

6th International Conference on Information Systems Security and Privacy (ICISSP 2020)

Valletta, Malta
25 – 27 February 2020

Editors:

**Steven Furnell
Paolo Mori**

**Edgar Weippl
Olivier Camp**

ISBN: 978-1-7138-4034-3

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© (2020) by SCITEPRESS – Science and Technology Publications, Lda.
All rights reserved.

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

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda.
at the address below.

SCITEPRESS – Science and Technology Publications, Lda.
Avenida de S. Francisco Xavier, Lote 7 Cv. C,
2900-616 Setúbal, Portugal

Phone: +351 265 520 185
Fax: +351 265520 186

info@scitepress.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

INVITED SPEAKERS

KEYNOTE SPEAKERS

- Leveraging Blockchain Technology to Enhance Security and Privacy in the Internet of Things 5
Sokratis K. Katsikas
- Toward Active and Passive Confidentiality Attacks on Cryptocurrency Off-chain Networks 7
Utz Nisslmueller, Klaus-Tycho Foerster, Stefan Schmid and Christian Decker
- Backdooring Deep Learning Architectures: Threats and (some) Opportunities 15
Mauro Barni

PAPERS

FULL PAPERS

- AMNESIA: A Technical Solution towards GDPR-compliant Machine Learning 21
Christoph Stach, Corinna Giebler, Manuela Wagner, Christian Weber and Bernhard Mitschang
- Secure Ownership Transfer for the Internet of Things 33
Martin Gunnarsson and Christian Gehrman
- Host Fingerprinting for Web Servers Authentication 45
Ezio Lefons, Sebastiano Pizzutilo and Filippo Tangorra
- A Formal Approach for the Analysis of the XRP Ledger Consensus Protocol 52
Lara Mauri, Stelvio Cimato and Ernesto Damiani
- Email Spoofing Attack Detection through an End to End Authorship Attribution System 64
Giacomo Giorgi, Andrea Saracino and Fabio Martinelli
- Lightweight Authentication and Secure Communication Suitable for IoT Devices 75
Simona Buchovecká, Róbert Lórencz, Jiří Buček and Filip Kodýtek
- CoRA: A Scalable Collective Remote Attestation Protocol for Sensor Networks 84
Aída Diop, Maryline Laurent, Jean Leneutre and Jacques Traoré
- Track Down Identity Leaks using Threat Intelligence 96
Timo Malderle, Sven Knauer, Martin Lang, Matthias Wbbeling and Michael Meier
- Assessing Testing Strategies for Access Control Systems: A Controlled Experiment 107
Said Daoudagh, Francesca Lonetti and Eda Marchetti
- Secrecy and Authenticity Properties of the Lightning Network Protocol 119
Hans Hüttel and Vilim Staroveski
- Privacy with Health Information Technologies: What Story Do Data Breaches in US Tell Us? 131
Sylvestre Uwizeyemungu and Placide Poba-Nzaou
- Evaluating the Effect of Justification and Confidence Information on User Perception of a Privacy Policy Summarization Tool 142
Vanessa Bracamonte, Seira Hidano, Welderufael B. Tesfay and Shinsaku Kiyomoto

