

Jianqing Zhang

Ph.D. Candidate

Department of Computer Science
University of Illinois at Urbana-Champaign

PERSONAL INFORMATION

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RESEARCH INTERESTS

Security; Networking; Formal Methods; Programming Languages; Web Application. Focusing on secure communication schemes and protocols for control networks, including secure multicast for power grid communication networks, access control for substation intelligent electronic devices (IEDs).

EDUCATION

- Ph.D.** Computer Science Since Aug. 2004
University of Illinois at Urbana-Champaign
DISSERTATION: Secure Networked Control Systems (expected graduation date: Oct. 2009)
DISSERTATION ADVISOR: Dr. Carl A. Gunter
- M.S.E.** Computer and Information Science Aug. 2003 - Aug. 2004
University of Pennsylvania. Admitted into Doctoral Program.
- M.E.** Computer Science and Engineering Sep. 1999 - Apr. 2002
Beihang University (formerly known as Beijing University of Aeronautics and Astronautics)
THESIS: Research and Implementation of XML-Based Key Management System
THESIS ADVISOR: Dr. Jinpeng Huai
- B.E.** Computer Science and Engineering Sep. 1994 - Apr. 1998
Beihang University
Admitted into Graduate Program with the exemption of Admission Examination

EMPLOYMENT EXPERIENCE

- Illinois Security Lab**, University of Illinois at Urbana-Champaign Since Aug. 2004
Research Assistant
Currently sponsored by Trustworthy Cyber Infrastructure for the Power Grid (TCIP), <http://www.tcip.itl.uiuc.edu/>
- EnerNex Corporation**, Knoxville, TN. May 2008 - Aug. 2008
Summer Intern
- Sun Microsystems Laboratory**, Burlington, MA. Jun. 2005 - Aug. 2005
Summer Intern

Penn Security Lab , University of Pennsylvania Research Assistant (Fellowship)	Aug. 2003 - Aug. 2004
IBM China Software Development Lab , Beijing, China. Software Engineer Developed and tested web based e-Business platforms and applications.	Aug. 2002 - Jul. 2003
Information Security One (China) Ltd. , Beijing, China. Software Engineer Analyzed and designed a real-time firewall and IDS management system.	Apr.2002 - Jul.2002
The Institute of Advanced Computing Technology , Beihang University, Beijing, China. Research Assistant	Sep.1999 - Apr.2002

RESEARCH PROJECTS

Secure Multicast for Control Networks Aim at next generation multicast for control networks, <i>e.g.</i> secure GOOSE for power substations. Propose an IPsec based multicast scheme with the concern of timing constraints, including Group Security Association (GSA), Group Security Policy (GSP) and an enhanced group key management protocol. Designed and evaluated the performance of native IPsec multicast and hub-and-spokes IPsec multicast schemes with off-the-shelf IPsec implementations in LAN. For the case study of IEC61850 enabled substations, developing a secure multicast configuration tool integrated with Substation Configuration Language (SCL).	Since Oct. 2007
Group Internet Key Exchange Propose an enhanced key management scheme for multicast IPsec to replace current IETF group key management protocol, Group Domain of Interpretation (GDOI), which is based on inefficient and DoS-vulnerable IKEv1. Designing and implementing an IKEv2 based GDOI by substituting Phase 1 of GDOI, <i>i.e.</i> Phase 1 of IKEv1, with IKEv2's first two exchanges for mutual authentication. Editing an IETF draft. A more efficient and DoS-resistant scheme will be concerned later.	Since Mar. 2009
TVA IEC61850 Bradley Substation Conformance Test Project To determine whether any latent defects remain in the system even after commission tests on IEDs have been performed. Collaborated closely with experts of IEC61850 and engineers of TVA; designed and refined the test plan; configured, executed and analyzed the test procedures which cover almost all IEC61850 communication functionalities. Delivered <i>Supplement of TVA IEC61850 Bradley IED Test Project</i> , a detailed test plan and guide with extensive technical notes, description of test methods.	May 2008 - Aug. 2008
Secure Intelligent Electronic Device Made a survey of power grid communication protocols and network architectures. Analyzed the security threats to networked IEDs; argued the idea of defense in depth of control devices in substation networks. Proposed an integrated architecture of secure wired and wireless network for substations. Writing a white paper with TCIP researchers.	Since Jul. 2006
AMPol: Adaptive Messaging Policy Introduced a service-oriented architecture that facilitates policy-aware, end-to-end adaptive messaging between multiple parties. Proposed service description mechanisms to describe non-functional QoS information of all the candidate services. Designed a middleware called AMPol-Q that enables clients to discover, select, compose, and monitor services that fulfil end-to-end QoS constraints. Evaluated the framework by a case study of puzzle anti-spam system for a web service email system.	Oct. 2004 - Jul. 2006
Outsourcing Security Analysis with Anonymized Logs Analyzed security logs for outsourced security services with the concern of privacy. Developed anonymization strategies for the logs that leave sufficient information for security analysis while protecting sensitive information.	Feb. 2006 - May 2006

