

Curriculum Vitae

Gail-Joon Ahn

Associate Professor

Department of Software and Information Systems

University of North Carolina at Charlotte

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1 CAREER OBJECTIVES

In today's generation of information technology, it is critical to manage large-scale networks and distributed systems efficiently and securely. Continued advances in basic technology, applied research and development, and education are required to satisfy this demand. My goal is to play a major role in this arena pursuing research and development, and education program in information and communication technology.

2 EDUCATION

Degree	Major	University	Year
Ph.D.	Information Technology	George Mason University, Virginia	2000
M.S.	Computer Science	George Mason University, Virginia	1997
B.S.	Computer Science	Soong-Sil University, Seoul	1994

PhD Thesis Title : **The RCL 2000 Language for Specifying Role-Based Authorization Constraints**

Thesis Committee : Dr. Ravi Sandhu (Dissertation Director), Dr. Sushil Jajodia, Dr. Daniel Menasce and Dr. Prasanta Bose

Abstract:

In this dissertation, I have developed a framework for specifying authorization constraints in role-based systems proposing the First formal (and intuitive) language, RCL 2000 (Role-based Constraints Language 2000), for role-based authorization constraints. Also I have provided a formal semantics for this language which is based on its translation to a restricted form of First order predicate logic. In addition, I demonstrated the expressive power of this language and characterized role-based constraints into prohibition and obligation constraints based on the constraints specifications. This work also shows that it is futile to try to enumerate all constraints because there are too many possibilities and variations; instead, we should pursue an intuitively simple yet rigorous language, such as RCL 2000, for specifying constraints. NIST's RBAC standard has been significantly influenced by this work.

3 EMPLOYMENT AND EXPERIENCE

University of North Carolina at Charlotte

- *Summer 2005 onwards* **Associate Professor**
Department of Software and Information Systems
University of North Carolina at Charlotte, Charlotte, North Carolina
- *Fall 2007 onwards* **Director**
Center for Digital Identity and Cyber Defense Research (DICyDER)
University of North Carolina at Charlotte, Charlotte, North Carolina

- *Spring 2001 onwards* **Key Representative**
NSA Center of Academic Excellence (CAE) in Information Assurance Education
University of North Carolina at Charlotte, Charlotte, North Carolina
- *Spring 2001 onwards* **Director**
Laboratory of Information Integration, Security and Privacy
University of North Carolina at Charlotte, Charlotte, North Carolina
- *Fall 2001 - Spring 2005* **Assistant Professor**
Department of Software and Information Systems
University of North Carolina at Charlotte, Charlotte, North Carolina
- *Fall 2000 - Summer 2001* **Assistant Professor**
Department of Computer Science
University of North Carolina at Charlotte, Charlotte, North Carolina

George Mason University

- *Spring 2000 - Summer 2000*
Post-Doctoral Research Associate
Laboratory for Information Security Technology
George Mason University, Fairfax, Virginia
- *Fall 1996 - Fall 1999*
Research Assistant
Laboratory for Information Security Technology
George Mason University, Fairfax, Virginia
- *Fall 1995 - Summer 1996*
System Administrator
IT&E Instructional Computing Laboratories
School of Information Technology and Engineering (IT&E)
George Mason University, Fairfax, Virginia
- *Spring 1995*
Teaching Assistant
Course : CS571(001 & 002) Operating Systems
Professors : Dr. Peter J. Denning and Dr. Daniel A. Menasce
Department of Computer Science
George Mason University, Fairfax, Virginia

4 PROFESSIONAL AFFILIATIONS

- Senior Member, IEEE (Institute of Electrical and Electronics Engineers) 1999 onwards (Senior recognition, 2007).

- Senior Member, ACM (Association for Computing Machinery) 1999 onwards (Senior recognition, 2007).
- Information Director, ACM SIGSAC (Special Interest Group on Security, Audit and Control), 2002 onwards.
- Member, HIPPA (Health Insurance Portability and Accountability Act) Privacy: Consent & Patient Rights Focus Group, NCHICA (North Carolina Health Information and Communications Alliance), 2003 onwards.
- Member, IFIP (International Federation for Information Processing) TC11 Working Group 11.3 Data and Application Security, 2002 onwards.
- Member, FISSEA (Federal Information Systems Security Educators' Association), which is an organization run by and for federal information systems security professionals, assisting federal agencies in meeting their computer security training responsibilities, 2003 onwards.
- Member, IRMA (Information Resources Management Association), which is an international professional organization dedicated to advancing the concepts and practices of information resources management in modern organizations, 2002 onwards.
- Faculty Associate, e-Business Technology Institute, UNC Charlotte, 2001 onwards.

5 HONORS AND AWARDS

- Received DOE CAREER Award, Department of Energy, September 2003.
-Only 20 recipients annually across all disciplines.
- Received FISSEA Educator of the Year Award, Federal Information Systems Security Educators' Association, March 2005.
- Received National Center of Academic Excellence in Information Assurance Education Designation by National Security Agency and Department of Homeland Security, 2001 & 2004 & 2007.
- Received Graduate Faculty Excellence in Teaching Award, College of Computing and Informatics, UNC Charlotte, April 2004.
- Received Research Excellence Award in Information Security and Privacy, College of Computing and Informatics, UNC Charlotte, September 2003.
- Best Student Paper Award: *John Melton and Gail-J. Ahn, "Application Penetration Testing: Concepts and Taxonomy,"* Department of Energy Cyber Security Training Conference, Overland Park, Kansas, May 24-27, 2004, presented by Department of Energy Office of the Chief Information Officer.
- Received Service Award, ACM Symposium on Access Control Models and Technologies, ACM, 2005.

- Nominated for the Oak Ridge Association Universities (ORAU) Competition for the Ralph E. Powe Junior Faculty Enhancement Award by Vice Chancellor for Research & Federal Relations (Dr. Stephen R. Mosier), UNC Charlotte, 2002.
- Received Soong-Sil University Alumni Scholarship Award, Fall 1999.
- Received George Mason University Doctoral Fellowship Award, Summer 1999.
- Received George Mason University Doctoral Fellowship Award, Fall 1999.
- Received Outstanding Student Scholarship Award, Soong-Sil University, Seoul, 1987-1989, 1992-1993.

6 TEACHING ACTIVITIES

6.1 University Teaching

At UNC Charlotte I have taught the following graduate-level courses developed by me. Since Spring 2002, some of my lectures have been televised over the NCREN so that NC A&T University students can take IA courses remotely.

- **Spring 2001, Fall 2001, Spring 2004, Spring 2006 and Spring 2008**
ITIS 6200/8200: Principles of Information Security and Privacy
- **Fall 2007**
ITIS 6150/8150: Software Assurance (Co-teaching with Dr. Seok-Won Lee)
- **Fall 2002, Fall 2003, Fall 2004, Fall 2005, and Fall 2006**
ITIS 6210/8210: Access Control and Security Architectures
- **Spring 2005**
ITIS 4220/5220 Vulnerability Assessment and Systems Assurance
- **Spring 2003**
ITIS 6230/8230: Information Systems and Infrastructure Protection
- **Spring 2002**
ITIS 6220/8220: Information and System Assurance

6.2 Curriculum Development at UNC Charlotte

- I have led efforts to introducing new Foundation courses in Information Security and Privacy curriculum in 2000. These courses were developed to meet National Security Telecommunications and Information Systems Security Standards. 6000-level courses satisfy the MS in information technology requirements and count as an elective towards the Graduate Certificate in Information Security and Privacy. 8000-level courses are for Ph.D. students. These courses satisfy the Ph.D in information technology requirements and count as an elective towards the Graduate Certificate in Information Security and Privacy as well.

- ITIS 3200 Introduction to Information Security and Privacy
 - ITIS 6200/8200 Principles of Information Security and Privacy
 - ITIS 6210/8210 Access Control and Security Architecture
 - ITIS 6220/8220 Information and System Assurance
- Also I have led efforts with Yuliang Zheng and Seok-Won Lee to develop new course proposals in 2001 and 2007, respectively. 6000-level courses satisfy the MS in information technology requirements and count as an elective towards the Graduate Certificate in Information Security and Privacy. 8000-level courses are for Ph.D. students. These courses satisfy the Ph.D in information technology requirements and count as an elective towards the Graduate Certificate in Information Security and Privacy as well.

- ITIS 6230/8230 Information Systems and Infrastructure Protection
- ITIS 6240/8240 Applied Cryptography
- ITIS 6150/8150 Software Assurance

- In addition, I have led efforts to develop the Graduate Certificate program in Information Security & Privacy in 2000. This program meets NSA IA curriculum guidelines. The graduate certificate program in Information Security and Privacy (IA certificate) requires a total of 12 graduate credit hours on the above-mentioned courses that have been developed by my leadership.

