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KAPIL KUMAR SINGH

EDUCATION

Ph.D. Computer Science	2005 – 2011
Georgia Institute of Technology, Atlanta, USA	GPA: 4.0/4.0
Advisor: Prof. Wenke Lee	
M.Sc. Computer Science	2003 - 2005
University of British Columbia, Vancouver, Canada	GPA: 4.0/4.0
Advisor: Prof. Norman C. Hutchinson	
B.Tech. Computer Science and Technology	1997 - 2001
Indian Institute of Technology (IIT), Roorkee, India	Aggregate: 82% with honors

RESEARCH INTERESTS

My current research focuses on web security and privacy, with a special focus on the design and evaluation of effective web security policies and robust web system designs. I also have research interests in the analysis of botnet architectures and in developing techniques to detect and remediate this form of malware. I am broadly interested in solving any challenging problem in the area of computer and networked systems security.

PUBLICATIONS

In Submission

- **Kapil Singh**, Helen J. Wang, Alexander Moshchuk, Collin Jackson and Wenke Lee, “HTTPi for Practical End-to-End Content Integrity”.
- Chaitrali Amrutkar, **Kapil Singh**, Arunabh Verma and Patrick Traynor, “On the Disparity of Display Security in Mobile and Traditional Web Browsers”.
- **Kapil Singh**, Ikpeme Erete and Wenke Lee, “xAccess: A Unified User-Centric Access Control Framework for Web Applications”.

Conferences and Workshops

- **Kapil Singh**, Samrit Sangal, Nehil Jain, Patrick Traynor and Wenke Lee, “Evaluating Bluetooth as a Medium for Botnet Command and Control”. *Proceedings of 7th Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA)*, Bonn, Germany, July 2010. (Acceptance rate: 30%)
- **Kapil Singh**, Alexander Moshchuk, Helen J. Wang and Wenke Lee, “On the Incoherencies in Web Browser Access Control Policies”. *Proceedings of 31st IEEE Symposium on Security and Privacy (Oakland)*, Oakland, CA, May 2010. (Acceptance rate: 10.9%)
- **Kapil Singh**, Sumeer Bhola and Wenke Lee, “xBook: Redesigning Privacy Control in Social Networking Platforms”. *Proceedings of 18th USENIX Security Symposium*, Montreal, Canada, August 2009. (Acceptance rate: 14.7%)
- **Kapil Singh** and Wenke Lee, “On the Design of a Web Browser: Lessons learned from Operating Systems”. *Workshop on Web 2.0 Security and Privacy (W2SP)*, Oakland, USA, May 2008. (Acceptance rate: 31%)
- **Kapil Singh**, Abhinav Srivastava, Jonathon Giffin and Wenke Lee, “Evaluating Email’s Feasibility for Botnet Command and Control”. *Proceedings of 38th IEEE/IFIP International Conference on Dependable Systems and Networks*

(DSN), Anchorage, USA, June 2008. (Acceptance rate: 25%)

- Monirul Sharif, **Kapil Singh**, Jonathon Giffin and Wenke Lee, "Understanding Precision in Host Based Intrusion Detection – Formal Analysis and Practical Models". *Proceedings of RAID 2007 - Recent Advances in Intrusion Detection (RAID)*, Surfers Paradise, Australia, September 2007. (Acceptance rate: 18%)
- **Kapil Singh** and Son Vuong, "Blaze: A Mobile Agent Paradigm for VoIP Intrusion Detection Systems". *Proceedings of the International Conference on E-Business and Telecommunication Networks (ICETE)*, Setubal, Portugal, August 2004.
- Ken Deeter, **Kapil Singh**, Steve Wilson, Luca Fillipozzi and Son Vuong, "Aphids: A Mobile Agent-based Programmable Hybrid Intrusion Detection System". *Proceedings of Mobile Aware Technologies and Applications (Formerly Mobile Agents for Telecommunication Applications)*, Florianópolis, Brazil, October 2004.
- **Kapil Singh** and Pawan Agarwal, "Pricing the Internet - An Approach to Relieve Congestion. Analysis of various Pricing Schemes", *iNFLUX 2000*, Roorkee, India, 2000.

