# PROCEEDINGS OF SPIE

# International Conference on Network Communication and Information Security (ICNCIS 2021)

Yaqiong Liu Fushuan Wen Editors

3–5 December 2021 Sanya, China

Organized by
Noroff University College (Norway)

Sponsored by AEIC Academic Exchange Information Center

Published by SPIE

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon

Please use the following format to cite material from these proceedings: Author(s), "Title of Paper," in International Conference on Network Communication and Information Security (ICNIS 2021), edited by Yaqiong Liu, Fushuan Wen, Proc. of SPIE 12175, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510653276

ISBN: 9781510653283 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time)

SPIF ord

Copyright © 2022 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



**Paper Numbering:** A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

# **Contents**

## NETWORK COMMUNICATION TECHNOLOGY AND SIGNAL MODEL RECOGNITION

12175 02	Modulation recognition method of wireless communication digital signal considering multi-dimensional characteristics [12175-35]
12175 03	A network attack evaluation model based on variable weight theory [12175-30]
12175 04	A dual-path network for source-robust spatial image steganalysis [12175-15]
12175 05	joint coding of underwater acoustic communication source channel based on polar code [12175-26]
12175 06	Analysis and research on current situation of structured data desensitization technology [12175-14]
12175 07	Spectrum-efficient wireless backhaul with renewable energy powered base stations [12175-33]
12175 08	A comparison of low-speed communication modes [12175-12]
12175 09	Forward denoising neural network for underground mine images [12175-4]
12175 OA	Research on image trading system based on Blockchain and IPFS [12175-27]
12175 OB	Environmental domain embedding for far-field speaker verification [12175-5]
12175 OC	The analysis on the direct sequence spread spectrum communication system [12175-9]
12175 OD	Research on the realization method of the docking function between Wechat payment system and supermarket cashier system [12175-1]
12175 OE	Design of high gain maritime satellite antenna [12175-2]
12175 OF	Integral fault analysis of Midori64 lightweight cipher [12175-24]
12175 0G	Influence of atmospheric turbulence on laser time-frequency transmission [12175-36]
12175 OH	Discussion on the degree of influence on the performance of scene semantic classification after applying SRCNN reconstruction model [12175-11]
12175 01	Technical applications of using 5G in industrial internet [12175-39]

### NETWORK INFORMATION SECURITY AND INTELLIGENT ALGORITHM APPLICATION

12175 OJ	Study and implementation of encryption algorithm based on SM2 [12175-38]
12175 OK	Key management technology analysis based on UAV cluster communication security [12175-28]
12175 OL	Detecting DoH tunnels with privacy protection using federated learning [12175-20]
12175 OM	Study on the deployment of national top-level nodes [12175-17]
12175 ON	Research on secure communication module based on subscriber identity module as root of trust [12175-18]
12175 00	A highly secure C2C-PAKE cross-domain protocol [12175-25]
12175 OP	A quantitative approach to the competence of trainees based on the cyber security skills framework $[12175\text{-}3]$
12175 0Q	Color restoration of murals based on the latent space in machine learning [12175-37]
12175 OR	The SIM card-based security identification scheme of Internet of Things device [12175-19]
12175 OS	Safety risk assessment and control to operation control system of the virtual power plant based on COBIT 5 for risk [12175-10]
12175 OT	Chosen-message forgery attack on SCREAM [12175-29]
12175 OU	A method to analysis the risk factors in information system [12175-23]
12175 OV	Analyze the application of digital communication in the library information security based on RFID [12175-13]
12175 OW	Intrusion detection method for complex network environment based on security situation awareness [12175-34]
12175 OX	Performance optimization and simulation of SDN fat tree network based on Dijkstra's algorithm [12175-32]
12175 OY	Mobile edge computing offload strategy based on energy aware [12175-6]