In addition, I have heavily involved in developing the following undergraduate and graduate courses to further enhance our information assurance (IA) curriculum. It includes an effort to propose a new course on “Computer Forensic” and helped to be successfully delivered in Spring 2004:

- ITIS 4220/5220 Vulnerability Assessment and Systems Assurance
- ITIS 5250 Computer Forensics

- I also helped Dr. Dahlberg prepare the guidelines for Computer Science M.S. students selecting a networking concentration with IA courses in Fall 2003.
- In addition, I prepared an application for Information Assurance Courseware Evaluation and received CNSS certificate (Standard No. 4011, 4013, 4014-E, and 4015) from National Security Agency so that our IA curriculum and program have fulfilled the requirements of national standards.
- I have helped the department develop undergraduate curriculum for BA in Software and Information Systems in 2001. This program is designed for students interested in pursuing a career in Information Technology with a focus on developing large-scale information systems. This degree will also well prepare students to pursue graduate studies in Information Technology and related application areas.

6.3 Graduate Theses

- Doctoral Students:

I have supervised the following Ph.D. students directly.

Graduates:

- Dongwan Shin, “Role-based Access Control for Trust Management: Model, Processes, and Management,” Fall 2004 (**Joined at New Mexico Tech as an assistant professor**).
- Longhua Zhang, “Rule-Based Framework for Role-Based Delegation and Revocation: Models, Architectures and Mechanisms,” Fall 2005.
- Lawrence Teo, “Internet-scale Intrusion Detection and Prevention,” Spring 2006 (Founded Calyptix Security Corp.)

In Progress:

- Jing Jin, “Secure Information Sharing and Management for Ad-hoc Collaboration,” Since 2004 (ABD).
- Wenjuan Xu “System Security Policy Analysis against Security Objectives,” Since 2005.
- Hongxin Hu “Assurance Management Framework for Access Control,” Since 2005.
- Moonam Ko “User-centric Identity Management: Models, Architectures and Tools,” Since 2005.
- Napoleon Paxton “Risk-aware Network-centric Attack Detection and Prevention,” Since 2005 (**NASA Fellowship recipient**).

I have supervised the following Ph.D students indirectly.

- Seung-Phil Hong, “The Authorization Management for Large-Scale Enterprise System : Model, Architecture, and Mechanism,” School of Engineering, Information and Communications University, Korea, Dissertation Committee, January 2003.
- Robin Gandhi, “Traceability-preserving Evidence Capture for Requirements Domain Modeling (tentative),” College of Computing and Informatics, UNC Charlotte, Dissertation Committee, Since 2006.
- Qi Guo, “A Formal Approach To The Role Mining Problem (tentative),” MSIS Department, Rutgers University, Dissertation Committee, Since 2007.
- Ling Guo, “Privacy Preserving Market Basket Data Analysis (tentative),” College of Computing and Informatics, UNC Charlotte, Dissertation Committee, Since 2007
- Vishwas Patil, “Interoperability in Access Control Models,” Department of Computer Science, Sapienza University of Rome, Italy, External Reviewer, 2007.
- Amir Chinaei, “Access Control Administration with Adjustable Decentralization,” Department of Computer Science, University of Waterloo, External Examiner, 2007.

- **Master Students:**

I have supervised the following master students directly and indirectly.

- Uttam Sankhlar, “Digital Rights Management and Enforcement,” Thesis Advisor, Spring 2003.
- Navatha Tirunagarivishwanatham, “Network Layer Security for Mobile Ad hoc Networks,” Thesis Committee, Spring 2003.
- Gautam Singaraju, “Virtual Environment and Environment Profiles for TIDeS,” Thesis Committee, March 2003.
- Amey Shindker, “Testbed for Evaluation of Intrusion Detection Systems—A Portable and Modularized Approach, Thesis Committee, April 2003.
- Vinod Namboodiri, “MAWNeT: Multimedia Adaptable Wireless Networks—A Hybrid, Proxy-based Multimedia Adaption Scheme,” Thesis Committee, Spring 2003.
- Omkar Dalvi, “Quality Analysis of Bit-Rates Reduction Techniques for MPEG-1,” Thesis Committee, Fall 2003.
- Gibson Grose, “Focusing Trusted Systems Research and Implementation,” Thesis Committee, Fall 2003.
- Deepak Yavagal, “DITSCAP Automation,” Thesis Committee, Decemeber 2005.
- Divya Muthurajan, “Non-Functional Requirements Engineering,” Thesis Committee, Spring 2006.
- Siddharth Wagle, “DITSCAP Automation: Service-oriented Architecture,” Thesis Committee, Spring 2007.

6.4 Senior Projects/Individual Studies/Master Projects Supervised

- **Senior Projects**

I have supervised the following senior projects. Each project requires to submit a final report and presentation in public.

- Nilesh Patel and Amish Patel, “Java-Powered Comprehensive Web Server,” Fall 2000, Spring 2001
- Zewdu Tesfay and Zhaoying Chen, “Security in the Wireless World,” Spring 2001, Fall 2001
- Yukie Yabe, “Simplified PKI for UNC Charlotte,” Spring 2001
- Vibhuti Patel and Viral Patel, “Security Showcase,” Fall 2001, Spring 2002
- Dhvanika Patel, Hiral Patel, Nita Patel and Pranjali Patel, “Copyrights Protection,” Fall 2001, Spring 2002
- Keyun Mistry, Chaitesh Shah, Sejal Suthar and Viral Patel, “CyberAlarm: Detection Engine for DoS Attacks,” Spring 2002, Fall 2002
- Yong Rhee, “Security Policy on Windows,” Spring 2002

- Trevor Nance , Hyung I. Lee, Nishit Mehta and Gaurav Gogna, “Computer Forensics,” Fall 2002, Spring 2003.
- Keyuri Patel and Yamini Patel, “Secure Workflow,” Fall 2003, Spring 2004.
- James Deese, “Pandora I/II: Web Phishing,” Fall 2004, Spring 2005.
- Kevin Pearson and Benjamin Hill, “Pandora I/II: Secure Sensor Network,” Summer 2005, Fall 2005.
- Dennis Underwood, “Pandora I/II: DoD Cyber Crime Practices,” Fall 2006, Spring 2007.
- Jonathan Peterson and Ryan Bender, “Pandora I/II: Correlation Builder for Bot Analysis,” Spring 2007, Fall 2007.
- Ebonie Williams and Carla Hoyle, “Pandora I: Systematic Compliance Management,” Fall 2007.

- **Individual Studies**

I have supervised the following graduate-level individual studies. Each project requires to submit a final report and presentation in public.

- Bhavik Shah, “Scalable Authentication Architecture for the Web,” Fall 2000
- Sree Pradhip, “Security Architecture for Wireless Environment,” Spring 2001
- Li Cheng, “CyberLock: Intrusion Detection Systems for Network-based Attacks,” Summer 2001
- Milin Shah, “Token-based Digital Rights Management,” Summer 2001
- Dongwan Shin, “Scalable Certificate-based Authentication for Critical Information Infrastructure,” Summer 2001
- Muraleetharan Kurundachalam, “Design and Development of Authorization Constraints Specification Tool,” Fall 2001
- Krishna Kamalanathan, “Engineering a Digital Rights Management Using COTS Components,” Fall 2001
- Tanusree Pai, “Role-based Collaborative Environment,” Spring 2002
- Ragu Kakaral, “Engineering Tool for Information Assurance,” Spring 2002
- Pushpinder Singh Garcha, “Privacy-Preserving Techniques,” Summer 2002
- Savitha Narayan, “Network Vulnerability Assessment for the Cyber world,” Fall 2002
- Kaushal Shah, “Switched Telephone Networks,” Fall 2003-Spring 2004
- Lawrence Teo, “Security-Enhanced Computing Platforms,” Fall 2003
- Prasad Shenoy, “Privacy in Identity Management,” Fall 2003
- Suraj Vyas, “Ntree: A Two Dimensional partial order for Group Protection,” Fall 2003-Spring 2004
- Dai Chun Cheng, “Enterprise Security: Survey on enterprise security needs/requirements,” Fall 2003

- Badri Mohan, “Role-based Authorization,” Fall 2003
- Seunghyun Im, “Secure Delegation for Mobile Sensors,” Spring 2004
- Chaya Aswath, “Access Control in Digital Home,” Fall 2004
- Dhruv Gami, “Role-based Delegation on SELinux,” Fall 2004
- Jing Jin, “Design and Development of Secure Information Sharing Toolkit,” Spring 2005
- John Lam, “Managing Privacy for Federated Identity Management,” Fall 2005
- Swapnil Brahmanekar, “Practical Tools for Enterprise Security Management,” Spring 2006
- Moonam Ko, “Portable Identity Management Systems,” Spring 2006
- Wenjuan Xu, “SELinux Security Policy Analysis,” Spring 2007
- Sriharsha Chintalapani, “User-centric Identity Management,” Fall 2007
- Hongxin Hu, “Realizing a Formal RBAC Model in Real Systems,” Fall 2007

- **Master Projects**

I have supervised 4 graduate-level projects which are required to meet MS in Computer Science requirements at the College of Computing and Informatics. Each project requires to submit a final report and presentation in public.

