Ilsun You Taek-Young Youn (Eds.)

Information Security Applications

23rd International Conference, WISA 2022 Jeju Island, South Korea, August 24–26, 2022 Revised Selected Papers



Lecture Notes in Computer Science

13720

Founding Editors

Gerhard Goos

Karlsruhe Institute of Technology, Karlsruhe, Germany

Juris Hartmanis

Cornell University, Ithaca, NY, USA

Editorial Board Members

Elisa Bertino

Purdue University, West Lafayette, IN, USA

Wen Gao

Peking University, Beijing, China

Bernhard Steffen

TU Dortmund University, Dortmund, Germany

Moti Yung

Columbia University, New York, NY, USA

More information about this series at https://link.springer.com/bookseries/558

Ilsun You · Taek-Young Youn (Eds.)

Information Security Applications

23rd International Conference, WISA 2022 Jeju Island, South Korea, August 24–26, 2022 Revised Selected Papers



Editors
Ilsun You
Soonchunhyang University
Asan-Si, Korea (Republic of)

Taek-Young Youn Dankook University
Yongin, Korea (Republic of)

ISSN 0302-9743 ISSN 1611-3349 (electronic) Lecture Notes in Computer Science ISBN 978-3-031-25658-5 ISBN 978-3-031-25659-2 (eBook) https://doi.org/10.1007/978-3-031-25659-2

© Springer Nature Switzerland AG 2023

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This volume contains revised and selected papers which were submitted to and presented at the 23rd World Conference on Information Security Applications (WISA 2022) which was held at Jeju Island, Korea, during August 24–26, 2022. WISA 2022 provided an international forum for sharing original research results among specialists in various theories and practical applications.

We received 76 submissions, covering all areas of information security, and finally selected 30 papers to be presented at the conference. Among them, only 25 papers (32.9% of submitted papers) were selected for publication in this LNCS volume. We thank the authors for submitting meaningful papers to WISA 2022. We also thank the authors for their patience and cooperation during the back-and-forth process of comments and revisions requested by the editor and the reviewers. We were specially honored to have the two keynote talks by Willy Susilo (University of Wollongong), on "Cloud Computing Security," and Yi-Bing Lin (Miin Wu SOC Chair Professor) on "5G Private Network Security and Applications."

The conference was hosted by the Korea Institute of Information Security and Cryptography (KIISC) and sponsored by the Ministry of Science, ICT and Future Planning (MSIP) and National Intelligence Service (NIS), and co-sponsored by the Electronics & Telecommunications Research Institute (ETRI), the Korea Internet & Security Agency (KISA), the National Security Research Institute (NSR), and KONAI. The program chairs, Ilsun You (Kookmin University) and Taek-Young Youn, prepared a valuable program along with the Program Committee members listed here. The excellent arrangements for the conference venue were led by the WISA 2022 general chair, Okyeon Yi (Kookmin University), and organizing chairs, Jung Taek Seo (Gachon University) and Ki-Woong Park (Sejong University). Many people contributed to the success of WISA 2022. We would like to express our deepest appreciation to each of the WISA Program Committee and Organizing Committee members. Thanks to their invaluable support and sincere dedication, WISA 2022 was a success. Finally, we thank the Springer team for assistance with the LNCS proceedings.

September 2022 Ilsun You
Taek-Young Youn

Organization

General Chair

Okyeon Yi Kookmin University, South Korea

Program Committee Chairs

Ilsun You Kookmin University, South Korea Taek-Young Youn Dankook University, South Korea

Organizing Committee Chairs

Jung Taek Seo Gachon University, South Korea Ki-Woong Park Sejong University, South Korea

Poster Session Chairs

Hwanguk Kim Sangmyung University, South Korea Haehyun Cho Soongsil University, South Korea

Program Committee

Pelin Angin Middle East Technical University, Turkey Joonsang Baek University of Wollongong, Australia

Xiaofeng Chen Xidian University, China Jin-Hee Cho Virginia Tech, USA

Dooho Choi Korea University, South Korea
Swee-Huay Heng Multimedia University, Malaysia
Hsu-Chun Hsiao National Taiwan University, Taiwan
Jin Hong University of Western Australia, Australia
Qiong Huang South China Agricultural University, China

