# 16th International Conference on Cyber Warfare and Security (ICCWS 2021)

Online 25 – 26 February 2021

# **Editors:**

Juan Lopez Jr. Ambareen Siraj Kalyan Perumalla

ISBN: 978-1-7138-2785-6

# Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



## Some format issues inherent in the e-media version may also appear in this print version.

Copyright The Authors, (2021). All Rights Reserved. No reproduction, copy or transmission may be made without written permission from the individual authors.

Printed with permission by Curran Associates, Inc. (2021)

#### **Review Process**

Papers submitted to this conference have been double-blind peer reviewed before final acceptance to the conference. Initially, abstracts were reviewed for relevance and accessibility and successful authors were invited to submit full papers. Many thanks to the reviewers who helped ensure the quality of all the submissions.

## **Ethics and Publication Malpractice Policy**

ACPIL adheres to a strict ethics and publication malpractice policy for all publications – details of which can be found here:

http://www.academic-conferences.org/policies/ethics-policy-for-publishing-in-the-conference-proceedings-of-academicconferences-and-publishing-international-limited/

## **Conference Proceedings**

The Conference Proceedings is a book published with an ISBN and ISSN. The proceedings have been submitted to a number of accreditation, citation and indexing bodies including Thomson ISI Web of Science and Elsevier Scopus.

Author affiliation details in these proceedings have been reproduced as supplied by the authors themselves.

Published by Academic Conferences and Publishing International Ltd. 33 Wood Lane Sonning Common RG4 9SJ UK

Phone: 441 189 724 148 Fax: 441 189 724 691 info@academic-conferences.org

# Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

# Contents

Paper Title	Author(s)	Page No
Preface		v
Committee		vi
Biographies		viii
Research papers		
Smart Semi-Supervised Accumulation of Large Repositories for Industrial Control Systems Device Information	Kimia Ameri, Michael Hempel, Hamid Sharif, Juan Lopez Jr. and Kalyan Perumalla	1
Web CARTT: The Web-Based Cyber Automated Red Team Tool	Joseph Berrios, Alan Shaffer and Gurminder Singh	11
The Overton Window: A Tool for Information Warfare	George-Daniel Bobric	20
Review of National and International Cybersecurity Exercises Conducted in 2019	Ivona Brajdić, Ivan Kovačević and Stjepan Groš	28
Mathematical Models for Solving the Problems of Information Warfare	Viacheslav Burlov	37
Nation-State Perspectives on Information Operations and the Impact on Relative Advantage	Brenna Cole and George Noel	48
Control-Theory-Informed Feature Selection for Detecting Malicious Tampering in Additive Layer Manufacturing Processes	Joel Dawson, Michael Iannacone, Srikanth Yoginath, Varisara Tansakul, Rob Jordan, Ali Passian, Joel Asiamah, Milton Nance Ericson and Gavin Long	55
A Methodology for Smart TV Forensics	Chuck Easttom	65
Mathematically Modelling Victim Selection in Cyber Crimes	Chuck Easttom	71
Paper-Tapping to Exfiltrate Data Using Laser Printers	Eric Filiol, Pierre Gautier. Florian le Scanf, Paul Quinonero and Pierre-Emmanuel Rabillard	80
Dynamic Temporal Encryption: A Scheme for Maintaining Secure Encryption Keys in Tactical Environments	Ryan Gabrys, Luis Martinez, Mike Tall and Sunny Fugate	91
The Politics and Practice of Cyber Attribution: A Global Legal Perspective	Virginia Greiman	102
Ontology Modelling of Industrial Control System Ethical Hacking	Thomas Heverin, Ansh Chandnani, Cate Lopex and Nirav Brahmhatt	109
Ivan the Terrible as Pivotal Figure in the Ideology of Information Warfare	Michael Bennett Hotchkiss	118
Companion Assisted Software Based Remote Attestation in SCADA Networks	William Johnson, Sheikh Ghafoor and Stacy Prowell	127
Enhancing Security for Financial Data Supply Chains Using Encryption and Other Technologies	Nida Kazi	136
ePilotage System of Systems' Cyber Threat Impact Evaluation	Tiina Kovanen, Jouni Pöyhönen and Martti Lehto	144