- Anant V. Dimri, “Security Management Tool for Handheld Device,” Spring 2002
- Pooja Yadav, “Secure e-Transaction on a Stock Portfolio for Handheld Device,” Summer 2002
- Savitha Narayan, “Assessment and Visualization of Network Vulnerability,” Fall 2002
- Pushpinder Singh Garcha, “Enhanced Wireless Security,” Fall 2002

6.5 Student Teaching Evaluations

My teaching evaluations both by students and by faculty peer have been very good even though the courses were over the NCREN network, which is a more challenging instruction environment compared to regular classroom teaching.

6.6 Education Grants

My leadership role has been a driving force in the preparation & execution of following education grants:

- **DoD Carolinas Cyber-Defender Scholarship Program, \$90,960.00**
Principal Investigators: Gail-J. Ahn (PI) and Bill Chu
Sponsor: *Department of Defense*, 2007 - 2008.
- **Collaborative Project: Focused Faculty Development Workshop on Cyber Games and Interactive Simulations, \$246,000.00**
Principal Investigators: Brent Kang, Bill Chu and Gail-J. Ahn (co-PI)
Sponsor: *National Science Foundation*, 2007 - 2009.

- **DoD Carolinas Cyber-Defender Scholarship Program, \$194,661.00**
 Principal Investigators: Gail-J. Ahn (PI) and Bill Chu
 Sponsor: *Department of Defense*, 2006 - 2007.
- **DoD Carolinas Cyber-Defender Scholarship Program, \$166,297.00**
 Principal Investigators: Gail-J. Ahn (PI) and Bill Chu
 Sponsor: *Department of Defense*, 2005 - 2006.
- **Carolinas Cyber-Defender Scholarship Program, \$650,000.00**
 Principal Investigators: Bill Chu, Gail-J. Ahn (co-PI), Y. Zheng and W.J. Tolone
 Sponsor: *National Science Foundation*, 2005 - 2009
- **DoD Carolinas Cyber-Defender Scholarship Program, \$58,460.00**
 Principal Investigators: Gail-J. Ahn (PI), Bill Chu, Y. Zheng, W.J. Tolone, Zhaoyu Liu, Yongge Wang, Seok-Won Lee, David Wilson, Anita Raja and Teresa Dahlberg
 Sponsor: *Department of Defense*, 2004 - 2005.
- **Collaborative Project: Bridging Gaps in IA Education through Collaboration, \$300,000.00**
 Principal Investigators: Bill Chu, Seok-Won Lee, Gail-J. Ahn (co-PI), Anita Raja, Yuliang Zheng, Yongge Wang, William Tolone, Zhaoyu Liu and David Wilson
 Sponsor: *National Science Foundation*, 2004 - 2007.
- **DoD Carolinas Cyber-Defender Scholarship Program, \$192,458.00**
 Principal Investigators: Gail-J. Ahn (PI), Bill Chu, Y. Zheng, W.J. Tolone, Zhaoyu Liu, Yongge Wang, David Wilson, Seok-Won Lee and Teresa Dahlberg
 Sponsor: *Department of Defense*, 2003 - 2004
- **DoD Carolinas Cyber-Defender Scholarship Program, \$369,446.00**
 Principal Investigators: Gail-J. Ahn, Bill Chu (co-PI), Y. Zheng, W.J. Tolone, Zhaoyu Liu, Yongge Wang, and Teresa Dahlberg
 Sponsor: *Department of Defense*, 2002 - 2003
- **Carolinas Cyber-Defender Scholarship Program, \$3,665,870.00**
 Principal Investigators: Bill Chu, Gail-J. Ahn (co-PI), Y. Zheng, W.J. Tolone, and Teresa Dahlberg
 Sponsor: *National Science Foundation*, 2002 - 2006
- **DOD Carolinas Cyber-Defender Scholarship Program, \$150,000.00**
 Principal Investigators: Bill Chu, Gail-J. Ahn (co-PI), William Tolone and Yuliang Zheng
 Sponsor: *Department of Defense and National Security Agency*, 2001-2002
- **Microsoft University Research Program**
 Principal Investigator: Gail-J. Ahn
 Sponsor: *Microsoft Corp.*, 2000 - 2005

6.7 Other Activities

- I have organized a student research group named *Pandora*. This student group has involved in projects on information security and privacy through senior projects, individual studies, or Master projects.
- I helped NC A&T University develop an IA course on “Wireless Security.” The course has been offered in Fall 2002 as an advanced topic course at NC A&T University.
- I have demonstrated the diversity of my teaching capabilities through classroom-style, project-based, and televised courses.

7 RESEARCH

7.1 Specialties

My research foci include:

- Authentication and Access Control
- Formal Models for Computer Security
- Network and Distributed Systems Security
- Secure Electronic Commerce
- Risk Assessment and Management
- Information Assurance

7.2 Research Grants

I have successfully obtained funds in the following competitive research grant schemes: National Science Foundation, National Security Agency, National Institute of Justice, Department of Defense, Department of Energy, Department of the Navy (Space and Naval Warfare Systems Center), Electronic and Telecommunication Research Institute, Bank of America, the Robert Wood Johnson Foundation, Hewlett-Packard Research, Microsoft Corporation, and University Faculty Research funds.

- **Examining the Creation, Distribution and Function of Malware On-Line, \$280,073.00 (my share 45%)**

Principal Investigators: Tom Holt, Gail-J. Ahn (co-PI) and Bill Chu

Sponsor: *National Institute of Justice*, 2007-2009.

- Bots constitute a significant threat to computer users around the globe. In fact, zombies and bots cost US businesses over \$900,000 in 2006 alone. Bots can also act as a force multiplier for computer attackers by leveraging the power of thousands of systems to their needs. At the same time, they allow attackers to conceal their identities behind common computer users who may be unaware

that their machines are involved in cybercrime incidents. Finally, bots act as a versatile attack platform, enabling all manner of cybercrime. While there is some knowledge on the ways that bots operate, there is little research exploring the ways that bots are created and distributed by computer attackers. However, few researchers in the academic community have attempted to systematically examine the creation, distribution, and attack functions of bots circulating online. This information is vital to improve law enforcement and computer security responses to this threat, though it requires a combination of social and computer science research. Thus we propose to examine the social and technical aspects of bots correlating bot characteristics and attack attributes. The objective is to investigate a uniform interface for a multiple of heterogeneous independently developed bot analysis repositories.

- **Detecting and Responding Network-centric Attack through Visual Analysis, \$102,507**

Principal Investigator: Gail-J. Ahn (PI) (Collaborator: Anna Yu, NC A&T Univ., \$112,500.00, Total Funding: \$225,007.00)

Sponsor: *National Security Agency*, 2007 - 2009.

- With the rapid increasing of network attacks, how to keep computer and network systems secure and stable has become a critical issue. Developing various methodologies and techniques to detect, prevent and respond to various attacks in network is an urgent matter. The overall objective of this exploratory research is to build highly scalable and interactive solutions to prevent and respond to network-centric attacks. We propose to establish a hybrid interaction/analysis/visualization methodology by integrating intrusion detection techniques with visualization, visual analysis and intelligent interaction strategies.

The goals of the exploratory work are: a) develop a network traffic generator to mimic network-centric attacks by generating network traffic corresponding to the types of attack; b) design and implement an interactive real-time visualization system to monitor large scale-scale network traffic activity, to analyze the large amount of data, to identify abnormal behavior, and to proactively respond (manual or automatic) to network-centric attacks; and c) provide an adaptable and expandable environment to meet the needs of the analysts or administrators.

- **Secure Information Sharing within a Collaboratory Environment, \$265,000.00**

Principal Investigator: Gail-Joon Ahn (PI)

Sponsor: *Early Career Principal Investigator Award, Department of Energy*, 2003 - 2008.

- The research focuses on the issue of information sharing and dissemination within a collaboratory environment. We attempt to minimize the risks of unauthorized access through a delegation framework. This DoE CAREER award is to support research in applied mathematics, collaboratory research, computer science, and networks performed by exceptionally talented scientists and engineers early in their careers.

- **Secure Information Sharing in Internet-based Collaborative Applications, \$155,077.00**

Principal Investigator: Gail-J. Ahn (PI) (Collaborator: Mukesh Singhal, UKY, \$140,000.00, Total Funding: \$295,077.00)

Sponsor: *National Science Foundation*, 2003 - 2008.