A Framework of Peer-to-Peer Policy Negotiation

Jun. 2005 - Aug. 2005

Analyzed peer-to-peer security policy negotiation; proposed a formal framework which models the process of deriving a mutually acceptable policy with the concern of meta-policies. Submitted as a candidate Patent Request in Sun Microsystems Laboratory.

XKeySec - XML Based PKIX Key Management System

Jan. 2001 - Mar. 2002

Analyzed XKMS; designed and implemented an XML-based PKIX key management system.

PUBLICATIONS

PAPERS

On the Latency of IPsec Multicast in Power Substation Local Area Networks (submitted)

Jianqing Zhang and Carl A. Gunter

The 4th International Workshop On Critical Infrastructures Security (CRITIS'09), Bonn, Germany. September 2009

Evaluating A Secure Protocol Scheme for Control Networks on the DETER Test Bed

Jianqing Zhang and Carl A. Gunter

Technical Report, Urbana, IL. June 2008

Mitigating Risks and Exploiting Opportunities for Networked Power Devices

Carl A. Gunter, Michael LeMay, Jianqing Zhang, George Gross, and Samuel T. King

The 1st International Conference on Critical Infrastructure Protection (ICCIP'07), Hanover, NH. March 2007

AMPol-Q: Adaptive Middleware Policy to Support QoS

Raja N. Afandi, Jianqing Zhang, and Carl A. Gunter

The 4th International Conference on Service Oriented Computing (ICSOC'06), Chicago, IL. December 2006

AMPol: Adaptive Messaging Policy

Raja N. Afandi, Jianqing Zhang, Munawar Hafiz and Carl A. Gunter

The 4th IEEE European Conference on Web Services (ECOWS'06), Zurich, Switzerland. December 2006

Outsourcing Security Analysis with Anonymized Logs

Jianqing Zhang, Nikita Borisov and William Yurcik

International Workshop on the Value of Security through Collaboration (SECOVAL'06), Baltimore, MD. September 2006

Held in conjunction with the International ICST Conference on Security and Privacy in Communication Networks (SecureComm'06)

AMPol: Adaptive Messaging Policy

Raja N. Afandi, Jianqing Zhang, Munawar Hafiz and Carl A. Gunter

IEEE Workshop on Web Service Security (WSSS'06), Oakland, CA. May 2006

Held in conjunction with the IEEE Symposium on Security and Privacy (IEEE S&P '06)

Research and Implementation Of XML-Based Key Management (in Chinese)

Jianqing Zhang, Jinpeng Huai and Xudong Liu

Journal Of Computer Research and Development, Vol. 40, January 2003. Beijing, China

Network Security and Internet Firewall (in Chinese) Jianqing Zhang

China Internet Times, October 1999. Beijing, China

BOOK CHAPTERS

Access 2002 Inside-Out Bo Zhang, Jianqing Zhang and Yundun Tang
Translation. Tsinghua University Press, 2002. P.R. China

MCSE Training Kit: Microsoft Exchange 2000 Server, Chapter 6 - Chapter 10
Jianqing Zhang *et al.*
Translation. Tsinghua University Press, October 2001. P.R. China

MCSE Training Kit: Microsoft SQL Server 2000 Database Design and Implementation, Chapter 13 -
Chapter 20
Jianqing Zhang *et al.*
Translation. Tsinghua University Press, September 2001. P.R. China