Harmonized Group Mix for ITS <i>Mirja Nitschke, Christian Roth, Christian Hoyer and Doğan Kesdoğan</i>	152
A Quantitative Study of Vulnerabilities in the Internet of Medical Things <i>Hervé Debar, Razvan Beuran and Yasuo Tan</i>	164
Speeding Up the Computation of Elliptic Curve Scalar Multiplication based on CRT and DRM <i>Mohammad Anagreh, Eero Vainikko and Peeter Laud</i>	176
External Contextual Factors in Information Security Behaviour <i>D. P. Snyman and H. A. Kruger</i>	185
A Homomorphic Proxy Re-authenticators based Efficient Multi-client Non-interactive Verifiable Computation Scheme <i>Shuaijianni Xu and Liang Feng Zhang</i>	195
MedBIoT: Generation of an IoT Botnet Dataset in a Medium-sized IoT Network <i>Alejandro Guerra-Manzanares, Jorge Medina-Galindo, Hayretin Bahsi and Sven Nömm</i>	207
SHORT PAPERS	
Security of Digital Banking Systems in Poland: Users Study 2019 <i>Wojciech Wodo and Damian Stygar</i>	221
Comparison of the Paillier and ElGamal Cryptosystems for Smart Grid Aggregation Protocols <i>Fabian Knirsch, Andreas Unterweger, Maximilian Unterrainer and Dominik Engel</i>	232
Privacy-preserving Surveillance Methods using Homomorphic Encryption <i>William Bowditch, Will Abramson, William J. Buchanan, Nikolaos Pitropakis and Adam J. Hall</i>	240
Maturity Modelling to Prepare for Cyber Crisis Escalation and Management <i>Grethe Østby and Basel Katt</i>	249
Translating Data Protection into Software Requirements <i>Ralf Kneuper</i>	257
Revisiting Higher-order Computational Attacks against White-box Implementations <i>Housseem Maghrebi and Davide Alessio</i>	265
Modeling Cyber Threat Intelligence <i>Siri Bromander, Morton Swimmer, Martin Eian, Geir Skjotskift and Fredrik Borg</i>	273
Integration of Data Envelopment Analysis in Business Process Models: A Novel Approach to Measure Information Security <i>Agnes Åkerlund and Christine Große</i>	281
Phishing URL Detection Through Top-level Domain Analysis: A Descriptive Approach <i>Orestis Christou, Nikolaos Pitropakis, Pavlos Papadopoulos, Sean McKeown and William J. Buchanan</i>	289
An Approach to Secure Legacy Software Systems <i>Stefanie Jasser and Jonas Kelbert</i>	299
Is Ethereum's ProgPoW ASIC Resistant? <i>Jason Orender, Ravi Mukkamala and Mohammad Zubair</i>	310

Exploring Vulnerabilities in Solidity Smart Contract <i>Phitchayaphong Tantikul and Sudsanguan Ngamsuriyaroj</i>	317
Quantifying the Significance of Cybersecurity Text through Semantic Similarity and Named Entity Recognition <i>Otgonpurev Mendsaikhan, Hirokazu Hasegawa, Yamaguchi Yukiko and Hajime Shimada</i>	325
A Comparison of Blockchain-based PKI Implementations <i>Clemens Brunner, Fabian Knirsch, Andreas Unterweger and Dominik Engel</i>	333
A Domain-specific Modeling Framework for Attack Surface Modeling <i>Tithnara Nicolas Sun, Bastien Drouot, Fahad R. Golra, Joël Champeau, Sylvain Guerin, Luka Le Roux, Raúl Mazo, Ciprian Teodorov, Lionel Van Aertryck and Bernard L'Hostis</i>	341
Visualizing Syscalls using Self-organizing Maps for System Intrusion Detection <i>Max Landauer, Florian Skopik, Markus Wurzenberger, Wolfgang Hotwagner and Andreas Rauber</i>	349
CoProtect: Collaborative Management of Cryptographic Keys for Data Security in Cloud Systems <i>Lorenzo Bracciale, Pierpaolo Loreti, Emanuele Raso, Maurizio Naldi and Giuseppe Bianchi</i>	361
Threat Modeling and Attack Simulations of Smart Cities: A Literature Review and Explorative Study <i>Robert Lagerström, Wenjun Xiong and Mathias Ekstedt</i>	369
Bident Structure for Neural Network Model Protection <i>Hsiao-Ying Lin, Chengfang Fang and Jie Shi</i>	377
Risk Identification: From Requirements to Threat Models <i>Roman Wirtz and Maritta Heisel</i>	385
A Systematic Approach toward Extracting Technically Enforceable Policies from Data Usage Control Requirements <i>Arghavan Hosseinzadeh, Andreas Eitel and Christian Jung</i>	397
Computer Viruses: The Abstract Theory Revisited <i>Nikolai Gladyshev</i>	406
Revisiting Privacy-aware Blockchain Public Key Infrastructure <i>Paul Plessing and Olamide Omolola</i>	415
Securing IoT Devices using Geographic and Continuous Login Blocking: A Honeypot Study <i>Fredrik Heiding, Mohammad-Ali Omer, Andreas Wallström and Robert Lagerström</i>	424
Active Directory Kerberoasting Attack: Monitoring and Detection Techniques <i>Lukáš Kotlaba, Simona Buchovecká and Róbert Lórencz</i>	432
CCA Secure Unidirectional PRE with Key Pair in the Standard Model without Pairings <i>Anass Sbai, Cyril Drocourt and Gilles Dequen</i>	440
Using Eyetracker to Find Ways to Mitigate Ransomware <i>Budi Arief, Andy Periam, Orcun Cetin and Julio Hernandez-Castro</i>	448
Email Image Spam Classification based on ResNet Convolutional Neural Network <i>Vít Listík, Jan Šedivý and Václav Hlaváč</i>	457
Evaluation to Classify Ransomware Variants based on Correlations between APIs <i>Jiaxing Zhou, Miyuki Hirose, Yoshio Kakizaki and Atsuo Inomata</i>	465

