The 23rd World Conference on Information Security Applications

WISA 2022

August 24-26, 2022

MAISON GLAD, Jeju Island, Korea, Hybrid (on-off mix) conference

Hosted by

Korea Institute of Information
Security & Cryptology

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Ministry of Science and ICT

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National Security Research Institute

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The 23rd World Conference on Information Security Applications

WISA 2022
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▶ Keynotes

▶ Keynotes 1

Keynote 1: Willy Susilo, Distinguished Professor
(University of Wollongong)

Title: Cloud Computing Security

Date : August 24, 13:40

Abstract

The emergence of cloud has significantly reduces the costs of hardware and software resources in computing infrastructure and the data is usually encrypted before outsourcing to the cloud. This talk will focus on the effort to secure cloud storage, which
is an important aspect of cloud computing adoption. We will discuss the theory and practice of secure cloud computing. Particularly, we will focus on the research problems in this area and some possible solutions. We will close the talk with future directions in this area.

Biography

Willy Susilo is a Distinguished Professor in the School of Computing and Information Technology, Faculty of Engineering and Information Sciences at the University of Wollongong (UOW), Australia. He is the director of Institute of Cybersecurity and Cryptology, School of Computing and Information Technology, UOW and the Head of School of Computing and Information Technology at UOW (2015 - now).
He is an IEEE Fellow, an IET Fellow, an ACS Fellow and an AAIA Fellow. Previously, he was awarded the prestigious Australian Research Council Future Fellowship in 2009. He has published more than 500 papers in journals and conference proceedings in cryptography and network security. In 2016, he was awarded the ``Researcher of the Year" at UOW, due to his research excellence and contributions. He is the Editor-in-Chief of the Elsevier's Computer Stanrdards and Interface and the Information journal. He is currently an Associate Editor of IEEE Transactions on Dependable and Secure Computing. He has also served as the program committee member of several international conferences.

▶ Keynotes 2

**Keynote 2: Yi-Bing Lin, Winbond Chair Professor,
Miin Wu SOC Chair Professor
(National Yang Ming Chiao Tung University,
National Cheng Kung University,
China Medical University, Asia University)**

Title: 5G Private Network Security and Applications

Date : August 25, 13:40

Abstract

5G private network has been developed in recent years. How this solution can be commercially operated become an interesting topic. Specifically, we need to find the killer applications and resolve the security issues for these applications so that they can be sustainably operated. This talk will provide our experience in using Quanta 5G private network for two applications: smart agriculture and interactive art performance. The smart agriculture solution called AgriTalk has been deployed in more than 10 commercial farms in Taiwan, one in Thailand, and one in Japan. The interactive art performance solution called CATtalk (Creative Art Talk) is used in many art performances and the CATtalk solution for the project, Hand extension, inheritance of the palm - Mechanical Puppet Project, has been selected for the DIGI play DANCE program at TANZAHOi International Festival in Germany, September 14 - 18, 2022. Through these examples, we will show how Quanta 5G private network plays an important role and how American Fuzzy (AFL), Common Vulnerabilities and Exposures (CVE), Authentication, Authorization and Accounting (AAA) are used to ensure security.

Biography

Yi-Bing Lin is the Winbond Chair Professor of National Yang Ming Chiao Tung University, Chair Professor of National Cheng Kung University and China Medical University. He is the author of the books Wireless and Mobile Network Architecture (Wiley, 2001), Wireless and Mobile All-IP Networks (John Wiley,2005), and Charging for Mobile All-IP Telecommunications (Wiley, 2008). Lin received numerous research awards including 2005 NSC Distinguished Researcher, 2006 Academic Award of Ministry of Education and 2008 Award for Outstanding contributions in Science and Technology, Executive Yuen, 2011 National Chair Award, and TWAS Prize in Engineering Sciences, 2011 (The Academy of Sciences for the Developing World). He is AAAS Fellow, ACM Fellow, IEEE Fellow, and IET Fellow.