Eul Gyu Im Hanyang University, South Korea Yeongjin Jang Oregon State University, USA

Hiroaki Kikuchi Meiji University, Japan

Dongseong Kim University of Queensland, Australia
Doowon Kim University of Tennessee, Knoxville, USA

HeeSeok Kim Korea University, South Korea

Hyunil Kim DGIST, South Korea

Jong Kim POSTECH, South Korea

Jongkil KimUniversity of Wollongong, AustraliaTaeGuen KimSoonchunhyang University, South KoreaHyun KwonKorea Military Academy, South Korea

Yonghwi Kwon University of Virginia, USA Kyu Hyung Lee University of Georgia, USA

Siqi Ma University of New South Wales, Australia

David Mohaisen University of Central Florida, USA Masakatsu Nishigaki Shizuoka University, Japan

Jason Nurse University of Kent, UK

Younghee Park San Jose State University, USA

Marcus Peinado Microsoft, USA

Hyun Sook RheeSamsung Electronics, South KoreaJunghwan RheeUniversity of Central Oklahoma, USAUlrich RührmairRuhr University Bochum, Germany

Kouichi Sakurai Kyushu University, Japan

Seog Chung Seo Kookmin University, South Korea
Seung-Hyun Seo Hanyang University, South Korea
Junji Shikata Yokohama National University, Japan
Sang Uk Shin Pukyong National University, South Korea

Seonghan Shin AIST, Japan

Amril Syalim University of Indonesia, Indonesia
Gang Tan Pennsylvania State University, USA
Simon Woo Sungkyunkwan University, South Korea

Toshihiro Yamauchi Okayama University, Japan Naoto Yanai Osaka University, Japan Meng Yu Roosevelt University, USA

Organizing Committee

Jong Wook Baek Gachon University, South Korea

Namkyun Baik Busan University of Foreign Studies, South Korea

Jungsoo ParkSoongsil University, South KoreaHangbae ChangChung-Ang University, South Korea

Byeongcheol Choi ETRI, South Korea

Daeseon Choi Soongsil University, South Korea Hyojin Cho Soongsil University, South Korea

KwangHee Choi KISA, South Korea

Won Seok Choi Hansung University, South Korea
Dongguk Han Kookmin University, South Korea
Jaecheol Ha Hoseo University, South Korea
Manpyo Hong Ajou University, South Korea
Seokhie Hong Korea University, South Korea

Souhwan Jung Soongsil University, South Korea

Yousung Kang ETRI, South Korea

ChangHoon Kim Daegu University, South Korea

Geonwoo Kim ETRI, South Korea

Howon Kim Pusan National University, South Korea
Hwanguk Kim Sangmyung University, South Korea

Jin Cheol Kim KEPCO-KDN, South Korea
Jongsung Kim Kookmin University, South Korea

Sungmin Kim Sungshin Women's University, South Korea Tae-Sung Kim Chungbuk National University, South Korea

Kibom Kim NSR, South Korea WonHo Kim NSR, South Korea Woo-Nyon Kim NSR, South Korea

Hun Yeong Kwon Korea University, South Korea

Jin Kwak Ajou University, South Korea

Daesung Moon ETRI, South Korea

Changhoon Lee Seoul National University of Science and

Technology, South Korea

Dong Hoon Lee Korea University, South Korea

Imyeong Lee Soonchunhyang University, South Korea

Jong-Hyouk Lee Sejong University, South Korea Kyungho Lee Korea University, South Korea Manhee Lee Hannam University, South Korea SeokJoon Lee Gachon University, South Korea

Sungjae Lee KISA, South Korea Donghwan Oh KISA, South Korea

Heekuck Oh Hanyang University, South Korea

Hyung-Geun Oh NSR, South Korea
Jin Young Oh KISA, South Korea

Yunheung Paek Seoul National University, South Korea Kyung-Hyune Rhee Pukyong National University, South Korea

HwaJung Seo Hansung University, South Korea

Kyungho Son Kangwon National University, South Korea Jungsuk Song Korea Institute of Science & Technology

Information, South Korea

Jaecheol Ryou Chungnam National University, South Korea Yoojae Won Chungnam National University, South Korea