A Practical Approach to Stakeholder-driven Determination of Security Requirements based on the GDPR and Common Criteria <i>Sandra Dominique Zinsmaier, Hanno Langweg and Marcel Waldvogel</i>	473
Achieving Privacy, Security, and Interoperability among Biometric Networks using Symmetric Encryption <i>Eduardo M. Lacerda Filho and Vinicius P. Gonçalves</i>	481
Improving Accuracy and Speed of Network-based Intrusion Detection using Gradient Boosting Trees <i>Ryosuke Terado and Morihiko Hayashida</i>	490
Anomaly Detection in Communication Networks of Cyber-physical Systems using Cross-over Data Compression <i>Hubert Schölnast, Paul Tavalato and Philipp Kreimel</i>	498
Privacy-preserving Measures in Smart City Video Surveillance Systems <i>Shizra Sultan and Christian D. Jensen</i>	506
Homomorphic Encryption at Work for Private Analysis of Security Logs <i>Aymen Boudguiga, Oana Stan, Hichem Sedjelmaci and Sergiu Carpov</i>	515
Radical Text Detection based on Stylometry <i>Álvaro de Pablo, Óscar Araque and Carlos A. Iglesias</i>	524
On Analyzing Third-party Tracking via Machine Learning <i>Alfonso Guarino, Delfina Malandrino, Rocco Zaccagnino, Federico Cozza and Antonio Rapuano</i>	532
The Root Causes of Compromised Accounts at the University <i>Philip Nyblom, Gaute Wangen, Mazaher Kianpour and Grethe Østby</i>	540
Patients to Mobilize Their Data: Secure and Flexible mHealth Delegation <i>Rafael Almeida, Pedro Vieira-Marques and Ana Ferreira</i>	552
Accountant: Protection of Data Integrity and Identification of Malicious Nodes in In-network Data Processing <i>David Jost and Mathias Fischer</i>	561
Building Competitive Advantage from Ubuntu: An African Information Security Awareness Model <i>Tapiwa Gundu and Nthabiseng Modiba</i>	569
A Curious Exploration of Malicious PDF Documents <i>Julian Lindenhofner, Rene Offenthaler and Martin Pirker</i>	577
Dual-use Research in Ransomware Attacks: A Discussion on Ransomware Defence Intelligence <i>Ziya Alper Genç and Gabriele Lenzini</i>	585
Systematization of Threats and Requirements for Private Messaging with Untrusted Servers: The Case of e-Mailing and Instant Messaging <i>Iraklis Symeonidis and Gabriele Lenzini</i>	593
An Analytical Scanning Technique to Detect and Prevent the Transformed SQL Injection and XSS Attacks <i>Mohammad Qbea'h, Saed Alrabaee and Djedjiga Mouheb</i>	603
Neural Network Security: Hiding CNN Parameters with Guided Grad-CAM <i>Linda Guiga and A. W. Roscoe</i>	611

