



The 24<sup>th</sup> World Conference on Information Security Applications

# WISA 2023

August 23-25, 2023

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

Hosted by



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## KEY CONTACTS

### General Information

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Seoul National University of Science and Technology, Republic of Korea  
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#### Jong-Hyok Lee

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jonghyouk@sejong.ac.kr

### Technical Program

#### Howon Kim

Pusan National University, Republic of Korea  
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#### Jonghee Youn

Yeungnam University, Republic of Korea  
youn@yu.ac.kr

### Registration: KIISC (Korea Institute of Information Security and Cryptology)

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The 24<sup>th</sup> World Conference on Information Security Applications

# WISA 2023

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## ▶ Committee

### ▶ General Chair

Yoojae Won          Chungnam National University, Republic of Korea

### ▶ Program Committee Chairs

Howon Kim          Pusan National University, Republic of Korea

Jonghee Youn      Yeungnam University, Republic of Korea

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Jong-Hyoun Lee    Sejong University, Republic of Korea

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Doowon Kim        University of Tennessee, USA

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Xiaofeng Chen     Xidian University, China

Eueung Mulyana   Bandung Institute of Technology, Indonesia

## Committee ◀

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Misim Jung	Culture Makers, Republic of Korea
Yoonjung Kwon	NAONWORKS, Republic of Korea

# ▶ Conference Program

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

## DAY 1 August 23 (Wednesday), 2023

Room Time	Crystal Hall
13:00 - 13:30	Registration /Opening Remarks
13:30 - 14:10	<b>Invited Talk: 5G-AKA and EAP-AKA' from Cryptographic Perspectives</b> - Seonghan Shin (National Institute of Advanced Industrial Science and Technology, Japan) Session Chair: Howon Kim (Pusan National University)
14:10 - 14:30	Coffee Break
14:30 - 16:10	<b>Session 1: Cryptography</b> Session Chair: Dooho Choi (Korea University)
16:10 - 16:30	Coffee Break
16:30 - 18:10	<b>Session 2: Network &amp; Application Security</b> Session Chair: Bonam Kim (Kookmin University)

## DAY 2 August 24 (Thursday), 2023

Room Time	Crystal Hall	Jade Hall
09:30 - 10:20	<b>Keynote 1: Leaking AI: On Side-Channel Vulnerabilities (and more) on EdgeML Devices</b> - Bhasin Shivam(Nanyang Technological University, Singapore) Session Chair: Young-Woo Kwon (Kyungpook National University)	
10:20 - 10:40	Coffee Break	
10:40 - 12:20	<b>Session 3: Privacy &amp; Management</b> Session Chair: Yoonho Choi (Pusan National University)	<b>Session 4: Attacks &amp; Defenses</b> Session Chair: Daeseon Choi (Soongsil University)
12:20 - 13:40	Lunch Break (Convention Hall, 1F)	
13:40 - 14:30	<b>Keynote 2: Post-Quantum Cryptography: Now and Onwards</b> - Bo-Yin Yang(Academia Sinica, Taiwan) Session Chair: Hwajeong Seo (Hansung University)	
14:30 - 15:00	Coffee Break	
15:00 - 16:30	<b>KIISC Board Meeting, Social Networking</b>	<b>Poster Session 1 in front of Jade Hall</b> Session Chair: Jonghee Youn (Yeungnam University)
16:30 - 18:00		<b>Poster Session 2 in front of Jade Hall</b> Session Chair: Jonghee Youn (Yeungnam University)
18:00 - 18:30	Break Time	
18:30 - End	Banquet (Convention Hall, 1F)	

## DAY 3 August 25 (Friday), 2023

Room Time	Crystal Hall	Jade Hall
09:30 - 11:50	<b>Session 5: Hardware &amp; Software Security</b> Session Chair: Haehyun Cho (Soongsil University)	<b>Session 6: Post-Quantum Cryptography &amp; Quantum Cryptanalysis</b> Session Chair: Jong Hwan Park (Sangmyung University)
11:50 - 13:00	Lunch Break (Crystal Hall, 2F)	