- The Internet revolution has led organizations worldwide to rely heavily on information sharing over the Internet to conduct their daily business. Information sharing on the Internet usually occurs in broad, highly dynamic network-based environments, and formally accessing the resources in a secure manner poses a difficult challenge. Our focus is on the problems of secure information exchange and secure information access in Internet-based collaborative environments. The research addresses the issue of how to advocate selective information sharing in role-based systems while minimizing the risks of unauthorized access proposing a delegation framework. The objective is to demonstrate the feasibility of our framework through policy specification, enforcement, and a proof-of-concept implementation—*This project was recently selected as the highlighted NSF project by NSF-IIS division (program manager: Dr. Le Gruenwald)*

- **Analyzing and Defeating Network-centric Attacks Using Honeypots, \$108,000.00 (my share 40%)**

Principal Investigators: Bill Chu, Gail-J. Ahn (co-PI), Tom Holt, Yongge Wang, and Brent Kang

Sponsor: *Bank of America*, 2006 - 2007.

- Networks of compromised machines called botnets are one of the most threatening adversaries over the Internet due in large part to the difficulty of identifying botnet traffic patterns. We have witnessed that existing signature-based detection and protection methods are ineffective in dealing with new unknown bots. In this project, we introduce a risk-aware network-centric management framework to detect and prevent targeted botnet attacks as well as propagation attempts within the network. Using risk as a factor in the decision process helps identify the bots more systematically. The intent is to learn more information about the bots by identifying malicious characteristics through the network traffic.

- **User-centric Identity and Privacy Management, \$150,911.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Bank of America*, 2005 - 2007.

- The Identity Metasystem is an interoperable architecture for digital identity that assumes people will have several digital identities based on multiple underlying technologies, implementations, and providers. Using this approach, customers will be able to continue to use their existing identity infrastructure investments, choose the identity technology that works best for them, and more easily migrate from old technologies to new technologies without sacrificing interoperability with others.

This project attempts to analyze the principles behind this approach, especially focusing on Microsoft's InfoCard architecture, which is a critical component in the Microsoft's Identity Metasystem, and identify how this approach can be a basis of an open and interoperable architecture for building the identity management system.

- **Sudden Capital Initial Operating Capability Phase I, \$1,464,587.00 (my share 5%)**

Principal Investigators: Bill Tolone, Wei-Ning Xiang, David Wilson, Anita Raja, Seok-won Lee and Gail-J. Ahn (co-PI)

Sponsor: *Department of Defense*, 2005.

- The objective of this project is to create a suite of analytical modeling and simulation tools and knowledge-bases to provide a synergistic “system of systems” view of designated geographic regions (e.g., urban, rural, industrial, municipal, regional, state/province, countries) and the related systems including infrastructure, political, military, social, economic, and information systems.

- **Privacy Attribute Specification and Management, \$105,839.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Bank of America*, 2004 - 2005.

- This project focuses on a general privacy attribute specification and management framework to specify privacy preferences and privacy policies within Liberty specifications. Through this project, we investigate preference expression language and privacy policy specification collaborating with the Financial Service Business (FSB) sector.

- **Critical Infrastructure Protection Center Initiatives: DITSCAP Automation, \$294,500.00 (my share 40%)**

Principal Investigators: Seok-Won Lee, Gail-J. Ahn (co-PI) and Bill Chu

Sponsor: *Space and Naval Warfare Systems Center*, 2004-2006.

- The system accreditation is a long and exhaustive process of self-checks and documentation requiring extensive resources to conduct, manage, and maintain. Automation of this process may exponentially reduce the time, and thereby introduce significant cost savings, in gathering the necessary information to meet the requirements of the certification and accreditation process. This project supports the phased development of a demonstrable automated tool that automates major portions of the Department of Defense Information Technology Security Certification and Accreditation Process.

- **Privacy Attribute Management, \$101,881.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Bank of America*, 2003 - 2004

- The level of privacy consumers relies in large part on the technical design of a new system or environment where personal data is used. This project attempts

to provide consumers with a high level of confidence in the privacy of their personal data, especially in the FSB sector, including proper privacy attribute management.

- **Security in Pervasive Computing, \$57,000.00 (my share 50%)**

Principal Investigators: Yuliang Zheng and Gail-J. Ahn (co-PI)

Sponsor: *Hewlett-Packard Research*, 2002 - 2003.

- Nomadic computing creates new opportunities for users to communicate and share information and experience in a way not possible with a wired network. It also poses a number of challenges, due to the fact that computing devices employed by users are mobile and constrained in terms of available computational power as well as communication bandwidth. One such challenge is how for users to share data in a secure and controlled manner. The objective of this project is to investigate a framework for delegation and authorization in pervasive computing environment.

- **Access and Identity Management, \$89,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Bank of America*, 2002 - 2003

- This research project examines and analyzes existing network identity management models such as Liberty model and the Passport model. Also, our objective includes: (1) enable consumers to protect the privacy and security of their network identity information, (2) enable businesses to maintain and manage their customer relationships without third-party participation, (3) provide an open single sign-on standard that includes decentralized authentication and authorization from multiple providers (4) create a network identity infrastructure that supports all current and emerging network access devices.

- **Engineering a Role-based Infrastructure Management System, \$75,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Electronics and Telecommunications Research Institute*, 2002 - 2003

- There is a compelling need for tools to help security policy administrators to carry out these designs and evolve them as the system evolves. Role engineering tools require rigorous formal foundation to be effective, but also need an easy to use and intuitive visual interface to make them usable without extensive formal training. Herein lies the opportunity and challenge. This project developed a system, called *RolePartner*, to assist security policy administrators in performing role engineering to establish a role-based infrastructure.

- **Scalable Token-based Authentication: Architectures and Mechanisms, \$35,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *National Science Foundation*, 2001 - 2002

- The objective of this project is to propose a novel framework to provide a systematic approach to understanding token-based authentication and to develop

scalable token-based authentication architectures and mechanisms through the practical experimentation using commercial-off-the-self technologies. Also, this research has been conducted to fulfill the following objectives: PKI-compliant solution, compatibility and scalability, and architecture-oriented approach. The preliminary results of this work show that it is futile to try to implement domain-specific authentication mechanism because there are too many possibilities and variations; instead, we should pursue an intuitively simple yet rigorous authentication architecture for the complex environment.

- **Experimental Testbed for Mobile Network Protocols, \$100,000.00 (my share 25%)**

Principal Investigators: Teresa Dahlberg, Gail-J. Ahn (co-PI), Essam El-Kwae, and Asis Nasipuri

Sponsor: *National Science Foundation*, 2001 - 2003

- The overall objective of this project is to experimentally analyze mobile network protocols that support multimedia services. A wireless, mobile multimedia network will be built to add an experimental component to four ongoing research projects. As Co-PI, Dr. Ahn's role is to develop a framework for building secure m-commerce applications and application layer protocols for security services and investigate vulnerability model identifying possible vulnerabilities and testing methodology.

- **Role-based Access Control on Privilege Management Infrastructure, \$51,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Electronics and Telecommunications Research Institute*, 2001 - 2002

- Security is the means to control access and protect information from accidental or intentional disclosure to unauthorized persons and from alteration, destruction or loss. We approach this project with a flexible focus on innovation and leveraging solutions using role-based access control in terms of models, architectures, and tools on Privilege Management Infrastructure (PMI). The framework for PMI in ISO draft has been referred to achieve this approach.

- **Healthkey Information Infrastructure Program, \$36,998.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *Robert Wood Johnson Foundation*, 2000 - 2001

- This project will focus on vendor-neutral specifications for Microsoft's Internet Explorer and Netscape plug-ins including the feasibility of expending with (Public Key Infrastructure) PKI infrastructure. Also, this project will implement the proof-of-concept prototype so that NC healthcare organizations can deploy pilot testing in various sites. In summary, the scope of this project focuses on (1) development of an authentication architecture for healthcare information systems supporting multiple authentication mechanisms (2) prototype implementation based on the architecture (3) pilot testing of the prototype

- **Email Fraud Protection for Financial Services, \$16,300.00 (my share 75%)**

Principal Investigators: Gail-J. Ahn (PI) and Zhaoyu Liu

Sponsor: *Bank of America*, 2002

- This project addresses two issues in email fraud protection: 1) how to protect a customer from email spoofing; and 2) how to protect a legitimate email sender from email address mismatching.

- **Modeling and Analysis of Role-Based Access Control in Distributed Systems, \$6,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *UNC Charlotte*, 2001 - 2002

- With technological advances in distributed computing our society is increasingly dependent upon critical applications that involve distributed and networked information system components and application-specific software components. Our objective in this project is to develop a unified RBAC model, called x-RBAC that uniformly addresses both context independent and interaction context dependent security, is scalable, can be supported by the underlying infrastructures and operating systems, and is intuitively understandable to administrators at the application level.

- **Access Control on Wireless Application Environment: Models, Architectures and Tools, \$5,000.00**

Principal Investigator: Gail-J. Ahn (PI)

Sponsor: *UNC Charlotte*, 2001 - 2002

- Although wireless network and mobile communications can be used for many applications, particular application environments still seem to need an important component, security services. In this project, our objective is to develop secure wireless applications on the Web. To do so, we investigate security issues and security architectures in wireless application environment, including following wireless technologies: WLAN and Bluetooth, WAP and i-Mode, WML (wireless markup language), WTLS (wireless transport layer), WAP proxy, Wireless PKI with DSML/LDAP, i-mode application and so on.