▶ Invited talks

▶ Invited talks 1

Invited Talk 1: So Jeong Kim, Senior Research Fellow
(Institute for National Security Strategy)

Title: Cyberattack Severity Assessment(CASA) and National Response
Matrix(NRM) in Korea

Date : August 24, 17:20

Abstract

State-sponsored cyber attacks have increased significantly and threaten national security in recent years. In order to maintain and ensure peace in cyberspace, it should be clear that malicious acts are paid for when they occur. However, due to the intrinsic characteristics of cyberspace, it is difficult to establish guidelines and procedures in proportion to the impact of a cyber attack. In particular, the Republic of Korea(ROK) has never taken public proportional response measures against numerous attacks over the past 20 years. But ROK is also trying to change its will to secure cyber attack deterrence and prepare an active response through the 「National Cybersecurity Strategy 2019」. In this talk, we propose a cyber attack severity assessment methodology and national response matrix to enable active response in the event of a cyber attack. We analyze the scale and impact of cyber threats caused by more than 20 attacks that ROK has suffered, and propose guidelines and procedures for proportional response accordingly. Therefore, we contribute to securing cyber attack deterrence by establishing the national standard for external responses against cyber attacks and actively imposing costs on malicious cyber attackers through CASA & NRM.

Biography

Dr. SO JEONG KIM is a senior research fellow of the Institute for the National Security Strategy. Before joining INSS, she worked at the NSR(National Security Research Institute) from 2004 to Feb. of 2022 as team lead.

Since joining NSR in 2004, she led the cybersecurity policy team and provides recommendations on cybersecurity policy and regulatory issues. She was involved in drafting South Korea's National Cyber Security Strategy, published in April 2019. She was also involved in the 4th and 5th UN Group of Governmental Experts as an adviser, and the MERIDIAN process as an adviser and organizer.

When she was at the NSR has been hosted the international Conference on cybersecurity policy and strategy, the GCPR(Global Conference on Peace Regime) since 2014, too. Her main research area is various policy issues regarding national cybersecurity policy such as international nor setting processes, CBMs, CIIP, law and regulations, cybersecurity evaluation methodology development and comparision, etc. Her recent paper is about the evaluation of cyber attack severiety and proposing national response matrix.

▶ Invited talks 2

Invited Talk 2: Sooel Son, Associate Professor
(School of Computing (SoC) and Graduate
School of Information Security (GSIS), KAIST)
Title: Two approaches for identifying web vulnerabilities: subgraph
isomorphism and reinforcement learning
Date : August 25, 9:30

Abstract

Web services have become integral parts of our daily lives, processing diverse types of private information. At the same time, web vulnerabilities in these services impose serious threats that endanger the security and privacy of service clients. In this talk, I will present two recent works on identifying web vulnerabilities. I will start by introducing a scalable way of identifying web vulnerabilities using subgraph isomorphism. From 7,174 web applications, we identified 2,464 potential vulnerabilities, including 42 CVEs, by identifying vulnerable subgraphs matching applications with known vulnerabilities. Also, I will present a novel penetration testing method using reinforcement learning to find reflected cross-site scripting vulnerabilities. By leveraging an intelligent agent, we enable the pentesting tool to generate context-aware payloads to exploit vulnerabilities. Our experimental results show that our tool outperforms other state-of-the-art tools in terms of finding more vulnerabilities and sending fewer attack requests.