PRESENTATIONS

A Survey of Group Key Management in Secure Multicast: Models, Protocols and Standards
Illinois Security Lab, University of Illinois at Urbana-Champaign. March 2009

TVA Bradley IEC61850 Substation IED Test Project
TCIP SIG Architecture, University of Illinois at Urbana-Champaign. December 2008

End-to-End Secure Control Network Architecture
TCIP, University of Illinois at Urbana-Champaign. April 2008

Secure Intelligent Electronic Devices (SIEDs)
Presented with Carl A. Gunter and Samuel T. King
Power Systems Engineering Research Center (PSERC) Industrial Advisory Board Meeting, Urbana, IL.
May 2007

IEC 61850 - Communication Networks and Systems in Substations: An Overview of Computer Science
Illinois Security Lab, University of Illinois at Urbana-Champaign. April, 2007

POSTERS

IPsec Based Multicast for Control Networks
Jianqing Zhang and Carl A. Gunter
TCIP Research Review, Urbana, IL. April 2009

Secure Intelligent Electronic Devices
Jianqing Zhang, Chris Grier, Samuel T. King, and Carl A. Gunter
The 4th Midwest Security Workshop (MSW), Chicago, IL. October 2007

Secure Intelligent Electronic Devices
Jianqing Zhang, Chris Grier, Samuel T. King, and Carl A. Gunter
TCIP Research Review, Urbana, IL. October 2007

Secure Relay
Jianqing Zhang, Carl A. Gunter, Samuel T. King and Pete Sauer
TCIP Research Review, Urbana, IL. December 2006

AMPol: Adaptive Messaging Policy
Raja N. Afandi, Jianqing Zhang, Munawar Hafiz, Carl A. Gunter
The 2nd ITI Workshop on Dependability and Security, Urbana, IL. December 2005

Internet Messaging as a Family of Web Services
Kevin Lux, Carl A. Gunter, Jianqing Zhang and Raja N. Afandi
The 1st ITI Workshop on Dependability and Security, Urbana, IL. December 2004

PAPER REVIEWS

- The 29th International Conference on Distributed Computing Systems (ICDCS 2009)
- The 41st Hawaii International Conference on System Sciences (HICSS 2008)
- The 20th IEEE Computer Security Foundations Symposium (CSF 2007)
- ACM Workshop on Privacy in the Electronic Society 2007 (WPES 2007)
- ACM Workshop on Privacy in the Electronic Society 2006 (WPES 2006)
- The 3rd IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS 2006)

TEACHING AND ADVISING EXPERIENCE

Teaching Assistant of <i>Information Assurance</i> University of Illinois at Urbana-Champaign Lecturer: Prof. David. M. Nicol	Jan. 2008 - May 2008
Teaching Assistant of <i>Foundations of Security</i> University of Illinois at Urbana-Champaign Lecturer: Prof. Carl A. Gunter	Jan. 2005 - May 2005
Teaching Assistant of <i>Computer Network</i> Beihang University Lecturer: Prof. Liangshuang Lv	Sep. 2000 - Jan. 2001
Mentor of undergraduate students (Class'01) The Dept. of Compute Science and Engineering, Beihang University	Sep. 1997 - Jul. 2001

HONORS & AWARDS

- University Fellowship, University of Illinois at Urbana-Champaign, 2004
- Research Fellowship, University of Pennsylvania, 2003
- Guanghua Graduate Scholarship, Beihang University, 2001 (top 5% of graduates in BHU)
- Second Prize in the college "Feng Ru" Extracurricular Competition of Science and Technology, 2000
- United Technologies Corporation Rong Hong Endowment, Beihang University, 1997 (10 out of 5,000 undergraduates in BHU)
- Student Honor Award of the City of Beijing, 1997 (300 out of all undergraduates in Beijing)
- Shen Xingyuan Scholarship, Beihang University, 1997 (10 out of 500 undergraduates in computer science)

EXPERTISE & TECHNICAL SKILLS

- Power grid communication and security: IEC 61850, IEC 62351, DNP3, ICCP, CIP-002-009
- Security technologies: IPsec, access control models, , XML security protocol suite, etc.
- Programming languages and operating systems: C/C++, JAVA, C#; Windows, Unix/Linux.

REFERENCES

Available upon request.