Book Chapters

- Son Vuong and **Kapil Singh**, Book chapter on VoIP Security. *Network Security: Current Status and Future Directions*, IEEE Press, Wiley Publications, 2007. *Editors*: Christos Douligeris and Dimitrios N. Serpanos.

Technical Reports / Others

- Abhinav Srivastava, **Kapil Singh** and Jonathon Giffin, "Secure Observation of Kernel Behavior". *Technical Report GT-CS-08-01*, Georgia Institute of Technology, Atlanta, 2008.
- **Kapil Singh** and Norman C. Hutchinson, "A Trust-based Model for Collaborative Intrusion Response". *6th Symposium on Operating Systems Design and Implementation (OSDI), WIP session*, San Francisco, USA, December 2004.
- **Kapil Singh** and Norman C. Hutchinson, "A Trust-based Model for Collaborative Intrusion Response". *Technical Report TR-2005-16*, University of British Columbia, Canada, 2005.

PROFESSIONAL EXPERIENCE

Georgia Institute of Technology

Graduate Research Assistant

Advisor: Prof. Wenke Lee

Worked on a number of research problems in the areas of web security and privacy, botnets and intrusion detection systems.

Atlanta, GA

August 2005 to May 2011

Microsoft Research

Research Intern

Mentor and Manager: Dr. Helen J. Wang

Studied the current state of access control policies that browsers use to share resources among their web site principals. We showed that mishandling of web site principals leads to many access control incoherencies, presenting hurdles for construction of secure web applications. Another unique contribution of this work is identifying the compatibility cost of removing these unsafe policies from the current web. In a second piece of work, we developed a practical mechanism to ensure end-to-end integrity of web content.

Redmond, WA

4th May 2009 to 18th August 2010

IBM Research T. J. Watson

Research Intern

Mentor: Dr. Sumeer Bhola

Designed and implemented a novel framework for building social networks that provides privacy control for data sharing with third party applications. We used information flow models to control what untrusted applications can do with the information they receive. We showed the viability of our design by means of a platform prototype and also developed some sample applications using the platform APIs.

Hawthorne, NY

12th May to 18th August 2008

Manager: Dr. Suresh Chari

IBM Research T. J. Watson

Research Intern

Mentor and Manager: Douglas Schales

Development of heuristics and mechanisms to detect P2P botnets, analyzing their traffic characteristics to differentiate P2P botnets from normal P2P networks. We developed network-based heuristics without relying on packet payload.

Hawthorne, NY

14th May to 21st August 2007

Damballa Inc.

Research Intern

Development of heuristics and mechanisms to detect IRC-based botnets, analyzing their characteristics and enumerating the victim machines. My responsibilities include development of the detection tool and streamlining the process of botnet detection with victim enumeration. I also developed heuristics for botnet detection in the absence of any bot binary analysis.

Atlanta, Georgia

15th May to 15th August 2006

University of British Columbia

Graduate Research/Teaching Assistant

Advisor: Prof. Norman C. Hutchinson

Worked on multiple research problems in the areas of intrusion detection systems and VoIP security. My responsibilities also included teaching in tutorial sessions, setting up class home works and grading for multiple undergraduate and graduate courses.

Vancouver, Canada

September 2003 to June 2005

Hughes Software Systems

Senior Software Engineer

Gurgaon, Haryana, India

18th June 2001 to 23rd July 2003

Project: SPACEWAY-STEM

Technology: Element Network Management

SPACEWAY is a next-generation satellite system, whose unique capabilities enable high speed data networking, groundbreaking applications, and unlock a wealth of value-added DIRECTV/DIRECPC services. It provides “one hop” satellite communication between two Satellite Terminals (STs) with a capability to support 8 million STs at customer end. I was involved in the STEM (Satellite Terminal Element Management) subsystem of SPACEWAY that handles Fault, Performance and Accounting Management areas of Network Management. My responsibilities included design, coding, integration and testing of the “Command Response” mechanism for commanding managed agents.