Biography

Dr. Sooel Son is an associate professor in the School of Computing (SoC) and Graduate School of Information Security (GSIS) at KAIST. He received a Computer Science Ph.D. from The University of Texas at Austin. His research focuses on web security and privacy problems. He is interested in analyzing Web applications, finding web vulnerabilities, and implementing new systems to find such vulnerabilities

▶ Invited talks

▶ Invited talks 3

Invited Talk 3: Dan Dongseong Kim, Associate Professor (University of Queensland)

Title: Moving Target Defense (MTD): Recent Advances and Future Challenges

Date : August 26, 9:30

Abstract

Moving Target Defense (MTD) is a promising defense technique and has been researched recently a lot. The main purpose of MTD is to confuse attackers by changing the attack surface of various systems and networks. This talk will cover the following topics:

1) Introduction to MTD including a brief intro to security fundamentals, and an introduction to security assessment;
2) Recent advances in MTD techniques including i) three dimensions of MTD (when, how, and what to trigger), ii) MTD techniques in a horizontal/vertical manner, iii) MTD metrics and MTD-related security and economic metrics, and iv) The state of the art MTD techniques (with my own research highlights);
3) Some practical examples of MTD design and implementation; and finally
4) MTD challenges and future directions.

Biography

Dr. Dan Dongseong Kim is an Associate Professor (softly equivalent to a Reader in the UK; a full professor in the US) in Cyber Security at The University of Queensland (UQ), Brisbane, Australia since 2019. Prior to UQ, he was a faculty member in Cyber Security in the Department of Computer Science and Software Engineering at the University of Canterbury (UC), Christchurch, New Zealand from 2011 to 2018. From 2008 to 2011, he was a postdoc at Duke University in the US. He was a visiting scholar at the University of Maryland, College Park, Maryland in the US in 2007. His research interests are in Cyber Security and Dependability for various systems and networks. More information is available at his UQ webpage: https://researchers.uq.edu.au/researcher/23703.

Conference Program ◀

The Main Place:The Crystal Hall, Jade Hall (2F)

DAY 1   August 24 (Wednsday), 2022

Time / Room	Crystal Hall	Jade Hall
13:00-13:40	Registration /Opening Remarks	
13:40-14:40	**Keynote 1: Cloud Computing Security** Session Chair: Ki-Woong Park (Sejong University)	
14:40-15:10	Coffee Break	
15:10-16:50	**Session 1: Cryptography 1** Session Chair: Seungkwang Lee (Dankook University)	**Session 2: 5G and Network Security** Session Chair: Youngsoo Kim (ETRI)
16:50-17:20	Coffee Break	
17:20-18:00	**Invited Talk 1: Cyberattack Severity Assessment and National Response Matrix in Korea** Session Chair: Dong Hee Kim (NSR)	

DAY 2   August 25 (Thursday), 2022

Time / Room	Crystal Hall	Jade Hall
9:30-10:10	**Invited Talk 2: Two approaches for identifying web vulnerabilities** Session Chair: Il-Gu Lee (Sungshin Women's University)	
10:10-11:00	Coffee Break	
11:00-12:20	**Session 3: Privacy and Password Security** Session Chair: HwaJung Seo (Hansung University)	**Session 4: Cryptography 2** Session Chair: Yousung Kang (ETRI)
12:20-13:40	Lunch	
13:40-14:40	**Keynote 2 5G Private Network Security and Applications** Session Chair: Haehyun Cho (Soongsil University)	
14:40-15:10	Coffee Break	
15:10-16:50	**Session 5: Security Analysis and Management 1** Session Chair: Bonam Kim (Kookmin University)	**Poster Session**
16:50-18:00	**Poster Session**	
18:00-18:30	Break Time	
18:30	Banquet (Convention Hall, 1F)	

▶ Conference Program

DAY 3 August 26 (Friday), 2022

Time / Room	Crystal Hall	Jade Hall
9:30-10:10	**Invited Talk 3** **Moving Target Defense (MTD): Recent Advances and Future Challenges** Session Chair: Seongmin Kim (Sungshin Women's University)	
10:10-10:40	Coffee Break	
10:40-12:20	**Session 6: Emersing Security Issues** Session Chair: Seung-Hyun Seo (Hanyang University)	**Session 7: Security Analysis and Management 2** Session Chair: Jungsoo Park (Soongsil University)
12:20-13:20	Lunch	

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DAY 2 **August 25 (Thursday), 2022**