## ▶ IITP 정보보호 기술교류회

시간	주요 내용
개최목적	정보보호 분야 R&D 추진방향 소개와 우수과제 전시·시상식 개최를 통한 연구자 연구 의욕 고취 및 우수성과 공유 추진
개최일시	2022년 8월 22일(화) 13:50~18:00
개최장소	메종글래드 제주 크리스탈홀
참석자	정보보호 분야 기술교류회 참관자 및 우수과제 수상자 등
주관	정보통신기획평가원(IITP)
주요 내용	정보보호 분야 정부 R&D 추진방향 소개, 우수과제 시상 및 연구성과 발표 우수과제 전시 (6개 과제) 등

### ● 세부일정(안)

시간	주요 내용	비고
13:20~13:50	우수과제 전시	-
13:50~14:10	정보보호 분야 정부 R&D 추진방향 소개	IITP 정현철 PM
14:10~14:40	우수과제 시상식	원장상(4개) 및 격려패(6개)
14:40~15:00	휴식 및 연구자 네트워킹	-
15:00~18:00	우수과제 연구성과 발표(10개 과제)	우수과제 연구책임자

※ 주요 내용은 행사 사정에 따라 변동 가능

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## The 2023 WISA Paper Session

**DAY 1** August 23 (Wednesday), 2023

### Session 1: Cryptography

**Session Chair: Dooho Choi (Korea University)**

#### A New Higher Order Differential of LCB

*Naoki Shibayama and Yasutaka Igarashi (Tokyo University of Science)*

#### Bloomier filters on 3-hypergraphs

*Hyungrok Jo and Junji Shikata (Yokohama National University)*

#### Principal Component Analysis over the Boolean Circuit within TFHE Scheme

*Hyun Jung Doh, Joon Soo Yoo, Mi Yeon Hong, Kang Hoon Lee, Tae Min Ahn and Ji Won Yoon (Korea University)*

#### A security analysis on MQ-Sign

*Yasuhiko Ikematsu (Kyushu University), Hyungrok Jo (Yokohama National University) and Takanori Yasuda (Okayama University of Science)*

### Session 2: Network and Application Security

**Session Chair: Bonam Kim (Kookmin University)**

#### Research on Security Threats Using VPN in Zero Trust Environments

*Eunyoung Kim (National Security Research Institute) and Kiwook Sohn (Seoul National University of Science and Technology)*

#### A Blockchain-based Mobile Crowdsensing and Its Incentive Mechanism

*Zhang Yan, Bai Yuhao, Lee Soojin (Hanyang University), Li Ming (Henan Normal University) and Seo Seung-Hyun (Hanyang University)*

#### A New Frontier in Digital Security: Verification for NFT Image using Deep Learning-based ConvNeXt Model in Quantum Blockchain

*Aji Teguh Prihatno, Naufal Suryanto, Harashta Tatimma Larasati, Yustus Eko, Thi-Thu-Huong Le and Howon Kim (Pusan National University)*

#### AE-LSTM based anomaly detection system for communication over DNP 3.0

*Il Hwan Ji, Seunggho Jeon and Jung Taek Seo (Gachon University)*

**DAY 2 August 24 (Thursday), 2023**

**Session 3: Privacy & Management**

**Session Chair: Yoonho Choi (Pusan National University)**

**Systematic Evaluation of Robustness Against Model Inversion Attacks on Split Learning**

*Hyunsik Na, Yoonju Oh, Wonho Lee and Daeseon Choi (Soongsil University)*

**Vulnerability Assessment Framework Based on In-the-Wild Exploitability for Prioritizing Patch Application**

*Seong-Su Yoon, Do-Yeon Kim, Ga-Gyeong Kim and Jeck-Chae Euom (Chonnam National University)*

**Patchman: Firmware Update Delivery Service Over the Blockchain for IoT Environment**

*Yustus Eko Oktian, Uk Jo, Simon Oh, Hanho Jeong, Jaehyun Kim, Thi-Thu-Huong Le and Howon Kim (Pusan National University)*

**Security Risk Indicator for Open Source Software to Measure Software Development Status**

*Hiroki Kuzuno (Kobe University), Tomohiko Yano (SECOM Co., Ltd.), Kazuki Omo (SIOS Technology, Inc.), Jeroen van der Ham (University of Twente) and Toshihiro Yamauchi (Okayama University)*