Project: SPACEWAY Applications

Technology: Billing Website Framework

Billing Website Framework is an application running on the SPACEWAY network that deals with billing functionality for the various services provided to the user. My responsibilities included design, coding, integration and testing of the framework.

Project: GSNS

Technology: GMM/SM Scripting

GSNS (GPRS Support Node Simulator) is a simulation tool for testing the GPRS network. GMM/SM (GPRS Mobility Management/ Session Management) deals with the Mobility and Session Management of the GPRS network.

TEACHING EXPERIENCE

- Guest Lecturer, Advanced Computer and Network Security (CS 8803), Georgia Institute of Technology, Spring 2008.
- Guest Lecturer, Computer and Network Security (CS 4237), Georgia Institute of Technology, Fall 2007, Spring 2009 and Fall 2009.
- Guest Lecturer, Network Security (CS 6262), Georgia Institute of Technology, Fall 2007, Fall 2008 and Fall 2009.
- Teaching Assistant, Parallel & Distributed Simulation Systems (CS 4230/6236), Georgia Institute of Technology, Fall 2005.
- Teaching Assistant, University of British Columbia, 2003-2005.

STUDENT MENTORING

- Priyanka Lakhe, M.S. in Information Security, Spring 2010. *Master's practicum on security in cloud computing.*
- Nikhil Kadu, M.S. in Information Security, Fall 2008. *Master's practicum on the design of secure and flexible web browser.*
- Samrit Sangal and Nehil Jain, M.S. in Information Security, Spring 2008. *CS 6262 project on the analysis of wireless botnets.*
- Priyank Raj, M.S. in Information Security, Fall 2007. *CS 8903 project on peer-to-peer botnet detection.*

FUNDING PROPOSALS

- Co-author of NSF grant proposal titled "User-Centric Security Policies and Frameworks for Web Applications".
PI: Prof. Wenke Lee

HONORS / AWARDS

- Student Travel Grant Award, USENIX Annual Technical Conference (2010), USENIX Security (2007, 2009), DSN (2008), IEEE Symposium on Security and Privacy (2008).
- International Partial Tuition Scholarship, University of British Columbia, Canada, 2003-05.
- University Merit Scholarship for academic excellence, IIT-Roorkee, India, 1997-2001.
- Gold Medal for highest grade in Economics and Management course (out of 350 students), IIT-Roorkee, India.
- National Talent Search Examination (NTSE) Scholarship awarded by National Council of Educational Research and Training, India to top 1% of approximate 50,000 candidates.

PROFESSIONAL ACTIVITIES

- PC Member: International Symposium on Security in Collaboration Technologies and Systems (SECOTS), 2011.
- Reviewer: Transactions on Dependable and Secure Computing (TDSC), 2011; Journal of Communications and Networks, 2011; Information Fusion, 2011; Transactions on the Web (TWEB), 2009.
- External Reviewer: IEEE Symposium on Security and Privacy (Oakland) 2006, 2007, 2008, 2009; USENIX Security Symposium 2006, 2007, 2008, 2009, 2010; ACM Conference on Computer and Communications Security (CCS) 2006, 2007, 2008, 2009; Network and Distributed System Security Symposium (NDSS) 2006, 2007, 2008, 2009; Annual Computer Security Applications Conference (ACSAC) 2006, 2007, 2008; Recent Advances in Intrusion Detection (RAID) 2010; European Symposium on Research in Computer Security (ESORICS) 2010; ACM Workshop on Recurring Malware (WORM) 2006, 2007; Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA) 2006, 2007; IEEE/IFIP International Conference on Dependable Systems and Networks (DSN) 2009; USENIX Workshop on Hot Topics in Security (HotSec) 2009; Grace Hopper Conference 2010.
- Organizing Committee Chair: SYNC 2001, a National Level Technical Conference organized at IIT-Roorkee, 2001.
- Student Member, IEEE and ACM.

EXTRA CURRICULAR HIGHLIGHTS

- Member, Graduate Admissions Committee, Department of Computer Science, UBC, Canada.
- Secretary of the Himalayan Explorers' Club, the adventure club of IIT-Roorkee for the year 2000-01 and Joint Secretary for the year 1999-2000.