Session 3: Privacy and Password Security
HwaJung Seo (Hansung University)

- **A novel metric for password security risk against dictionary attacks**

  Binh Le Thanh Thai and Hidema Tanaka (National Defense Academy of Japan)

- **Illegal Photo Shoot Detection Method Using Operating Frequency of Smartphone Camera**

  Seong-Hyun An (Kookmin University), Ji-Woo Lee (Korea Testing Certification Institute) and Dong-Guk Han (Kookmin University)

- **On Membership Inference Attacks to Generative Language Models across Language Domains**

  Myung Gyo Oh, Leo Hyun Park, Jaeuk Kim, Jaewoo Park and Taekyoung Kwon (Yonsei University)

- **Towards Evaluating the Security of Human Computable Passwords using Neural Networks**

  Issei Murata, Kouichi Sakurai, Yujie Gu and Pengju He (Kyushu University)

Session 4: Cryptography 2
Yousung Kang (ETRI)

- **Time-Optimal Design of Finite Field Arithmetic for SIKE on Cortex-M4**

  Mila Anastasova, Reza Azarderakhsh (Florida Atlantic University) and Mehran Mozaffari Kermani(University of South Florida)

- **Membership Privacy for Asynchronous Group Messaging**

  Keita Emura (National Institute of Information and Communications Technology), Kaisei Kajita (Japan Broadcasting Corporation), Ryo Nojima, Kazuto Ogawa (National Institute of Information and Communications Technology) and Go Ohtake (Japan Broadcasting Corporation)

- **Collision-Resistant and Pseudorandom Hash Function Using Tweakable Block Cipher**

  Shoichi Hirose (University of Fukui)

- **Chameleon DNN Watermarking: Dynamically Public Model Ownership Verification**

  Wei Li, Xiaoyu Zhang, Shen Lin (Xidian University), Xinbo Ban (Swinburne University of Technology) and Xiaofeng Chen (Xidian University)

- **Group Signatures with Designated Traceability over Openers' Attributes in Bilinear Groups**

  Hiroaki Anada (Aomori University), Masayuki Fukumitsu (University of Nagasaki) and Shingo Hasegawa (Tohoku University)

Session 5: Security Analysis and Management 1
Bonam Kim (Kookmin University)

- **Influence through Cyber Capacity Building: Network Analysis of Assistance, Cooperation, and Agreements among ASEAN Plus Three Countries**

  Yu-kyung Kim (Korea University), Myong-Hyun Go (The Asan Institute for Policy Studies) and Kyungho Lee (Korea University)

- **Recovering Yaw Rate from Signal Injection Attack to Protect RV's Direction**

  Hyunsu Cho, Sunwoo Lee (Korea University) , Wonsuk Choi (Hansung University) and Dong Hoon Lee (Korea University)

- **Analysis of Radioactive Decay Based Entropy Generator in the IoT Environments**

  Taewan Kim, Seyoon Lee, Seunghwan Yun (Kookmin University), Jongbum Kim (Korea Atomic Energy Research Institute) and Okyeon Yi (Kookmin University)

- **Enriching Vulnerability Reports Through Automated and Augmented Description Summarization**

  Hattan Althebeiti and David Mohaisen (University of Central Florida)

DAY 3 **August 26 (Friday), 2022**

Session 6: Emersing Security Issues
Seung-Hyun Seo (Hanyang University)

• **Optimized Implementation of Quantum Binary Field Multiplication with Toffoli Depth One**

Kyoungbae Jang, Kim Wonwoong, Sejin Lim, Yeajun Kang, Yu-Jin Yang and Hwajeong Seo(Hansung University)

• **On the use of radical isogenies for quantum-resistant CSIDH implementation**

Donghoe Heo (Korea University), Suhri Kim (Sungshin Women's University) and Seokhie Hong (Korea University)

• **A Joint Framework to Privacy-Preserving Edge Intelligence in Vehicular Networks**

Muhammad Firdaus and Kyung-Hyune Rhee (Pukyong National University)