Paper Title	Author(s)	Page No
Towards Remediating DDoS Attacks	Arturs Lavrenovs	152
Small Drones' Swarms and Military Paradigm Change	Martti Lehto and Bill Hutchinson	159
How to Dance Your Passwords: A Biometric MFA- Scheme for Identification and Authentication of Individuals in IIoT Environments	Christoph Lipps, Jan Herbst and Hans Dieter Schotten	168
Software Fingerprinting in LLVM	William Mahoney, Gregory Hoff, Todd McDonald and George Grispos	178
Cyber Protect: A Situational Awareness Platform	Mangoale Bokang, Phumeza Pantsi and Fikile Mapimele	187
Criminal Liability for the Violation of Identity Using Deepfakes in South Africa	Nomalanga Mashinini	195
A Cybersecurity Imperative on an Electronic Voting System in South Africa - 2024 and Beyond	Mmalerato Masombuka, Petrus Duvenage and Bruce Watson	204
A Machine Learning Deep-Dive Analysis Into Network Logs	Michael Motlhabi, Phumeza Pantsi and Rofhiwa Netshiya	213
Analyzing the Cyberattacks Sponsored by State-Actors Under the Contemporary Global Political and Legal Frameworks	Ayman Mottaleb and Mustafa Canan	223
Local Databases or Cloud Computing Services: Cybersecurity Issues at the NUST, Zimbabwe	Guidance Mthwazi	231
Assembling a Cyber Range to Evaluate Artificial Intelligence / Machine Learning (AI/ML) Security Tools	Jeffrey Nichols, Kevin Spakes, Cory Watson and Robert Bridges	240
MemForC: Memory Forensics Corpus Creation for Malware Analysis	Augustine Orgah, Golden Richard III and Andrew Case	249
Cyber-Worthiness and Cyber-Resilience to Secure Low Earth Orbit Satellites	David Ormrod, Jill Slay and Amy Ormrod	257
Game! Crime? The Shadow Economy Around Digital Games as a Playground for Cybercrime	Alexander Pfeiffer, Thomas-Gabriel Rüdiger, Stephen Bezzina, Simone Kriglstein and Thomas Wernbacher	267
What Role can Blockchain-Based Digital Identities Play to Counteract (Cyber)Crime in Relation to Assessment Results and Credentials in the Educational Sector? A Glimpse Into the Future	Alexander Pfeiffer, Stephen Bezzina, Simone Kriglstein, Thomas Wernbacher, Vince Vella and Alexiei Dingli	272
Use-Case on Distributed Ledger Technology: Antifraud Within the Department of Defense	Dorothy Potter and Adrienne Ferguson	281
Biocybersecurity: A Converging Threat as an Auxiliary to War	Lucas Potter, Orlando Ayala and Xavier-Lewis Palmer	291
Basic Elements of Cyber Security for an Automated Remote Piloting Fairway System	Jouni Pöyhönen, Tiina Kovanen and Martti Lehto	299
Contemplating Blame in Cyber Security	Karen Renaud, Alfred Musarurwa and Verena Zimmermann	309
Ha Ha Only Serious: Irony in Information Warfare and the Comedy-Cloaked Extremism	Keith Scott	318

Paper Title	Author(s)	Page No
Methodology for Modelling Financially Motivated Cyber Crime	Tiia Somer	326
Platform Neutrality: Solution for the Social Media War?	Marcel Stolz	336
Competing Interests of Cyberintelligence and Cyberdefence Activities in Neutral Countries	Marcel Stolz	345
Applied Analytical Model for Latency Evaluation of RISC-V Security Monitor	Justin Tullos, Scott Graham and Pranav Patel	354
SecCAN: A Practical Secure Control Area Network for Automobiles	Mohammad Arman Ullah, Sheikh Ghafoor, Mike Rogers and Stacy Prowell	364
Adversarial Poisoning Attack's Impact on Prediction Functionality of ML-Based Feedback Loop System in Cyber-Physical Context	Petri Vähäkainu, Martti Lehto and Antti Kariluoto	373
Defending ML-Based Feedback Loop System Against Malicious Adversarial Inference Attacks	Petri Vähäkainu, Martti Lehto and Antti Kariluoto	382
Cyber Threats Focusing On Covid-19 Outbreak	Namosha Veerasamy	391
Improving Joint All Domain Operations (JADO) Education	Christopher Voltz, Mark Reith, David Long and Richard Dill	401
An Empirical Study: Privacy and Security Analysis of Companion Robot System Development	Benjamin Yankson	409
PHD Papers		423
Analysis and Impact of The Cybercrimes in the Western Cape Small and Medium-Sized Businesses	Tabisa Ncubukezi, Laban Mwansa and Francois Rocaries	425
Multiband Reconfigurable Antenna for Wireless Communications Systems Using Metamaterials (Split Ring Resonator (SRR))	Zohra Zerrouk and Larbi Setti	436
Masters Research Papers		441
Cyber Security and Wind Energy: A Fault-Tolerance Analysis of DDoS Attacks	Christen-Jenna Bergs, Jason Bruiners, Fauwaaz Fakier and Lonwabo Stofile	443
Critical Infrastructure: A Battlefield for Cyber Warfare?	Eduardo Izycki and Eduardo Wallier Vianna	454
Network Forensics for Encrypted SCADA Device Programming Traffic	Robert Mellish, Scott Graham and Stephen Dunlap	465
Modification of the Lockheed Martin Cyber Kill Chain (LMCKC) for Cyber Security Breaches Concerning Low Earth Orbit (LEO) Satellites	Robert van der Watt and Jill Slay	473
Remote Memory Monitoring for Malware in a Talos II Architecture	Robert Willburn	486

Information Warfare: Current Posture and Ideas for Improvement	Trenton Woods and Mark Reith	493
Non Academic Papers		499
Lost Packet Warehousing Service	Ivan Burke, Michael Motlhabi, Rofhiwa Netshiya and Heloise Pieterse	501
Enabling NATO Cyberspace Operations by Building Comprehensive Cyberspace Situational Awareness	Alberto Domingo, Vicente Pastor, Manisha Parmar and Scott Foote	509
Work In Progress Papers		519
Challenges in Bridging the law Enforcement Capability gap	Anne Kohnke, Greg Laidlaw and Charles Wilson	521
Zynq System-on-Chip DMA Messaging for Processor Monitoring	Daniel Koranek, Douglas Hodson and Scott Graham	527
Towards Dynamically Shifting Cyber Terrain With Software-Defined Networking and Moving Target Defense	Robert Larkin, Steven Jensen, Daniel Koranek, Barry Mullins and Mark Reith	535
Using Al/Machine Learning for Reconnaissance Activities During Network Penetration Testing	George Stone, Douglas Talbert and William Eberle	541