7th International Conference on Information Systems Security and Privacy (ICISSP 2021)

Online 11-13 February 2021

Editors:

Paolo Mori Gabriele Lenzini Steven Furnell

ISBN: 978-1-7138-4016-9

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© (2021) 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

BRIEF CONTENTS

Invited Speakers	IV
WORKSHOP CHAIRS	IV
Organizing Committees	V
Program Committee	VI
Auxiliary Reviewers	VII
Workshop Program Committee	VIII
Selected Papers Book	VIII
Foreword	IX
Contents	XI

CONTENTS

INVITED SPEAKERS

KEYNOTE SPEAKERS	
New Directions for High-throughput and High-security Communication Adrian Perrig	5
Practical and Provably Sound Static Analysis of Ethereum Smart Contracts Matteo Maffei	7
Accessible Cyber Security: The Next Frontier? Karen Renaud	9
PAPERS	
FULL PAPERS	
Who Stores the Private Key? An Exploratory Study about User Preferences of Key Management for Blockchain-based Applications Clemens Brunner, Günther Eibl, Peter Fröhlich, Andreas Sackl and Dominik Engel	23
Utilizing Keystroke Dynamics as Additional Security Measure to Protect Account Recovery Mechanism Ahmed Anu Wahab, Daqing Hou, Stephanie Schuckers and Abbie Barbir	33
On Security Analysis of Periodic Systems: Expressiveness and Complexity Musab A. Alturki, Tajana Ban Kirigin, Max Kanovich, Vivek Nigam, Andre Scedrov and Carolyn Talcott	43
Predicting Security Program Effectiveness in Bring-Your-Own-Device Deployment in Organizations Alexander O. Akande and Vu N. Tran	55
Automatic Detection of Cyber Security Events from Turkish Twitter Stream and Newspaper Data Özgür Ural and Cengiz Acartürk	66
Improvement of Secure Multi-Party Multiplication of (k,n) Threshold Secret Sharing using Only $N=k$ Servers Ahmad Ahmad Aminuddin Mohd Kamal and Keiichi Iwamura	77
An Analytic Attack against ARX Addition Exploiting Standard Side-channel Leakage Yan Yan, Elisabeth Oswald and Srinivas Vivek	89
Bridging Knowledge Gaps in Security Analytics Fabian Böhm, Manfred Vielberth and Günther Pernul	98
The Comparison of Word Embedding Techniques in RNNs for Vulnerability Detection Hai Ngoc Nguyen, Songpon Teerakanok, Atsuo Inomata and Tetsutaro Uehara	109
A Permissioned Blockchain-based System for Collaborative Drug Discovery Christoffer Olsson and Mohsen Toorani	121

Checking Contact Tracing App Implementations Robert Flood, Sheung Shi Chan, Wei Chen and David Aspinall

133

Optimizing Leak Detection in Open-source Platforms with Machine Learning Techniques Sofiane Lounici, Marco Rosa, Carlo Maria Negri, Slim Trabelsi and Melek Önen	145
Adversarial Machine Learning: A Comparative Study on Contemporary Intrusion Detection Datasets <i>Yulexis Pacheco and Weiqing Sun</i>	160
Automatic Detection and Decryption of AES by Monitoring S-Box Access Josef Kokeš, Jonatan Matějka and Róbert Lórencz	172
Parallel Privacy-preserving Computation of Minimum Spanning Trees Mohammad Anagreh, Eero Vainikko and Peeter Laud	181
Hydra: Practical Metadata Security for Contact Discovery, Messaging, and Dialing David Schatz, Michael Rossberg and Guenter Schaefer	191
Automated Black Box Detection of HTTP GET Request-based Access Control Vulnerabilities in Web Applications Malte Kushnir, Olivier Favre, Marc Rennhard, Damiano Esposito and Valentin Zahnd	204
A State Saturation Attack against Massively Multiplayer Online Videogames Blake Bryant and Hossein Saiedian	217
CyExec*: Automatic Generation of Randomized Cyber Range Scenarios Ryotaro Nakata and Akira Otsuka	226
From Exposed to Exploited: Drawing the Picture of Industrial Control Systems Security Status in the Internet Age <i>Yixiong Wu, Jianwei Zhuge, Tingting Yin, Tianyi Li, Junmin Zhu, Guannan Guo, Yue Liu and Jianju Hu</i>	237
Towards Academic and Skills Credentialing Standards and Distributed Ledger Technologies Morné Pretorius, Nelisiwe Dlamini and Sthembile Mthethwa	249
A Protection against the Extraction of Neural Network Models Hervé Chabanne, Vincent Despiegel and Linda Guiga	258
SHORT PAPERS	
Admonita: A Recommendation-based Trust Model for Dynamic Data Integrity Wassnaa Al-Mawee, Steve Carr and Jean Mayo	273
Experiences and Recommendations from Operating a Tor Exit Node at a University Michael Sonntag and René Mayrhofer	283
Mobile Robots: An Overview of Data and Security Esmeralda Kadena, Huu Phuoc Dai Nguyen and Lourdes Ruiz	291
Automatically Extracting Business Level Access Control Requirements from BPMN Models to Align RBAC Policies Roman Pilipchuk, Robert Heinrich and Ralf Reussner	300
Protecting Privacy during a Pandemic Outbreak Karsten Martiny, Linda Briesemeister, Grit Denker, Mark St. John and Ron Moore	308
Enhanced Information Management in Inter-organisational Planning for Critical Infrastructure Protection: Case and Framework <i>Christine Große</i>	319