• **Study on Feature Engineering for Performance Improvement of ML-based TTP-ID Automated Extraction**

Heejeong Kim and Hwankuk Kim (Sangmyung University)

Session 7: Security Analysis and Management 2
Jungsoo Park (Soongsil University)

• **vkTracer: Vulnerable Kernel Code Tracing to Generate Profile of Kernel Vulnerability**

Hiroki Kuzuno (Kobe University) and Toshihiro Yamauchi (Okayama University)

• **Dazzle-attack: Anti-Forensic Server-side Attack via Fail-free Dynamic State Machine**

Bora Lee (University of Virginia), Kyungchan Lim (The University of Tennessee), JiHo Lee, Chijung Jung (University of Virginia), Doowon Kim (University of Virginia), Kyu Hyung Lee (University of Georgia), Haehyun Cho (Soongsil University) and Yonghwi Kwon (University of Virginia)

• **Markov Decision Process For Automatic Cyber Defense**

Xiaofan Zhou (The University of Queensland), Simon Enoch(The University of Queensland, Federal University) and Dan Dongseong Kim (The University of Queensland)

• **A Survey on Sensor False Data Injection Attacks and Countermeasures in Cyber-physical and Embedded Systems**

Jinhong Choi and Yeongjin Jang (Oregon State University)

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The 2022 WISA Poster Session

DAY 2 **August 25 (Thursday), 2022**

- **Poster: RF Fingerprinting Method for Passive Key Entry System Authentication using MFCC features**

  Hyeon Park, Soohyun Kim, Jaeyong Lee, Kyungho Park and Taeguen Kim (SoonChunHyang University)

- **Poster: Efficient parallel implementation methods of LSH-512 utilizing SIMD AVX-512**

  HoJin Choi and Seogchung Seo (Kookmin University)

- **Poster: Network Traffic Aware Memory Attestation for Low Power Internet of Things**

  Na-Eun Park, Tae-Rim Park, Hye-Yeon Shim, Yeon-Ji Lee and Il-Gu Lee (Sungshin Women's University)

- **Poster: Whitelist Security Application and Analysis in Healthcare Systems**

  Binna Kim and Sangji Park (Kangwon National University)

- **Poster: On the Claims of Weak Block Synchronization in Bitcoin**

  Seungjin Baek, Hocheol Nam, Yongwoo Oh (Korea Advanced Institute of Science and Technology), Muoi Tran (National University of Singapore) and Min Suk Kang (Korea Advanced Institute of Science and Technology)

- **Poster: Exploring FaaS platforms' charging method from the perspective of Kubernetes HPA to avoid burst attacks**

  Sara Hong, Yeeun Kim and Seongmin Kim (Sungshin Women's University)

- **Poster: Design of KEM-DEM on 6G Telecommunication for Quantum Computer**

  Seyoon Lee, Taewan Kim, Changuk Jang and Okyeon Yi (Kookmin University)

- **Poster: Metamorphic Testing on NIST LWC Finalists**

  Yongryeol Choi, Young Beom Kim and Seog Chung Seo (Kookmin University)

- **Poster: Decentralized SSO Authentication System with Identity Provider**

  Etienne Igugu Tshisekedi, Cho Nwe Zin Latt, Mariz Aguilar and Kyung-Hyune Rhee(Pukyong National University)

- **Poster: Performance evaluation of SMC in Fully Decentralized Network**

  Soyoung Joo and Il-Gu Lee (Sungshin Women's University)

- **Poster: An Analysis on the Feasibility of Cost-Effective Sandbox Using Open Source Intrusion Detection System**

  So-Yeon Kim, Jin-Min Lee, So-Hui Kim and Il-Gu Lee (Sungshin Women's University)

- **Poster: Deep learning-based Profiled Side-Channel Analysis Using Unsupervised Domain Adaptation on Different-Device**

  Jieun Woo and Dong-Guk Han (Kookmin University)