**Session 4: Attacks & Defenses**

**Session Chair: Daeseon Choi (Soongsil University)**

**Defending AirType against Inference Attacks using 3D In-Air Keyboard Layouts: Design and Evaluation**

*Hattan Althebeiti, Ran Gedawy, Ahod Alghuried (University of Central Florida), Daehun Nyang (Ewha Womans University) and David Mohaisen (University of Central Florida)*

**Robust Training for Deepfake Detection Models Against Disruption-Induced Data Poisoning**

*Jaewoo Park, Hong Eun Ahn, Leo Hyun Park and Taekyoung Kwon (Yonsei University)*

**Multi-class Malware Detection via Deep Graph Convolutional Networks using TF-IDF-based Attributed Call Graphs**

*Irshad Khan and Young-Woo Kwon (Kyungpook National University)*

**OCR meets the Dark Web: Identifying the Content Type Regarding Illegal and Cybercrime**

*Donghyun Kim, Seungho Jeon (Gachon University), Jiho Shin (Korean National Police University) and Jung Taek Seo (Gachon University)*

**DAY 3 August 25 (Friday), 2023****Session 5: Hardware & Software Security****Session Chair: Haehyun Cho (Soongsil University)****Protecting Kernel Code Integrity with PMP on RISC-V***Seon Ha and Hyungon Moon (Ulsan National Institute of Science and Technology)***Exploiting Memory Page Management in KSM for Remote Memory Deduplication Attack***Seungyeon Bae, Taehun Kim, Woomin Lee and Youngjoo Shin (Korea University)***Mutation Methods for Structured Input to Enhance Path Coverage of Fuzzers***Yonggon Park, Youngjoo Ko and Jong Kim (Pohang University of Science and Technology)***Improved Differential-Linear Cryptanalysis of Reduced Rounds of ChaCha***Ryo Watanabe, Nasratullah Ghafoori and Atsuko Miyaji (Osaka University)***SP-Fuzz: Fuzzing soft PLC with semi-automated harness synthesis***Seungho Jeon and Jung Taek Seo (Gachon University)***Session 6: Post-Quantum Cryptography & Quantum Cryptanalysis****Session Chair: Jong Hwan Park (Sangmyung University)****Quantum Circuit Designs of Point Doubling Operation for Binary Elliptic Curves***Harashta Tatimma Larasati and Howon Kim (Pusan National University)***PQ-DPoL: An Efficient Post-Quantum Blockchain Consensus Algorithm***Wonwoong Kim, Yeajun Kang, HyunJi Kim, Kyoungbae Jang and Hwajeong Seo (Hansung University)***Efficient Implementation of the Classic McEliece on ARMv8 processors***Minjoo Sim, Hyeokdong Kwon, Siwoo Eum, Gyeongju Song, Minwoo Lee and Hwajeong Seo (Hansung University)***Evaluating KpqC Algorithm Submissions: A Balanced and Clean Benchmarking Approach***Hyeokdong Kwon, Gyeongju Song, Minjoo Sim, Minwoo Lee and Hwajeong Seo (Hansung University)***Depth-Optimized Implementation of ASCON Quantum Circuit***Yujin Oh, Kyungbae Jang (Hansung University), Anubhab Baksi (Nanyang Technological University) and Hwajeong Seo (Hansung University)*

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## The 2023 WISA Poster Session

**Poster Session 1** 15:00 - 16:30, August 24 (Thursday), 2023

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**A Survey on Attack Cases with Living-Off-The-Land Techniques in Windows and Linux**

*Gyuhyun Jeon, Seungho Jeon and Jung Taek Seo (Gachon University)*

**Data Calibration to Enhance Security and Accuracy of Federated Learning**

*Na-Eun Park, So-Yeon Kim, Yuran Jeon, Seoyi Kim and Il-Gu Lee (Sungshin Women's University)*

