

KAPIL KUMAR SINGH

OBJECTIVE

To pursue PhD in Computer Science at Georgia Institute of Technology with research focus in the area of Web Security.

EDUCATION

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

RESEARCH INTERESTS

Web Security; Botnets; Intrusion Detection Systems; VoIP Security; Network/System Security, in general.

CURRENT RESEARCH

Browser Security. This project aims in designing a new secure web browser design based on some operating system principles. We are currently developing a working prototype of our browser with the goal of providing a balance between security and performance. The browser provides abstraction for supporting flexible security policies that can be developed using the low-level primitives of the browser. We believe our browser architecture will be well-suited to the emerging web 2.0 application designs.

Privacy Control in Web Applications. In this work, we present a novel framework for building secure social networks that requires no trust in the third party applications. We use information flow models to control what untrusted applications can do with the information they receive. We have implemented a working prototype of our system and made it available as a Facebook application.

PUBLICATIONS

- 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.
- 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.
- 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.
- Abhinav Srivastava, Kapil Singh and Jonathon Giffin, “Secure Observation of Kernel Behavior”. *Technical Report GT-CS-08-01*, Georgia Institute of Technology, Atlanta, 2008.
- 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.
- Son Vuong and Kapil Singh, Book chapter on VoIP Security. *Network Security: Current Status and Future Directions*, IEEE Press, Wiley Publications, 2007.
- Kapil Singh and Norman C. Hutchinson, “A Trust-based Model for Collaborative Intrusion Response”. *6th Symposium on Operating Systems Design and Implementation (OSDI’04), 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.
- 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 MATA 2004 - Workshop on 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

PROFESSIONAL EXPERIENCE

IBM Research T. J. Watson
Research Intern

Mentor: 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. We are in the process of patenting and publishing this work.

Hawthorne, NY
12th May to 18th August 2008

Manager: 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. IBM Research is currently trying to extend this work.

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

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.

PAST PROJECTS

- A Trust-based Model for Collaborative Intrusion Response (Master’s Thesis) – An intrusion response mechanism that identifies the source of attack and take appropriate action in such a way that can frustrate the attacker. The mechanism develops trust in the network for the attacked host and establishes proof of the attack so the response action is justified.
- Anonymous Peer-to-Peer File Sharing System – A P2P File Sharing System that provides both Initiator and Responder anonymity.
- Hybrid Profiling Strategy for IDS – A learning-based data modeling technique based on both user profiles and program profiles.
- APHIDS: Agent-based Programmable Hybrid Intrusion Detection System – A mobile agent based platform for data correlation between various Intrusion Detection Systems.
- An Efficient VoIP Implementation on Linux Platform (Undergraduate Thesis) – A VoIP implementation tested over the LAN.
- Compact Binary Encoding of a WML document – A tool for WML to Binary WML conversion.

HONORS / EXTRA CURRICULAR HIGHLIGHTS

- Student Travel Grant Award, DSN 2008.
- Student Travel Grant Award, IEEE Security and Privacy 2008.
- Student Travel Grant Award, USENIX Security 2007.
- 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 marks in Economics and Management during undergraduate study.
- National Talent Search Examination (NTSE) Scholarship awarded by National Council of Educational Research and Training, India to top 1% of approximate 50,000 candidates.
- Member, Graduate Admissions Committee, Department of Computer Science, UBC, Canada.
- Convener of the National Level Technical Conference SYNC-2001 held at IIT-Roorkee, India.
- 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.

PROFESSIONAL ACTIVITES

- External Reviewer: IEEE Security and Privacy (2006-09), USENIX Security (2006-09), NDSS (2005-08), CCS (2006-08), ACSAC (2005-07), WORM (2006), DIMVA (2006-07).
- Student Member, IEEE and ACM.

SOFTWARE SKILLS

Languages: C, C++, JAVA.

Scripting: Unix Shell Scripts, Tcl/Tk.

Framework: J2EE, ACE (Adaptive Communication Environment).

Tools: Rational ROSE for Designing, Interleaf for Documentation, Dreamweaver, Purify, Pure Coverage, JProbe.

REFERENCES

Prof. Wenke Lee
College of Computing
Georgia Institute of Technology
wenke@cc.gatech.edu

Prof. Mustaque Ahamad
College of Computing
Georgia Institute of Technology
mustaq@cc.gatech.edu

Prof. Jonathon Giffin
College of Computing
Georgia Institute of Technology
giffin@cc.gatech.edu

Douglas Schales
Researcher, IBM Research T. J. Watson
schales@us.ibm.com

Suresh Chari
Manager, IBM Research T. J. Watson
schari@us.ibm.com

Sumeer Bhola
Google Inc.
sumeer@acm.org