7.3 Publications

I have more than 80 scholarly publications. Among these publications, 17 are fully refereed journal papers, including the most prestigious information assurance journal such as ACM Transactions on Information and System Security.

7.3.1 Highly Recognized Papers

Paper with 200+ Google Scholar citations.

1. Role-based Authorization Constraints Specification, ACM Transactions on Information and System Security, 2000.

Paper with 100+ Google Scholar citations.

1. Role-based Access Control on the Web, ACM Transactions on Information and System Security, 2001.
2. A Rule-based Framework for Role-based Delegation and Revocation, ACM Transactions on Information and System Security, 2003.

The top 10 most popular paper.

1. Access Control in Collaborative Systems, ACM Computing Surveys, 2005. *Communications of the ACM-Vol.48:(9) recognized this paper as the top 10 most popular computing survey article downloaded in June 2005.*

7.3.2 Books

1. Steve Barker and Gail-Joon Ahn (Eds.), “Data and Applications Security XXI; 21st Annual IFIP WG 11.3 Working Conference on Data and Applications Security,” ISBN 978-3-540-73533-5, Lecture Notes in Computer Science, Vol. 4602, Springer, July 2007.
2. S. Hong, M. Kim, Gail-J. Ahn and J. Yoon, “e-Business Security,” Powerbook Publishing Co., Seoul, ISBN 89-8160-041-4 (393 pages), 2000.
3. Gail-J. Ahn, “The *RCL 2000* Language for Specifying Role-Based Authorization Constraints,” Ph.D. thesis, George Mason University, 2000.

7.3.3 Refereed Journal Publications

4. Karsten Sohr, Michael Drouineaud, Gail-Joon Ahn, and Martin Gogolla, “Analyzing and Managing Role-Based Access Control Policies,” *IEEE Transactions on Knowledge and Data Engineering*, 2008 (To appear).
5. Gail-J. Ahn, Badrinath Mohan and S. Hong, “Secure Information Sharing Using Role-based Delegation,” *Journal of Network and Computer Applications*, Elsevier Science, January 2007.
6. Seok-Won Lee, Divya Muthurajan, Robin Gandhi, Deepak Yavagal and Gail-J. Ahn, “Building Decision Support Problem Domain Ontology from Security Requirements to Engineer Software-intensive Systems,” *International Journal of Software Engineering and Knowledge Engineering*, World Scientific, 2006.
7. Seok-Won Lee, Robin Gandhi and Gail-J. Ahn, “Certification Process Artifacts Defined as Measurable Units for Software-intensive Systems Lifecycle,” *Software Process: Improvement and Practice*, John Wiley & Sons, 2006
8. Dongwan Shin and Gail-J. Ahn, “Role-based Privilege and Trust Management,” *Computer Systems Science & Engineering Journal*, Vol. 20, No. 6, CRL Publishing, November 2005.

9. B. Tolone, Gail-J. Ahn, T. Pai, "Access Control in Collaborative Systems," *ACM Computing Surveys*, Vol. 37, No. 1, ACM, March 2005 (Corresponding Author: **Gail-J. Ahn**).
10. Dongwan Shin, Gail-J. Ahn, Sangrae Cho and Seunghun Jin, "A role-based infrastructure management system: design and implementation," *Concurrency and Computation: Practice and Experience*, John Wiley & Sons, Volume 16, Issue 11, pp 1121-1141, August 2004.
11. Longhua Zhang, Gail-J. Ahn, and Bill Chu, "A Rule-Based Framework for Role-Based Delegation and Revocation," *ACM Transactions on Information and System Security*, Volume 6, Issue 3, August 2003.
12. Gail-J. Ahn, S. Hong, and E. Shin, "Reconstructing a Formal Security Model," *Information and Software Technology*, Volume 44, Issue 11, Elsevier Science, August 2002.
13. S. Hong, Gail-J. Ahn, M. Kim, "Secure Consolidated Authorization Mechanism for Supply Chain Management," *International Journal of Computer and Information Science (IJCIS)*, Vol. 3, No. 3, September 2002.
14. Gail-J. Ahn and K. Kim, "CONUGA: Constrained User Group Assignment," *Journal of Network and Computer Applications*, Volume. 24, No. 2, Academic Press, April 2001.
15. Gail-J. Ahn and Ravi Sandhu, "Decentralized User Group Assignment in Windows NT," *Journal of Systems and Software*, Volume. 56, No. 1, Elsevier Science, February 2001.
16. J. Park, Gail-J. Ahn, and R. Sandhu, "Role-based Access Control on the Web," *ACM Transactions on Information and System Security*, Volume 4, No. 1, ACM, February 2001.
17. Gail-J. Ahn, "Role-based Access Control in DCOM," *Journal of Systems Architecture*, Volume 46, No. 13, Elsevier Science, November 2000.
18. Gail-J. Ahn and R. Sandhu, "Role-based Authorization Constraints Specification," *ACM Transactions on Information and System Security*, Volume 3, No. 4, ACM, November 2000.
19. Gail-J. Ahn and Ravi Sandhu, "Towards Role-Based Administration in Network Information Services," *Journal of Network and Computer Applications*, pages 199-213, Academic Press, Volume 22, No.3, 1999.
20. Gail-J. Ahn, "Adopting Roles in Network Information Services," *International Journal of Computers and Applications*, pages 100-104, Volume 21, No.3, ACTA Press, 1999.

7.3.4 Refereed Conference & Book Chapter Publications

21. Gail-J. Ahn, "Discretionary Access Control," Book Chapter (regular entry), *Encyclopedia of Database Systems*, Springer, 2007 (To appear).
22. Jing Jin, Gail-J. Ahn, Mohamed Shehad and Hongxin Hu, "Towards Trust-aware Access Management for Ad-hoc Collaborations," *Proc. of 3rd IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, IEEE, New York, November 12-15, 2007.
23. Gail-J. Ahn and Moonam Ko, "User-centric Privacy Management for Federated Identity Management," *Proc. of 3rd IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, IEEE, New York, November 12-15, 2007.
24. Napoleon Paxton, Gail-J. Ahn and Bill Chu, "Towards Practical Framework for Collecting and Analyzing Network-Centric Attacks," *Proc. of IEEE International Conference on Information Reuse and Integration*, Las Vegas, NV, Aug 13-15, 2007.
25. Bill Chu, Gail-J. Ahn, Steven Blanchard, James Deese, Richard Kelly, Huiming Yu and Ashika Young, "Collegiate Cyber Game Design Criteria and Participation," *Proc. of the 6th IEEE/ACIS International Conference on Computer and Information Science (ICIS 2007)*, Melbourne, Australia, July 11-13, 2007.
26. Gail-J. Ahn and Dhruv Gami, "Enabling Role-Based Delegation and Revocation on Security-Enhanced Linux," *Proc. of 12th IEEE Symposium on Computers and Communications (ISCC'07)*, Aveiro, Portugal, July 1-4, 2007.
27. Gail-J. Ahn and Hongxin Hu, "Towards Realizing a Formal RBAC Model in Real Systems," *Proc. of 12th ACM Symposium on Access Control Models And Technologies (SACMAT)*, Sophia Antipolis, France, June 20-22, 2007.
28. Lawrence Teo and Gail-J. Ahn, "Towards Effective Security Policy Management for Heterogeneous Network Environments," *Proc. of IEEE Workshop on Policies for Distributed Systems and Networks (POLICY'07)*, Bologna, Italy, June 13-15, 2007.
29. Napoleon Paxton, Gail-J. Ahn, Richard Kelly, Kevin Pearson and Bill Chu, "Collecting and Analyzing Bots in a Systematic Honeynet-based Testbed Environment," *Proc. of the 11th Colloquium for information Systems Security Education*, Boston, MA, June 4-7, 2007.
30. Lawrence Teo and Gail-J. Ahn, "Managing Heterogeneous Network Environments Using an Extensible Policy Framework," *Proc. of ACM Symposium on InformAtion, Computer and Communications Security (ASIACCS'07)*, Singapore, March 20-22, 2007.
31. Jing Jin and Gail-J. Ahn, "Towards Secure Information Sharing and Management in Grid Environments," *Proc. of 2nd IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing*, Atlanta, GA, USA, November 17-20, 2006.