**Anomaly Detection using LSTM-Based Autoencoder with Time Series Dataset over a network**

*Hyewon Kim and Minsuk Kim (Sangmyung University)*

**V2V-MHT: Accelerated V2V Authentication Framework using Merkle Hash Tree**

*YoonSun Han, YoungBeom Kim and Seog Chung Seo (Kookmin University)*

**Vehicle CAN Network Imbalance Intrusion Detection and Explanation Based on XGBoost and SHAP**

*Thi-Thu-Huong Le, Naufal Suryanto, Aji Teguh Prihatno, Yustus Eko Oktian, Hyoeun Kang and Howon Kim (Pusan National University)*

**Enhancing Cyber Strategies through Reinforcement Learning: A CyberBattleSim (CBS)**

*Bumsok Kim, Minsuk Kim, Junghyun Kim, Yonghoon Choi and Seungseo Roh (Sangmyung University)*

**A Model for Collecting and Analyzing Network Logs DataSets**

*Jaehan Jeong and Go Woong (Korea Internet & Security Agency)*

**Decision Tree Based Poisoning Backdoor Attacks and Mutation model SPRT detection defense in NSL-KDD Dataset**

*Jinhyeok Jang, Yoonsoo An, Dowan Kim and Daeseon Choi (Soongsil University)*

**A Method of GML-based Software Structuring for Verification of Open-source Software License Compatibility**

*Won-Bin Kim, Yongjoon Joe, Kyung-Yeob Park and Dong-Myung Shin (LSware Inc.)*

**Designing a Deceptive Honeypot Architecture for Industrial Control Systems**

*Dong-Hyuk Shin, Jong-Bum Lee and Ieck-Chae Euom (Chonnam National University)*

**Suboptimal Feature Selection Technique for Efficient Machine Learning-based Malicious Traffic Detection**

*So-Eun Jeon, Ye-Sol Oh, Ye-Seul Kil, Yeon-Ji Lee and Il-Gu Lee (Sungshin Women's University)*

**Identity Concealing Steganography-based Data Sharing Mechanism**

*Jinsu Kim and Namje Park (Jeju National University)*

**SGX-Enabled Edge Cloud Architecture for Secure Data Augmentation**

*Jiwon Ock and Seongmin Kim (Sungshin Women's University)*

**Solid Pod-based Medical Data Sharing System to Ensure Data Sovereignty**

*Sohui Kim, Minjeong Kim and Il-Gu Lee (Sungshin Women's University)*

**A Study on Establishing a Secure Remote Work Environment in a VDI Environment Based on Zero Trust**

*Chang Hoon Kim (Daegu University), Howon Kim (Pusan National University), Sokjoon Lee (Gachon University), Young Rang Kim (Pribit Technology) and Jungsoo Park (Hoseo University)*

**Analyzing Risk Attitudes in DeFi Crypto Credit Lending through On-chain Data**

*Simon Oh, Yeongjae Shin (Pusan National University), Uk Jo, Hyeoun Kang (SmartM2M), Kyeongwoo Oh, Jaehyun Kim, Bogeum Kim, Hyejin Sim, Changwoo Choi and Howon Kim (Pusan National University)*

**Parameter Optimization Techniques for Privacy and Utility Trade-off of Differential Privacy**

*Jung-Hwa Ryu, Sun-Jin Lee, Hye-Yeon Shim and Il-Gu Lee (Sungshin Womens' University)*

**A Study on Digital Human Ownership Management Techniques in Metaverse Based on NFT**

*Changhyun Roh, Changjun Choi, HyunSoo Kim and DongMyung Shin (LSWare Inc.)*

**Exploring Hybrid Quantum-Classical Approaches for Information Security**

*Dedy Septono Catur Putranto, Rini Wisnu Wardhani and Howon Kim (Pusan National University)*

**Analysis of International Trends for the Introduction of Zero Trust**

*Jeong Hyeop Hong, Sun Woo Kim, Ui Hyun Park and Kyung-ho Son (Kangwon National University)*

**TrustVoice: Detecting Voice Phishing Apps Using Their Runtime Behaviors**

*Chanjong Lee and Hyoungshick Kim (Sungkyunkwan University)*

**The RSA Algorithm's Quantum Cryptanalysis Posture**

*Rini Wisnu Wardhani, Dedy Septono Catur Putranto and Howon Kim (Pusan National University)*