Contents

Cryptograpny	
Collision-Resistant and Pseudorandom Hash Function Using Tweakable Block Cipher Shoichi Hirose	3
Shoichi Hhose	
Provably Secure Password-Authenticated Key Exchange Based on SIDH Theo Fanuela Prabowo and Chik How Tan	16
Group Signatures with Designated Traceability over Openers' Attributes	
in Bilinear Groups	29
Grover on SPARKLE Yujin Yang, Kyungbae Jang, Hyunji Kim, Gyeongju Song, and Hwajeong Seo	44
Network Security	
Quality-of-Service Degradation in Distributed Instrumentation Systems Through Poisoning of 5G Beamforming Algorithms Borja Bordel, Ramón Alcarria, Joaquin Chung, Rajkumar Kettimuthu, Tomás Robles, and Iván Armuelles	63
An Effective Approach for Stepping-Stone Intrusion Detection Using	-
Packet Crossover Lixin Wang, Jianhua Yang, and Austin Lee	77
Software-Defined Network Based Secure Internet-Enabled Video	
Surveillance System Mathew Del Castillo, Harvey Hermosa, Philip Virgil Astillo, Gaurav Choudhary, and Nicola Dragoni	89
TLS Goes Low Cost: When TLS Meets Edge Intae Kim, Willy Susilo, Joonsang Baek, Jongkil Kim, and Yang-Wai Chow	102
5G-AKA, Revisited	114

Privacy Enhancing Technique

Membership Privacy for Asynchronous Group Messaging	131
On Membership Inference Attacks to Generative Language Models Across	
Language Domains Myung Gyo Oh, Leo Hyun Park, Jaeuk Kim, Jaewoo Park, and Taekyoung Kwon	143
A Joint Framework to Privacy-Preserving Edge Intelligence in Vehicular	
Networks	156
Vulnerability Analysis	
Recovering Yaw Rate from Signal Injection Attack to Protect RV's Direction	171
Hyunsu Cho, Sunwoo Lee, Wonsuk Choi, and Dong Hoon Lee	1/1
A Survey on Sensor False Data Injection Attacks and Countermeasures in Cyber-Physical and Embedded Systems Jinhong Choi and Yeongjin Jang	185
DAZZLE- ATTACK: Anti-Forensic Server-side Attack via Fail-Free	
Dynamic State Machine Bora Lee, Kyungchan Lim, JiHo Lee, Chijung Jung, Doowon Kim, Kyu Hyung Lee, Haehyun Cho, and Yonghwi Kwon	204
vkTracer: Vulnerable Kernel Code Tracing to Generate Profile of Kernel	
Vulnerability Hiroki Kuzuno and Toshihiro Yamauchi	222
Security Engineering	
ARMing-Sword: Scabbard on ARM	237
Optimized Implementation of Quantum Binary Field Multiplication with Toffoli Depth One	251
Kyungbae Jang, Wonwoong Kim, Sejin Lim, Yeajun Kang, Yujin Yang, and Hwajeong Seo	231

Contents	xiii
Time-Optimal Design of Finite Field Arithmetic for SIKE on Cortex-M4 Mila Anastasova, Reza Azarderakhsh, and Mehran Mozaffari Kermani	265
Analysis of Radioactive Decay Based Entropy Generator in the IoT Environments Taewan Kim, Seyoon Lee, Seunghwan Yun, Jongbum Kim, and Okyeon Yi	277
Security Management	
A Novel Metric for Password Security Risk Against Dictionary Attacks Binh Le Thanh Thai and Hidema Tanaka	291
Towards Evaluating the Security of Human Computable Passwords Using Neural Networks Issei Murata, Pengju He, Yujie Gu, and Kouichi Sakurai	303
Markov Decision Process for Automatic Cyber Defense	313
Influence Through Cyber Capacity Building: Network Analysis of Assistance, Cooperation, and Agreements Among ASEAN Plus Three Countries	330
Chameleon DNN Watermarking: Dynamically Public Model Ownership Verification Wei Li, Xiaoyu Zhang, Shen Lin, Xinbo Ban, and Xiaofeng Chen	344
Author Index	357