 8-12, 2008.
- CSAW 2008: 2nd Computer Security Architecture Workshop, Fairfax, Virginia, October 31, 2008.
- CCS 2008: 15th ACM Conference on Computer and Communications Security, Alexandria, Virginia, October 27-31, 2008.
- SUTC 2008: 2nd IEEE International Conference on Sensor Networks, Ubiquitous, and Trustworthy Computing (Reliable Software Systems track), Taichung, Taiwan, June 11-13, 2008.
- SESS 2008: 4th International Workshop on Software Engineering for Secure Systems, Leipzig, Germany, May 17-18, 2008.
- NDSS 2008: 15th Annual Networked and Distributed Systems Security Symposium, San Diego, California, February 11-13, 2008.

Other Panels and Committees

- NSF panelist, 2012.

- Invited Speaker, Summer Schools on Cryptography and Software Security, Pennsylvania State University, State College, Pennsylvania, May 30-June 1, 2012.
- Invited Participant, INCO-TRUST Workshop on International Cooperation in Security and Privacy—International Data Exchange with Security and Privacy: Applications, Policy, Technology and Use, New York City, New York, May 3-5, 2010.
- Invited Participant, 2nd ICT-FORWARD Workshop, Saint-Jean-Cap-Ferrat, France, May 4-5, 2009.

Reviewing

- *Journals*: Journal of Computer Security (JCS), ACM Transactions on Internet Technology (TOIT), ACM Transactions on Information and System Security (TISSEC), IEEE Transactions on Software Engineering (TSE), Communications of the ACM (CACM), Computer Networks—The International Journal of Computer and Telecommunications Networks (COMNET).
- *Conferences*: IEEE Symposium on Security and Privacy (2007), IEEE Computer Security Foundations Symposium (2008), ACM Conference on Computer and Communications Security (2005, 2006, 2007), USENIX Security Symposium (2005, 2006), ISOC Symposium on Networked and Distributed Systems Security (2005, 2007), USENIX Annual Technical Conference (2004, 2008), International Symposium on High-Performance Computer Architecture (2008), International World Wide Web Conference (2004, 2005), International Conference on Computer-Aided Verification (2005, 2006), International Conference on Tools and Algorithms for the Construction and Analysis of Systems (2007), ACM SIGPLAN SIGACT Symposium on the Principles of Programming Languages (2010), ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (2008), ACM SIGSOFT International Symposium on Foundations of Software Engineering (2008), ACM SIGSOFT International Symposium on Software Testing and Analysis (2004), Formal Methods and Models for Codesign (2004).
- *Workshops*: Workshop on Software Engineering for Secure Systems (2005).
- *Other*: ARO Proposal Reviewer (2008).

University and Departmental Service

- At the Department of Computer Science, Rutgers University:
 - ▷ Graduate committee (2010-present).
 - ▷ Undergraduate advising committee (2008-present).
 - ▷ Graduate admissions committee (2007-2009).
 - ▷ Faculty hiring committee (2009-2012).
 - ▷ Co-organizer, New York area Security and Privacy day (May 2009).
- At the Department of Computer Science, University of Wisconsin: Incoming graduate student transition committee, constituted by students' chapter of the ACM (Spring 2002).

Collaboration with Industry

- Research collaboration agreement with AT&T Research, Florham Park, New Jersey. Collaborating on security and privacy in cloud computing (July 2011-July 2012).
- Joint study agreement with IBM TJ Watson Research Center, Hawthorne, New York. Collaborating on the design and implementation of security monitors using transactional memory introspection (January 2009-January 2010).
- Technology transfer to Grammatech Inc., Ithaca, New York. Lead the design, implementation and evaluation of a buffer overrun detection tool using CodeSurfertm (September 2001–August 2003).

Professional Societies

- Member of the ACM and ACM SIGPLAN.
- Member of DIMACS, the Center for Discrete Mathematics and Theoretical Computer Science.

12 PERSONAL INFORMATION

- **Nationality**: Indian.
- **Date and place of birth**: September 1979, Bangalore, India.

Last update: April 17, 2012