Distributed Defence of Service (DiDoS): A Network-layer Reputation-based DDoS Mitigation Architecture <i>Andikan Otung and Andrew Martin</i>	619
Presence Metadata in the Internet of Things: Challenges and Opportunities <i>Robert Hegarty and John Haggerty</i>	631
A Study of Classification of Texts into Categories of Cybersecurity Incident and Attack with Topic Models <i>Masahiro Ishii, Satoshi Matsuura, Kento Mori, Masahiko Tomoishi, Yong Jin and Yoshiaki Kitaguchi</i>	639
New General Secret Sharing Scheme using Hierarchical Threshold Scheme: Improvement of Information Rates for Specified Participants <i>Kouya Tochikubo</i>	647
Greater Control and Transparency in Personal Data Processing <i>Giray Havur, Miel Vander Sande and Sabrina Kirrane</i>	655
Securing Industrial Production from Sophisticated Cyberattacks <i>Andrew Sundstrom, Damas Limoge, Vadim Pinskiy and Matthew Putman</i>	663
A Meta Model for a Comprehensive Description of Network Protocols Improving Security Tests <i>Steffen Pfrang, David Meier, Andreas Fleig and Jürgen Beyerer</i>	671
Introducing a Verified Authenticated Key Exchange Protocol over Voice Channels for Secure Voice Communication <i>Piotr Krasnowski, Jerome Lebrun and Bruno Martin</i>	683
Legislation and the Negative Impact on Cybersecurity in Healthcare <i>Jesse Daniels and Sajal Bhatia</i>	691
Secure Comparison and Interval Test Protocols based on Three-party MPC <i>Wataru Fujii, Keiichi Iwamura and Masaki Inamura</i>	698
Multi-level Distributed Intrusion Detection System for an IoT based Smart Home Environment <i>Simone Facchini, Giacomo Giorgi, Andrea Saracino and Gianluca Dini</i>	705
Ontology-based Automation of Penetration Testing <i>Ge Chu and Alexei Lisitsa</i>	713
Recommender Systems Robust to Data Poisoning using Trim Learning <i>Seira Hidano and Shinsaku Kiyomoto</i>	721
Distance Metric Learning using Particle Swarm Optimization to Improve Static Malware Detection <i>Martin Jureček and Róbert Lórencz</i>	725
Security and Privacy in Smart Grids: Challenges, Current Solutions and Future Opportunities <i>Ismail Butun, Alexios Lekidis and Daniel Ricardo dos Santos</i>	733
Tool Support for Risk-driven Planning of Trustworthy Smart IoT Systems within DevOps <i>Andreas Thompson and Gencer Erdogan</i>	742
Methodology and Feedback about Systematic Cybersecurity Experts Auditing in Belgium <i>Christophe Ponsard, Jeremy Grandclaudon and Nicolas Point</i>	754

4TH INTERNATIONAL WORKSHOP ON FORMAL METHODS FOR SECURITY ENGINEERING

FULL PAPERS

Towards a Comprehensive Solution for Secure Cryptographic Protocol Execution based on Runtime Verification <i>Christian Colombo and Mark Vella</i>	765
Detection of Crawler Traps: Formalization and Implementation Defeating Protection on Internet and on the TOR Network <i>Maxence Delong, Baptiste David and Eric Filiol</i>	775
Verifying Sanitizer Correctness through Black-Box Learning: A Symbolic Finite Transducer Approach <i>Sophie Lathouwers, Maarten Everts and Marieke Huisman</i>	784
The Blockchain Potential in Computer Virology <i>Joanna Moubarak, Eric Filiol and Maroun Chamoun</i>	796
Android Run-time Permission Exploitation User Awareness by Means of Formal Methods <i>Fausto Fasano, Fabio Martinelli, Francesco Mercaldo and Antonella Santone</i>	804
Analysis of Security Attacks in Wireless Sensor Networks: From UPPAAL to Castalia <i>Cinzia Bernardeschi, Gianluca Dini, Maurizio Palmieri and Francesco Racciatti</i>	815
Accidental Sensitive Data Leaks Prevention via Formal Verification <i>Madalina G. Ciobanu, Fausto Fasano, Fabio Martinelli, Francesco Mercaldo and Antonella Santone</i>	825
SHORT PAPERS	
Bank Credit Risk Management based on Data Mining Techniques <i>Fabio Martinelli, Francesco Mercaldo, Domenico Raucci and Antonella Santone</i>	837
Comparing Machine Learning Techniques for Malware Detection <i>Joanna Moubarak and Tony Feghali</i>	844
AUTHOR INDEX	853