**Blockchain-based Zero Trust System for Medical Data Exchange**

*Yohan Kim, Hanho Jeong, Jaehan Cho, Donggyu Kim, SangBong Oh and Howon Kim (Pusan National University)*

**Metaverse Copyright Ownership Verification using Redundant Verification for Virtual Performance**

*Won-Bin Kim, Changhyun Roh, Yongjoon Joe and Dong-Myung Shin (LSWare Inc.)*

**Poster Session 2 16:30 - 18:00, August 24 (Thursday), 2023**

**Session Chair: Jonghee Youn (Yeungnam University)**

**Physical Layer Security Mechanism for Secure Trigger- based Uplink Multi-User Transmission**

*So-Hyun Park and Il-Gu Lee (Sungshin Women's University)*

**Efficient Implementation of Kyber on MSP430 Environment**

*DongHyun Shin, YoungBeom Kim and Seog Chung Seo (Kookmin University)*

**Optimization Study of Parallel Implementation for Scrypt: A Memory Hard Function**

*Seongjun Choi, Dongcheon Kim and Seog Chung Seo (Kookmin University)*

**High-Performance Kyber Implementation on ARMv7 Neon Technology**

*YoungBeom Kim (Kookmin University), Jeonghwan Shin, Hojoong Park (KT R&D Center Infra DX Lab), and Seog Chung Seo (Kookmin University)*

**Defense Against Adversarial Evasion Attacks on Self-Driving Car Using Image Quantization**

*Seungyeol Lee, Hyeonro Lee and Jaecheol Ha (Hoseo University)*

**Face Verifiable Anonymization in Video Surveillance**

*Sungjune Park, Hyunsik Na, Seungmin Kim and Daeseon Choi (Soongsil University)*

**A Multi-step Framework for Botnet Attack Detection in IoT Environment**

*Hojun Jin, Seungho Jeon and Jung Taek Seo (Gachon University)*

**Implementation of Montgomery Reduction and Butterflies for CRYSTALS-Dilithium on RISC-V**

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

**The Sky's Betrayal: Drone Hijacking on DJI Enhanced WiFi Protocol**

*Derry Pratama (Pusan National University), Jaegeun Moon (SmartM2M), Agus Mahardika Ari Laksmono, Dongwook Yun, Byeonguk Jeong, Iqbal Muhammad (Pusan National University), Janghyun Ji (SmartM2M) and Howon Kim (Pusan National University)*

**Efficient Implementation of Multiplication Reduction over NIST Prime P-384 for 8 bit AVR Processor**

*Mingi Kim, YoungBeom Kim and Seog Chung Seo (Kookmin University)*

**A Study on Tor Traffic Identification Technology for Blocking Dark Web Access in a LAN Environment**

*Hongbi Kim, Daeil Jang and Seunggoo Ji (Korea Internet & Security Agency)*

**Contact PUF: Highly Stable Physical Unclonable Functions Based on Contact Failure Probability in 180 nm, 130 nm, and 28 nm CMOS Processes**

*Duhyun Jeon (ICTK Holdings), Dongmin Lee and Byong-Deok Choi (Hanyang University)*

**An Implementation of Lightweight RISC-V Trusted Execution Environment with Memory Encryption and Task Isolation**

*Woojung Park, Janghyun Ji and Jaegeun Moon (SmartM2M)*

**Strengthening Secure Payment Systems in 5G-based IoT: A Comprehensive Analysis of Tokenization and PCI DSS Compliance**

*Hyeon No, Heekyung Shin, Jiwon Ock, Yeeun Kim and Seongmin Kim (Sungshin Women's University)*

**Tri-band-based Wi-Fi Indoor Localization to Defend against Jamming Attacks**

*Jin-Min Lee, Na-Yeon Shin, Jung-Hyun Moon and Il-Gu Lee (Sungshin Women's University)*

**On Secrecy of RSMA-enabled UAV Downlink Communications: Problem and Research Trends**

*Tri-Hai Nguyen, Heejae Park and Laihyuk Park (Seoul National University of Science and Technology)*