32. Jing Jin and Gail-J. Ahn, "Role-based Access Management for Ad-hoc Collaboration," *Proc. of 11th ACM Symposium on Access Control Models And Technologies (SACMAT)*, Lake Tahoe, CA, USA, June 7-9, 2006.
33. Seok-Won Lee, Robin Gandhi, Divya Muthurajan, Deepak Yavagal and Gail-J. Ahn, "Building Problem Domain Ontology from Security Requirements in Regulatory Documents," *Proc. of ACM ICSE Workshop on Software Engineering for Secure Systems (SESS05)*, Shanghai, China, 20-28 May 2006.
34. Jing Jin and Gail-J. Ahn, "Policy-Driven Access Management for Ad-hoc Collaborative Sharing," *Proc. of 2nd International Workshop on Pervasive Information Management (PIM 2006)*, Lecture Notes in Computer Science (LNCS-4254), Munich, Germany, March 30, 2006.
35. Gail-J. Ahn and John Lam, "Managing Privacy Preferences in Federated Identity Management," *Proc. of ACM Workshop on Digital Identity Management*, Fairfax, VA, November 11, 2005.
36. Karsten Sohr, Gail-J. Ahn and Lars Migge, "Specification and Validation of Authorisation Constraints Using UML and OCL," *Proc. of 10th European Symposium on Research in Computer Security (ESORICS)*, Lecture Notes in Computer Science (LNCS), Milan, Italy, September 12-14, 2005.
37. Seok-Won Lee, Robin A. Gandhi and Gail-J. Ahn, "Security Requirements Driven Risk Assessment for Critical Infrastructure Information Systems," *Proc. of Symposium on Requirements Engineering for Information Security*, Paris, France, August 29, 2005.
38. Seok Won Lee, Gail-J. Ahn and Robin A. Gandhi, "Engineering Information Assurance for Critical Infrastructures: The DITSCAP Automation Study," *Proc. of the 15th Annual International INCOSE Symposium*, Rochester, New York, July 10-15, 2005.
39. Seok Won Lee, Robin A. Gandhi, Gail-J. Ahn and Deepak Yavagal, "Active Automation of the DITSCAP," *Proc. of IEEE International Conference on Intelligence and Security Informatics*, Lecture Notes in Computer Science (LNCS), Atlanta, GA, May 19-20, 2005.
40. Seok Won Lee, Robin A. Gandhi, Gail-J. Ahn, "Establishing Trustworthiness in Services of the Critical Infrastructure through Certification and Accreditation," *Proc. of ACM ICSE Workshop on Software Engineering for Secure Systems (SESS05)*, St. Louis, Missouri, May 15-16, 2005 and also in ACM SIGSOFT Software Engineering Notes, Volume 30 , Issue 4, July 2005.
41. Karsten Sohr, Gail-J. Ahn and Lars Migge, "Articulating and Enforcing Authorisation Policies with UML and OCL," *Proc. of ACM ICSE Workshop on Software Engineering for Secure Systems (SESS05)*, St. Louis, Missouri, May 15-16, 2005 and also in ACM SIGSOFT Software Engineering Notes, Volume 30 , Issue 4, July 2005.

42. Deepak S. Yavagal, Seok Won Lee, Gail-J. Ahn and Robin A. Gandhi, "Common Criteria Requirements Modeling and its Uses for Quality of Information Assurance (QoIA)," *Proc. of 43rd ACM Southeast Conference*, Atlanta, GA, March 18-20, 2005.
43. Lawrence Teo and Gail-J. Ahn, "Supporting Access Control Policies Across Multiple Operating Systems," *Proc. of 43rd ACM Southeast Conference*, Atlanta, GA, March 18-20, 2005.
44. Karsten Sohr, Michael Drouineaud, and Gail-J. Ahn, "Formal Specification of Role-based Security Policies for Clinical Information Systems," *Proc. of 20th Annual ACM Symposium on Applied Computing*, Santa Fe, New Mexico, March 13 -17, 2005.
45. J.A. Foster, K.R. Subramanian and Gail-J. Ahn, "Interactive Exploration of Large Filesystems," *Proc. of 17th SPIE Conference on Visualization and Data Analysis*, January 16-20, 2005, San Jose, California, USA.
46. Gail-J. Ahn, Dongwan Shin and Seng-Phil Hong, "Information Assurance in Federated Identity Management: Experimentations and Issues," *Proc. of 15th International Conference on Web Information Systems Engineering*, Lecture Notes in Computer Science (LNCS3306), pp 79-90, November 22-24, 2004, Brisbane, Australia.
47. Dongwan Shin and Gail-J. Ahn, "Role-based Trust Assignment in Trust Management Systems," *Proc. of 17th International Conference on Parallel and Distributed Computing Systems (PDCS 04)*, San Francisco, USA, September 15-17, 2004.
48. Gail-J. Ahn, Dongwan Shin and Longhua Zhang, "Role-based Privilege Management Using Attribute Certificates and Delegation ," *Proc. of International Conference on Trust and Privacy in Digital Business*, Lecture Notes in Computer Science (LNCS3184), August 30 - September 3, 2004.
49. Lawrence Teo and Gail-J. Ahn, "Towards the Specification of Access Control Policies on Multiple Operating Systems," *Proc. of 5th Annual IEEE Information Assurance Workshop*, United States Military Academy, West Point, New York, June 10-11, 2004.
50. John Melton and Gail-J. Ahn, "Application Penetration Testing: Concepts and Taxonomy," *Proc. of 2004 Department of Energy Cyber Security Training Conference*, Overland Park, Kansas, May 24-27, 2004 (Best Student Paper presented by Department of Energy Office of the Chief Information Officer).
51. Dongwan Shin, Gail-J. Ahn and Prasad Shenoy, "Ensuring Information Assurance in Federated Identity Management," *Proc. of the 23rd IEEE International Performance Computing and Communications Conference (IPCCC)*, Phoenix, Arizona, April 14-17, 2004.
52. Gail-J. Ahn and Seng-Phil Hong, "Group Hierarchies with Constrained User Assignment in Linux," *Proc. of the 2nd International Workshop on Security in Information Systems (WOSIS)*, Porto, Portugal, April 13, 2004.

53. Lawrence Teo, Yu-An Sun and Gail-J. Ahn, "Defeating Internet Attacks Using Risk Awareness and Active Honey pots," *Proc. of IEEE International Information Assurance Workshop*, Charlotte, NC, April 8-9, 2004.
54. Gail-J. Ahn and Badrinath Mohan, "Secure Information Sharing Using Role-based Delegation," *Proc. of IEEE International Conference on Information Technology: Coding & Computing (ITCC)*, Las Vegas, NV, April 5-7, 2004.
55. Gail-J. Ahn, Longhua Zhang, Dongwan Shin and Bill Chu, "Authorization Management for Role-based Collaboration," *Proc. of IEEE International Conference on Systems, Man, and Cybernetics*, October 5-8, 2003, Washington, DC.
56. William Tolone, Robin Gandhi and Gail-J. Ahn, "Locale-Based Access Control: placing collaborative authorization decisions in context" *Proc. of IEEE International Conference on Systems, Man, and Cybernetics*, October 5-8, 2003, Washington, DC.
57. Ivan Howitt, Gail-J. Ahn, Teresa Dahlberg, Asis Nasupri and Yuliang Zheng, "Context & Environmental Aware Wireless Sensor Networks for Reconfigurable Manufacturing Systems," *Proc. of the 2nd CIRP Conference on Agile, Reconfigurable Manufacturing*, Ann Arbor, MA, August 20-21, 2003.
58. Gail-J. Ahn, "Specification and Classification of Role-based Authorization Policies," *Proc. of 8th IEEE International Workshop on Enterprise Security (WETICE 2003)*, June 9-11, 2003, Linz, Austria.
59. Lawrence Teo, Gail-J. Ahn and Yuliang Zheng, "Dynamic and Risk Aware Network Access Management," *Proc. of 8th ACM Symposium on Access Control Model and Technology*, June 2-3, 2003, Como, Italy.
60. David Ferriolo and Gail-J. Ahn, "Role Control Center: Features and Case Studies," *Proc. of 8th ACM Symposium on Access Control Model and Technology*, June 2-3, 2003, Como, Italy.
61. Dongwan Shin and Gail-J. Ahn, "On Modeling System-centric Information for Role Engineering," *Proc. of 8th ACM Symposium on Access Control Model and Technology*, June 2-3, 2003, Como, Italy.
62. Longhua Zhang and Gail-J. Ahn, "Constrained Role-based Delegation," *Proc. of Eighteenth IFIP International Information Security Conference*, May 26-28, 2003, Athens, Greece.
63. Lawrence Teo, Yuliang Zheng and Gail-J. Ahn, "Intrusion Detection Force: An Infrastructure for Internet-Scale Intrusion Detection," *Proc. of First IEEE International Information Assurance Workshop (IWIA 2003)*, March 2003, Germany.
64. Gail-J. Ahn Badrinath Mohan, "Role-Based Authorization in Decentralized Health Care Environments," *Proc. of Eighteenth Annual ACM Symposium on Applied Computing*, March 9-12, 2003, Melbourne, Florida.