Model-based Threat and Risk Assessment for Systems Design Avi Shaked and Yoram Reich	331
Towards Collaborative Cyber Threat Intelligence for Security Management Oleksii Osliak, Andrea Saracino, Fabio Martinelli and Theo Dimitrakos	339
A Secure Network Scanner Architecture for Asset Management in Strongly Segmented ICS Networks <i>Matthias Niedermaier, Thomas Hanka, Florian Fischer and Dominik Merli</i>	347
Canopy: A Learning-based Approach for Automatic Low-and-Slow DDoS Mitigation Lucas Cadalzo, Christopher H. Todd, Banjo Obayomi, W. Brad Moore and Anthony C. Wong	356
Remote WebAuthn: FIDO2 Authentication for Less Accessible Devices Paul Wagner, Kris Heid and Jens Heider	368
Active Directory Kerberoasting Attack: Detection using Machine Learning Techniques Lukáš Kotlaba, Simona Buchovecká and Róbert Lórencz	376
Field Studies on the Impact of Cryptographic Signatures and Encryption on Phishing Emails Stefanie Pham, Matthias Schopp, Lars Stiemert, Sebastian Seeber, Daniela Pöhn and Wolfgang Hommel	384
Towards a Formalisation of Expert's Knowledge for an Automatic Construction of a Vulnerability Model of a Cyberphysical System <i>Witold Klaudel and Artur Rataj</i>	391
A Novel Simplified Framework to Secure IoT Communications Sairath Bhattacharjya and Hossein Saiedian	399
Linking Biometric Voice Identity with Self-monitoring Health Data as a Temporal-spatial Event Stored in a Mobile Device <i>Bon Sy</i>	407
DLP-Visor: A Hypervisor-based Data Leakage Prevention System Guy Amit, Amir Yeshooroon, Michael Kiperberg and Nezer J. Zaidenberg	416
Continuous Authentication based on Hand Micro-movement during Smartphone Form Filling by Seated Human Subjects Aratrika Ray, Daqing Hou, Stephanie Schuckers and Abbie Barbir	424
Blockchain based Secured Virtual Machine Image Monitor Srijita Basu, Sandip Karmakar and Debasish Bera	432
The Proposal of Double Agent Architecture using Actor-critic Algorithm for Penetration Testing Hoang Viet Nguyen, Songpon Teerakanok, Atsuo Inomata and Tetsutaro Uehara	440
Two Stage Anomaly Detection for Network Intrusion Detection Helmut Neuschmied, Martin Winter, Katharina Hofer-Schmitz, Branka Stojanovic and Ulrike Kleb	450
Ontology-based Cybersecurity and Resilience Framework Helmar Hutschenreuter, Salva Daneshgadeh Çakmakçı, Christian Maeder and Thomas Kemmerich	458
Study of Intra- and Inter-user Variance in Password Keystroke Dynamics Blaine Ayotte, Mahesh K. Banavar, Daqing Hou and Stephanie Schuckers	467