**Accelerating Key Derivation Function on GPU Architectures**

*Dong-Cheon Kim and Seog Chung Seo (Kookmin University)*

**Enhancing Robustness of Self-Driving Car Regression Models through Feature Squeezing**

*Hyeonro Lee, Seungyeol Lee, Seongwoo Hong and Jaecheol Ha (Hoseo University)*

**Privacy-Preserving DTx Data with Differential Privacy**

*Gee-Hee Yun and Kyoung-Jin Kim (Sungshin Women's University)*

**Side Channel Attack Resistant Binarized Neural Network Accelerator**

*Junho Lee, Haeyoung Kim, Dongwook Yun and Howon Kim (Pusan National University)*

**Tabling GHASH in LEA-GCM on GPU and Optimization**

*Jaeseok Lee, Dongcheon Kim and Seog Chung Seo (Kookmin University)*

**Research on Identification of Cyber Attacker Groups and Interpretation of Results**

*Sungtaek Oh and Woong Go (Korea Internet Security Agency)*

**Evaluation Criteria for Cyberattack Scenarios Used in Training Exercises**

*Insung Song, Seungho Jeon and Jung Taek Seo (Gachon University)*

**Malextension: Malicious Extension to Hack your Browser**

*Jiwon Jang, Ye-Sol Oh (Sungshin Women's University), and Il-Gu Lee (Sungshin Women's University)*

## ▶ International Participants Payment Method

Registration Deadline: August 10, 2023 (UTC+09:00)

Participants can register for the conference until August 10, 2023 (UTC+09:00)

Please read carefully the registration guidelines below.

We use online registration to complete the registration for participants.

Click on the registration page link: <https://kiisc.or.kr/payment/pay/173>

At least one presenter per accepted paper, poster must register for the conference as an attendance until Aug. 5, 2023 (UTC+09:00)

## ▶ Registration Fees (International)

Online Attendance	Student	350 USD
	General Participant	
Offline Attendance	Student	350 USD
	Offline Attendance General Participant	500 USD

(Online) Registration includes (a) access to the online conference and (b) the access to the online proceedings.

(Offline) Registration includes (a) access to the online conference and (b) the access to the online proceedings (c) 2 Lunches, 1 Banquet

### Credit Card

-Use a credit card payment system (EXIMBAY)

### Wire Transfer

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- beneficiary's account number : 754-01-0008-146

- beneficiary's bank : Kookmin Bank

- the branch name : Yeoksamyeok Branch

- SWIFT code : CZNBKRSE

- beneficiary' address : Room 909, Seongji Heights 3-Cha Bldg., 507, Nonhyeon-ro, Gangnam-gu, Seoul, Korea 06132

\* This payment method is provided by Eximbay and is billed as [www.eximbay.com](http://www.eximbay.com)

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## ▶ Registration-Related Inquiries

If you have any questions regarding your registrations, please contact the Registration Company via email at [kiisc@kiisc.or.kr](mailto:kiisc@kiisc.or.kr)

## ▶ Registration Policy

At least one presenter per accepted paper, poster must register for the conference as an author.

We are unable to offer refunds, cancellations, or substitutions for any registrations for this event.

## ▶ Registration

### ▶ 한국인 (국내거주인) 등록안내

Registration Fees (Domestic) : 사전등록 2023년 8월 10일(목)까지

\*논문 발표자는 2023년 8월 5일(토)까지 등록

Offline Attendance	학생(전일제)	500,000 원
	군·공무원	500,000 원
	일반	700,000 원
Online Attendance	학생(전일제)/일반	200,000 원
시니어(63세 이상) 종신회원		무료

(오프라인) 온라인 학술대회 참석 링크, 온라인 프로시딩, 점심2회, 만찬 1회 제공

(온라인) 온라인 학술대회 참석 링크, 온라인 프로시딩 제공

▷ 학회 홈페이지( [www.kiisc.or.kr](http://www.kiisc.or.kr) ) 접속 → 학회행사 → 사전등록바로가기 → WISA 2023 (Domestic) 클릭  
(신용카드/계좌이체 결제 가능)

▷ 사전등록 송금처

- 예금주 : 한국정보보호학회

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