65. Dongwan Shin, Gail-J Ahn and Sangrae Cho, "Role-based EAM Using X.509 Attribute Certificate," *Proc. of 16th Annual IFIP WG 11.3 Working Conference on Data and Application Security*, King's College, University of Cambridge, UK July 29-31, 2002.
66. Dongwan Shin, Gail-J. Ahn and Joon S. Park, "An application of DSML for RBAC," *Proc. of 26th IEEE Annual International Computer Software and Application Conference*, Oxford, England, August 26-29, 2002.
67. Gail-J. Ahn and Dongwan Shin, "Towards Scalable Authentication in Health Services," *Proc. of 7th IEEE International Workshop on Enterprise Security (WETICE 2002)*, CMU, PA, June 10-12, 2002.
68. Longhua Zhang, Gail-J Ahn and Bill Chu, "A Role-Based Delegation Framework for Healthcare Information Systems," *Proc. of 7th ACM Symposium on Access Control Models and Technologies (SACMAT)*, Monterey, CA, June 3-4, 2002.
69. William J. Tolone, Bei-tseng Chu, Gail-J. Ahn, Robert G. Wilhelm, and John E. Sims, "Challenges to Multi-Enterprise Integration: the EECOMS Experience," *Proc. of International Conference on Enterprise Integration and Modeling Technology (ICEIMT'02)*, Valencia, Spain, April 24-26, 2002.
70. Kayvan Najarian, Xiaolu Sun and Gail-J. Ahn, "A Neural Model for Network Intrusion Detection," *Proc. of the 6th World Multi-Conference on Systems, Cybernetics, and Informatics*, Orlando, FL, U.S.A., July 2002.
71. Seung-Phil Hong, Gail-J. Ahn, Myung-Chul Kim, Min-Hyung Kim and Jung Tae Yoon, "Secure Consolidated Authorization Mechanism for SCM," *Proc. of the 1st ACIS International Conference on Computer and Information Science (ICIS '01)*, Orlando, FL, October 3-5, 2001.
72. Gail-J. Ahn, "Scalable Authentication Architecture for Critical Information System," *Proc. of the 18th AFCEA Annual Federal Database Colloquium and Exposition*, San Diego, California, August 28-30, 2001.
73. Gail-J. Ahn and Seung-P. Hong, "Browsing Structured Data with Role-based Security Realm," *Proc. of the 2nd ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing*, NIT, Japan, August 20-22, 2001.
74. Joon Park, Gail-J. Ahn and Ravi Sandhu, "RBAC on the Web Using LDAP," *Proc. of 15th Annual IFIP WG 11.3 Working Conference on Data and Application Security*, Ontario, Canada, July 15-18, 2001.
75. Gail-J. Ahn and Michael Shin, "Role-based Authorization Constraints Specification Using Object Constraint Language," *Proc. of 6th IEEE International Workshop on Enterprise Security (WETICE 2001)*, MIT, MA, June 20-22, 2001.

76. Longhua Zhang, Gail-J. Ahn and Bill Chu, "A Rule-Based Framework for Role-Based Delegation," *Proc. of 6th ACM Symposium on Access Control Models and Technologies (SACMAT)*, Chantilly, VA, May 3-4, 2001.
77. Ravi Sandhu and Gail-J. Ahn, "Role-based Constraints Language," Position Paper, *IEEE Workshop on Policies for Distributed Systems and Networks*, HP Labs Bristol, UK, January 29-31, 2001.
78. Gail-J. Ahn, R. Sandhu, J. Park and M. Kang, "Injecting RBAC to Secure a Web-based Workflow System," *Proc. 5th ACM Workshop on Role-Based Access Control*, Germany, July 26-28, 2000.
79. E. Shin and Gail-J. Ahn, "UML-based Representation of Role-based Access Control," *Proc. 5th IEEE International Workshop on Enterprise Security (WETICE 2000)*, NIST, MD, June 14-16, 2000.
80. Gail-J. Ahn and Ravi Sandhu, "The RSL99 Language for Role-Based Separation of Duty Constraints," *Proc. 4th ACM Workshop on Role-Based Access Control*, pages 43-54, October 28-29, 1999.
81. Gail J. Ahn, "Hierarchical Administration in Network Information Services," *Proc. 17th International Association of Management (IAOM) Annual International Conference*, pages 424-429, August 6-8, 1999.
82. Gail-J. Ahn and Ravi Sandhu, "Security Architecture of DCOM and Its Integration with RBAC," *Proc. International Computer Symposium (ICS '98)*, pages 71-78, December 17-19, 1998.
83. Ravi Sandhu and Gail-J. Ahn, "Decentralized Group Hierarchies in UNIX: An Experiment and Lessons Learned," *Proc. 21st National Information Systems Security Conference*, pages 486-502, Crystal City, October 5-8, 1998.

7.3.5 Miscellaneous Technical Publications

84. Prasad Shenoy, Dongwan Shin and Gail-J. Ahn, "Towards IA-Aware Web Services for Federated Identity Management," *Proc. of IASTED International Conference on Communication, Network, and Information Security*, New York, December 10-12, 2003.
85. Gail-J. Ahn, "Role-Based Access Control: Features and Experiments," In *Proc. 1999 World Congress of Korean Scientists and Engineers*, July 6-16, 1999.
86. Gail-J. Ahn, "Survey of Unifying Approach for Concurrency Control and Recovery," *KSEA Letters*, pages 45-49, Volume 27, No. 4, 1999.
87. Ravi Sandhu and Gail-J. Ahn, "Group Hierarchies with Decentralized User Assignment in Windows NT," *Proc. IASTED International Conference on Software Engineering*, pages 352-355, Las Vegas, Nevada, Oct. 28-31, 1998.

7.3.6 Papers under Review

1. Lawrence Teo and Gail-Joon Ahn, Managing Heterogeneous Network Environments Using an Extensible Policy Framework, *Journal of Network and Systems Management*.
2. Lawrence Teo, Gail-Joon Ahn, and Yuliang Zheng, A Dynamic Intrusion Suppression Framework to Counter Internet-based Threats, *ACM Transactions on Internet Technology*.
3. Gail-Joon Ahn and Jing Jin, Role-based Access Management for Ad-hoc Collaborative Sharing, *IEEE Transactions on Dependable and Secure Computing*.
4. Gail-Joon Ahn and Hongxin Hu, Realizing a Formal Security Model in Real Systems, *ACM Transactions on Software Engineering and Methodology*.
5. Gail-Joon Ahn, Hongxin Hu and Jing Jin, Security-enhanced OSGi Service Environments, *IEEE Transactions on Systems, Man, and Cybernetics-Part C*.

7.4 Recognition

- Guest Editor, *ACM Transactions on Information and Systems Security*, Vol.10, No.1, February 2007.
- NSF Panelist, 2004, 2005, 2006, 2007.
- Interviewed for North Carolina News 14 on HoneyNet Project, April 2007.
- Interviewed for Charlotte Business Journal on HoneyNet Project, April 2007
- Invited Speaker, Information Management Forum Security Conference, Charlotte, November 7-8, 2006.
- Invited Speaker at Colloquium Series, North Carolina State University (March 2003), Old Dominion University (April 2004), Seoul National University (June 2004), Information and Communication University (May 2001, Taejeon Korea), Samsung Advanced Institute of Technology (June 2004), Purdue University (September 2004), University of Pittsburgh (September 2004), Kyoto University (March 2005) and Arizona State University (April 2007).
- Invited Panelist, Faculty Orientation, UNC Charlotte, August 2003.
- Invited Speaker, LG-EDS Information Assurance Expo, July 2003.
- Invited Speaker, College of Computing and Informatics Award Ceremony, UNC Charlotte, September 2003.
- Invited Reviewer (1 of 9), INCITS Fast of Draft Standard BSR INCITS 359, Information technology - Role Based Access Control (Project 1544L), 2003.
- Panel Moderator, Annual Symposium on Information Security and Privacy, Charlotte, NC, October 2001.

- Tutorial, LG-EDS (2 day tutorial), Korea, May 2001.
- Invited Speaker, PAiRS Work Group Meeting, Chapel Hill, NC, November 2000.
- Invited Speaker, Annual Symposium on Information Security and Privacy, Charlotte, NC, October 2000, 2005, 2006.

7.5 Other Activities

I invited three international visiting scholars: (1) Dr. Byunggi Kim, who is a professor at SoongSil University, helped us develop a research initiative on wireless security. (2) Mr. Sangrae Cho, who is a senior scientist at ETRI, helped us develop PKI and PMI solutions for enterprise security. (3) Dr. Sin H. Choi, who is an assistant professor at Kangwon National University, helped us investigate security issues in sensor network environments. In addition, I actively participated in the meetings with industries—recent meetings include TIAA-CREF (April 2007), Cloakware (April 2007), and iDefense-VeriSign (October 2007).