Windows Malware Binaries in C/C++ GitHub Repositories: Prevalence and Lessons Learned William La Cholter, Matthew Elder and Antonius Stalick	475
Implementation of Secondary Available Digital Content Protection Schemes using Identity-based Signatures	485
Nozomi Nagashima, Masaki Inamura and Keiichi Iwamura	
Towards an Ontology for Enterprise Level Information Security Policy Analysis Debashis Mandal and Chandan Mazumdar	492
Enabling Monetization of Depreciating Data on Blockchains Christian Dahdah, Coline Van Leeuwen, Ziad Kheil, Jérôme Lacan, Jonathan Detchart and Thibault Gateau	500
Profiling and Discriminating of Containerized ML Applications in Digital Data Marketplaces (DDM) Lu Zhang, Reginald Cushing, Ralph Koning, Cees de Laat and Paola Grosso	508
Representation of PE Files using LSTM Networks Martin Jureček and Matouš Kozák	516
Understanding How People Weigh the Costs and Benefits of using Facebook Jack McClary and Sid Stamm	526
How to Improve the GDPR Compliance through Consent Management and Access Control Said Daoudagh, Eda Marchetti, Vincenzo Savarino, Roberto Di Bernardo and Marco Alessi	534
Sociocultural Influences for Password Definition: An AI-based Study Carlos Ocanto Dávila, Rocío Cabrera Lozoya and Slim Trabelsi	542
Efficient Semantic Representation of Network Access Control Configuration for Ontology-based Security Analysis Florian Patzer and Jürgen Beyerer	550
A Lemon by Any Other Label Vaibhav Garg	558
Implementing Secure Applications Thanks to an Integrated Secure Element Sylvain Guilley, Michel Le Rolland and Damien Quenson	566
An Asynchronous Federated Learning Approach for a Security Source Code Scanner Sabrina Kall and Slim Trabelsi	572
HyperPass: Secure Password Input Platform Michael Kiperberg and Nezer J. Zaidenberg	580
Detecting Cyber Security Attacks against a Microservices Application using Distributed Tracing Stephen Jacob, Yuansong Qiao and Brian Lee	588
Stopping DNS Rebinding Attacks in the Browser Mohammadreza Hazhirpasand, Arash Ale Ebrahim and Oscar Nierstrasz	596
Securing the Linux Boot Process: From Start to Finish Jakob Hagl, Oliver Mann and Martin Pirker	604
Leveraging Dynamic Information for Identity and Access Management: An Extension of Current Enterprise IAM Architecture Alexander Puchta, Sebastian Groll and Günther Pernul	611

Dreaming of Keys: Introducing the Phantom Gradient Attack Åvald Åslaugson Sommervoll	619
Towards Exploring User Perception of a Privacy Sensitive Information Detection Tool Vanessa Bracamonte, Welderufael B. Tesfay and Shinsaku Kiyomoto	628
Evaluation of Vulnerability Reproducibility in Container-based Cyber Range Ryotaro Nakata and Akira Otsuka	635
Improving Classification of Malware Families using Learning a Distance Metric Martin Jureček, Olha Jurečková and Róbert Lórencz	643
A Dynamic Access Control System based on Situations of Users Hirokazu Hasegawa and Hiroki Takakura	653
An Overview of Cryptographic Accumulators Ilker Ozcelik, Sai Medury, Justin Broaddus and Anthony Skjellum	661
MADLIRA: A Tool for Android Malware Detection Khanh Huu The Dam and Tayssir Touili	670
Securing Orchestrated Containers with BSI Module SYS.1.6 Christoph Haar and Erik Buchmann	676
Privacy Preserving Services for Intelligent Transportation Systems with Homomorphic Encryption Aymen Boudguiga, Oana Stan, Abdessamad Fazzat, Houda Labiod and Pierre-Emmanuel Clet	684
Security Property Modeling Hiba Hnaini, Luka Le Roux, Joel Champeau and Ciprian Teodorov	694
Developing Cyber-risk Centric Courses and Training Material for Cyber Ranges: A Systematic Approach Gencer Erdogan, Antonio Álvarez Romero, Niccolò Zazzeri, Anže Žitnik, Mariano Basile, Giorgio Aprile, Mafalda Osório, Claudia Pani and Ioannis Kechaoglou	702
Release-aware In-out Encryption Adjustment in MongoDB Query Processing Maryam Almarwani, Boris Konev and Alexei Lisitsa	714
Learning from Smartphone Location Data as Anomaly Detection for Behavioral Authentication through Deep Neuroevolution Mhd Irvan, Tran Phuong Thao, Ryosuke Kobayashi, Toshiyuki Nakata and Rie Shigetomi Yamaguchi	723

5TH INTERNATIONAL WORKSHOP ON FORMAL METHODS FOR SECURITY ENGINEERING

FULL PAPERS

Malware Classification with Word Embedding Features Aparna Sunil Kale, Fabio Di Troia and Mark Stamp	733
Malware Classification using Long Short-term Memory Models Dennis Dang, Fabio Di Troia and Mark Stamp	743
Malware Classification with GMM-HMM Models Jing Zhao, Samanvitha Basole and Mark Stamp	753
Unconventional Attack against Voting Machines Enlarging the Scope of Cybersecurity Risk Analysis <i>Eric Filiol</i>	763
A New Dataset for Smartphone Gesture-based Authentication Elliu Huang, Fabio Di Troia, Mark Stamp and Preethi Sundaravaradhan	771
On Formalising and Analysing the Tweetchain Protocol Mariapia Raimondo, Simona Bernardi and Stefano Marrone	781
Experimental Evaluation of Description Logic Concept Learning Algorithms for Static Malware Detection Peter Švec, Štefan Balogh and Martin Homola	792
Towards Formal Security Verification of Over-the-Air Update Protocol: Requirements, Survey and UpKit Case Study Christophe Ponsard and Denis Darquennes	800
SHORT PAPER	
Colluding Covert Channel for Malicious Information Exfiltration in Android Environment Rosangela Casolare, Fabio Martinelli, Francesco Mercaldo and Antonella Santone	811
AUTHOR INDEX	819