- **Poster: Differential Fault Attack on AES using Three-byte Fault Ciphertext**

  Jae-Won Huh and Dong-Guk Han (Kookmin University)

- **Poster: Transformer-based network Intrusion Detection**

  Inseo Park (Kangwon National University)

- **Poster: A Study on the Improvement of OCR Performance for the Detection of Personal Information in Images**

  Chanyoung Kwon, Yeongdon Kim and Binna Kim (Kangwon National University)

- **Poster: BPFenforcer: An eBPF based Security Policy Enforcement System for Containerized Environment**

  Songi Gwak, Thien-Phuc Doan and Souhwan Jung (Soongsil University)

- **Poster: Study of Intelligent Cyber Range Simulation using Reinforcement Learning**

  Junghyun Kim, Bumsok Kim and Min-Suk Kim (Sangmyung University)

- **Poster: Study of Technology for Anomaly Detection in Secure Edge System via Video Surveillance**

  Jae-Hyeok Jeong and Min-Suk Kim (Sangmyung University)

- **Poster: Performance evaluation of open source-based intrusion detection for advanced cyberattacks jointly utilizing ransomware and trojans**

  Yurim Lee, Soeun Jeon, Sunjin Lee and Ilgu Lee (Sungshin Women's University)

- **Poster: A Study on TTP analysis method of similar attack groups using MITRE ATT&CK framework**

  Chan-Woong Hwang and Woong Go (Korea Internet & Security Agency)

- **Poster: MFT : Metamorphic Fuzz Testing for Efficient Correctness Validation of Cryptographic Implementations**

  HyungJoon Yoon, YoungBeom Kim, Yongryeol Choi and Seog Chung Seo (Kookmin University)

- **Poster: Efficient Remote Identification for Drone Swarms**

  Jun-Woo Kwon, Kang-Moon Seo, Soojin Lee, Jane Kim and Seung-Hyun Seo (Hanyang University)

- **Poster: Automotive Cyber Security for Data Storage of Autonomous Vehicles**

  Insup Kim, Ganggyu Lee (Samsung Electronics) and Wonsuk Choi (Hansung University)

- **Poster: On Privacy Risks of Watching YouTube over Cellular Networks with Carrier Aggregation**

  Nitya Lakshmanan, Abdelhak Bentaleb (National University of Singapore), Byoungjun Choi, Roger Zimmermann (Korea Advanced Institute of Science and Technology), Jun Han (Yonsei University) and Min Suk Kang (Korea Advanced Institute of Science and Technology)

- **Poster: A Blockchain-based Dataset Distribution Protocol for a Trustworthy AI Collaboration Framework**

  Siwan Noh, Sung-Won Kang, Zhuohao Qian and Kyung-Hyune Rhee (Pukyong National University)

- **Poster: Exploratory research on digital forensic laboratory tools and equipment: Focused on focus group interviews**

  Su-Min Shin, Hyeon-Min Park and Gi-Bum Kim (Sungkyunkwan University)

- **Poster: Deep learning based Scheme for Developing Secure Systems in CCTV using Anomaly detection**

  Hyewon Suk, Junwon Jang and Minsuk Kim (Sangmyung University)

- **Poster: Consistent Management Method on Shared Object Manipulation in Mixed Reality**

  Jun Lee (Hoseo University) and Hyun Kwon (Korea Military Academy)

- **Poster: XR-based Spatial Multi-Presence System for Remote Collaboration**

  Jun Lee (Hoseo University) and Hyun Kwon (Korea Military Academy)

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▶ International Participants Payment Method

Participants can register for the conference until August 12, 2022 (UTC+09:00)

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▶ Registration Fees (International)

Online Attendance	Student/General Participants	350 USD
Offline Attendance	Student	350 USD
	General Participants	500 USD

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▶ Registration

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	군·공무원	500,000 원
	일반	700,000 원
Online Attendance	**학생(전일제)/일반**	200,000 원
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