8 SERVICE

8.1 University Service

- Member, College Infrastructure Planning Committee, College of Computing and Informatics, UNC Charlotte, 2006-2007.
- Chair, Undergraduate Program Committee, S&IS Dept., UNC Charlotte, 2004-2005.
- Member, Undergraduate Program Committee, S&IS Dept., UNC Charlotte, 2007 onwards.
- Chair, Security Committee, College of Computing and Informatics, UNC Charlotte, 2003-2005.
- Advisor, Korean Student Association, UNC Charlotte, 2001 onwards.
- Member, Faculty Academic Policy and Standards Committee, UNC Charlotte, 2000-2005.
- Member, Faculty Council, UNC Charlotte, 2002-2003.
- Member, Ph.D Committee, College of Computing and Informatics, UNC Charlotte, 2002-2004.
- Member, Faculty Search Committee, S&IS Dept, UNC Charlotte, 2001, 2002, 2003, 2004, 2007.
- Member, Library Committee, CS Dept., UNC Charlotte, 2000.

8.2 Community Service

- HIPPA Privacy: Consent & Patient Rights Focus Group in NCHICA. As a member of this group, I supported NCHICA to have a comprehensive framework and practical tools for the education and implementation of the portions of HIPAA dealing with consents and patients' rights as they affect covered entities and other persons.
- Co-founded Annual Symposium on Information Security and Privacy in 2000. This event has drawn over 400 attendees from Charlotte (NC), Rockhill (SC), Concord (NC), Windston-Salem (NC) in 2007.

8.3 Professional Service

8.3.1 Conference Committee

I have served on various IA conference program committees as follows:

- Program Committee, *ACM Symposium on Applied Computing (SAC)– Computer Security Track*, 2008, 2007, 2006, 2005, and 2004.
- Program Committee, *Annual IFIP WG 11.3 Working Conference on Data and Applications Security*, 2008, 2007 (Program Co-Chair), 2006, 2005, 2004, and 2003.
- Program Committee, *ACM Workshop on Digital Identity Management*, 2008, 2007 (General Co-Chair), 2006 and 2005.
- Proceedings Chair, *First ACM Conference on Wireless Network Security (WiSec '08)*, 2008.
- Program Committee, *International Conference on I-Warfare and Security*, 2008, 2007, 2006, and 2005.
- Program Committee, *International Conference on Security and Cryptography (SECRYPT)*, 2008 and 2007.
- Program Committee, *IEEE International Conference on Information Reuse and Integration*, 2008, 2007, and 2006.
- Program Committee, *ACM Symposium on Access Control Models And Technologies*, 2008 (Publicity Chair), 2007, 2006 (Proceedings Chair), 2005 (Program Chair), 2004 (Proceedings Chair), 2003 (Proceedings Chair), and 2002 (Proceedings Chair).
- Program Committee, *IEEE Workshop on Policies for Distributed Systems and Networks*, 2008 and 2007.
- General Co-Chair, *IEEE Workshop on Web and Pervasive Security*, 2008.
- Program Committee, *ACM Workshop on Information and Communications Security Standards and Regulations*, 2007.

- Program Committee, *IEEE Workshop on Information Assurance (WIA-2007)*, 2007 and 2006.
- Program Committee, *ACM Conference on Computer and Communication Security*, 2007, 2005 (Publicity Chair), 2004 (Publicity Chair), 2003 (Publicity Chair), and 2002 (Publicity Chair).
- Program Committee, *Third International Symposium on Information Assurance and Security*, August 29-31, 2007
- Program Committee, *ACM Symposium on InformAtion, Computer and Communications Security (ASIACCS'07)*, 2007.
- Program Committee, *IEEE ICPS 2007 - SecPerU 2007 Workshop*, 2007.
- Workshop Co-Chair, *IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing: TrustCol Workshop*, 2007 and 2006.
- Program Committee, *IEEE International Workshop on Privacy Data Management*, 2007
- Program Committee, *IEEE 15th International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprise & Security Technologies (ST)*, 2006 and 2005.
- Program Committee, *ACM Workshop on Visualization for Computer Security (VizSEC)*, November 3, 2006.
- Program Committee, *IEEE 13th International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprise – Enterprise Security*, 2004 (Program Co-Chair), 2003, 2002, and 2001.
- Program Committee, *International Workshop on Broadband Wireless Services and Applications (BroadWISE)*, October 25, 2004.
- Program Committee, *7th Information Security Conference (ISC04)*, Palo Alto, USA, Sept 27-29, 2004.
- Program Committee, *20th International Conference on Conceptual Modeling (ER2001)*, November 27-30, 2001.
- Program Committee, *The First International Workshop for Asian Public Key Infrastructure (IWAP2001)*, October 19-20, 2001.
- Program Committee, *International Conference on Information Security and Cryptology (ICISC2001)*, December 6-7, 2001.

8.3.2 Journal & Editorial Reviewer

IEEE Internet Computing, Communications of the ACM, VLDB Journal, International Journal of Cooperative Information Systems, ACM Transactions on Information and System Security, IEEE Transactions on Knowledge and Data Engineering, ACM Computing Survey, ACM Transaction on Software Engineering, The Internet Encyclopedia, Information and Software Technology, Journal of Database Management, ACM Transactions on Internet Technology, IEEE Transactions on Dependable and Secure Computing, ACM Transactions on Software Engineering and Methodology and IEEE Transactions on Parallel and Distributed Systems.

8.3.3 Professional Activities

- Member, ACM SACMAT Steering Committee, 2005 onwards
- Member, IATAC (Information Assurance Technology Analysis Center) SME, 2007 onwards
- Technical Committee, Distributed Intelligent Systems, IEEE SMC Society, 2007 onwards.
- Member, ORAU National Security Experts Team, 2007 onwards.
- Reviewer, IEEE Computer Society CHC60 Competition, 2006.
- External Reviewer, NSERC Strategic Network Grant Application, 2007.
-Invited by the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Federal Government's granting council for university based research in science and engineering.
- Editorial Board, *Journal of Database Management*, 2001 onwards.
- Review Committee, Common Criteria Protection Profiles, NIST, 2001.

8.4 Leadership in Service

- I also played a critical role in defining the proposed center of excellence in the department of software and information systems and the establishment of the Laboratory of Information Integration, Security and Privacy. In addition, I have actively participated in the development of academic strategic plan.
- Prepared the case for UNC Charlotte's information security and privacy program to be recognized by NSA as a Center of Academic Excellence in Information Assurance Education. As a result, UNC Charlotte received NSA's recognition in March 2001. Also, NSA and DHS redesignated UNC Charlotte as an National Center of Academic Excellence in Information Assurance Education in 2004 and 2007. Also, participated in the Software Security Institute Initiative that led us to be the first University partner with SANS in 2007.

9 OTHER ACHIEVEMENTS

- I helped LIISP establish collaborative relationships with the Information and Communication University (Taejon, Korea), Seoul National University (Seoul, Korea) and Kyoto University (Kyoto, Japan), the top-tier Universities in Korea and Japan. A research exchange agreement between these institutions was signed in May 2001, July 2004 and November 2006, respectively.
- I was asked to have an interview with UNC Charlotte Public Relation Office for their article with respect to industrial-university collaboration.
- I serves as the Director of LIISP and contributed significantly to the strategic plan of the department. Special recognition were also given to my extraordinary efforts in proposal developments. I was also being recognized for my outstanding contributions to the development of research programs of the department, including the development of the e-business technology institute.
- I have filed an invention disclosure and a few patent applications:
 - Patent Application (Pending), “Systems and Methods for Dynamic and Risk-aware Network Security,” Application Docket No. 46872.285236, May 30, 2003: Yuliang Zheng, Lawrence Teo and Gail-J. Ahn.
 - Report of Invention, “An Information Assurance Engineering Methodology for Critical Infrastructure Protection: The DITSCAP Automation Study,” Assignment ID No. COIT-SIS-AA-2004-128, IR No. 2004-071, November 15, 2004: Seokwon Lee and Gail-J. Ahn.
 - Provisional Patent Application, “Method and Apparatus for Privacy Attribute Specification and Management for Digital IDs,” Assignment ID No. 60/629075 (US Patent and Trademark Office), December 20, 2004: Gail-J. Ahn.
 - Provisional Patent Application, “Systems and Methods for Role-based Privilege Delegation and Revocation,” Assignment ID No. 60/629076 (US Patent and Trademark Office), December 22, 2004: Gail-J. Ahn.
 - Provisional Patent Application, “Method for Dynamic and Risk-aware Response to Anomalous Connections in a Communications Medium,” Application No. 60/447494 (US Patent and Trademark Office), February 19, 2003: Yuliang Zheng, Lawrence Teo and Gail-J. Ahn.
 - Provisional Patent Application, “Method and Apparatus for Systematic Role Engineering and Administration for Enterprise Access Management,” Assignment ID No. 60/466879 (US Patent and Trademark Office), May 2, 2003: Gail-J. Ahn and Dongwan Shin.
 - Patent Application, “Systems and Methods for Dynamic and Risk-aware Network Security,” Application Docket No. 46872.285236, May 30, 2003: Yuliang Zheng, Lawrence Teo and Gail-J. Ahn.