2020 International Conference on Cyber Security and Protection of Digital Services (Cyber Security 2020)

Dublin, Ireland 15 – 19 June 2020



IEEE Catalog Number: ISBN:

CFP20F48-POD 978-1-7281-6429-8

Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP20F48-POD

 ISBN (Print-On-Demand):
 978-1-7281-6429-8

 ISBN (Online):
 978-1-7281-6428-1

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

E-mail: curran@proceedings.com Web: www.proceedings.com



Table of Contents

Sponsors and Partners	ii
Themes	
	iii
Preface	iv
Programme Committee	
Cyber Security 2020 Programme Committee	vi
Cybor Coounty 2020 Frogramme Committee	
Ceynote and Industry Speakers	
Dr Ruoyi Zhou – Director of IBM Research, Ireland	
Dr Phillippa M. Spencer – Senior Principal Statistician, DSTL, UK	
Dr Jason R. C. Nurse – Assistant Professor, University of Kent, UK	
Paul C. Dwyer – CEO, Cyber Risk International, Ireland	
Professor Steven B. Lipner – Executive Director, SAFECode	
Wayne Bursey – Industrial Cyber Security Lead, Siemen Ltd	
James Chappell – Founder & Chief Innovation Officer, Digital Shadows	
Valerie Lyons – Chief Operating Officer, BH Consulting, Ireland	
Vincent Blake – Vice President, IT Security, GRCA, Pearson Plc	
	viii
Dr Siôn Lloyd – Lead Security, Stability & Resiliency Specialist, ICANN	VIII
Frack 1: Critical National Infrastructures & CERTs	
Chapter 1	
An Empirical Study of CERT Capacity in the North Sea	
Martin Gilje Jaatun, Lars Bodsberg, Tor Olav Grøtan and Marie Elisabeth Gaup Moe	1
Chapter 2	
Developing a security behavioural assessment approach for cyber rating U.K. MSBs	9
Andrew Rae and Asma Patel	9
Chapter 3 /ulnerability-Based Impact Criticality Estimation for Industrial Control Systems	
Jchenna Daniel Ani, Hongmei He and Ashutosh Tiwari	17
Chapter 4	
What Could Possibly Go Wrong? Smart Grid Misuse Case Scenarios	
nger Anne Tøndel, Ravishankar Borgaonkar, Martin Gilje Jaatun and Christian Frøystad	25
Chapter 5	
Automated Artefact Relevancy Determination from Artefact Metadata and Associated Timeline	
Events	20
Kiaoyu Du, Quan Le and Mark Scanlon	33
Frack 2: Cyber Attacks, SOCs & Deception	
Chapter 6	
Towards a Framework for Measuring the Performance of a Security Operations Center Analyst	
Enoch Agyepong, Yulia Cherdantseva, Philipp Reinecke and Pete Burna	41
Chapter 7	
Slave Clock Responses to Precision Time Protocol Attacks: A Case Study	4.0
Naleed Alghamdi and Michael Schukat	49
Chapter 8	
Deep Down the Rabbit Hole: On References in Networks of Decoy Elements	FO
Daniel Reti, Daniel Fraunholz, Janis Zemitis, Daniel Schneider and Hans Dieter Schotten	53
Chapter 9	
Restricting Data Flows to Secure Against Remote Attack Iohn O'Raw and David Laverty	64
	١٠.

	i
An Overview of Web Robots Detection Techniques Hanlin Chen, Hongmei He and Andrew Star	68
	00
Chapter 11 Towards Identifying Human Astions, Intent, and Soverity of ART Attacks Applying Deception	
Towards Identifying Human Actions, Intent, and Severity of APT Attacks Applying Deception Techniques - An Experiment	
Joel Chacon, Sean McKeown and Richard Macfarlan	74
Joel Chacon, Sean McReown and Richard Macianan	
Track 3: Exploiting Deep Learning for Cyber Security	
Chapter 12	
"What did you say?": Extracting unintentional secrets from predictive text learning systems	00
Gwyn Wilkinson and Phil Legg	82
Track 4: Human Factors & Visual Analytics	
Chapter 13	
Privacy Policy – "I agree"?! – Do alternatives to text-based policies increase the awareness of the	
users?	90
Pascal Faurie, Arghir-Nicolae Moldovan and Irina Tal	00
Track 5: Cyber Threat Intelligence, OSINT & Cyber Microbiome	
Chapter 14	
Smarter Password Guessing Techniques Leveraging Contextual Information and OSINT	00
Aikaterini Kanta, Iwen Coisel and Mark Scanlon	96
Chapter 15	
Cyber Threat Intelligence and the Cyber Meta-Reality and Cyber Microbiome	00
Joshua Sipper	98
Track C. Digital Evidance & Forencies	
Track 6: Digital Evidence & Forensics Chapter 16	
Shouting Through Letterboxes: A study on attack susceptibility to voice assistants	
Andrew McCarthy, Benedict R. Gaster and Phil Legg	103
Chapter 17	
Forensic Considerations for the High Efficiency Image File Format (HEIF)	
Sean Mckeown and Gordon Russell	111
Chapter 18	
Using Amazon Alexa APIs as a Source of Digital Evidence	
Clemens Krueger and Sean McKeown	119
Chapter 19	
Introducing a forensics data type taxonomy of acquirable artefacts from programmable logic	
controllers	127
Marco Cook, Ioannis Stavrou, Sarah Dimmock and Christopher Johnson	127
Track 7. Cubar Security Detection	
Track 7: Cyber Security Detection Chapter 20	
A Security Perspective on Unikernels	
Joshua Talbot, Przemek Pikula, Craig Sweetmore, Samuel Rowe, Hanan Hindy, Christos Tachtatzis,	
Robert Atkinson and Xavier Bellekens	135
Chapter 21	
A Taxonomy of Approaches for Integrating Attack Awareness in Applications	
Tolga Ünlü, Lynsay Shepherd, Natalie Coull and Colin McLean	142
Chapter 22	
Cyber-security research by ISPs: A NetFlow and DNS Anonymization Policy	146
Martin Fejrskov, Jens Myrup Pedersen and Emmanouil Vasilomanolakis	146
Treat 0. Mahila Casuritu 9 Danaamuura	
Track 8: Mobile Security & Ransomware Chapter 23	
Moving Targets: Addressing Concept Drift in Supervised Models for Hacker Communication	
Detection	
Andrei Lima Queiroz, Brian Keegan and Susan Mckeever	154
Chapter 24	
OTOPIO AT	
	ļ

Memory Forensics Against Ransomware Pranshu Bajpai and Richard Enbody	161
Chapter 25	
An Empirical Study of Key Generation in Cryptographic Ransomware	169
Pranshu Bajpai and Richard Enbody	103
Chapter 26	
Assessing the Influencing Factors on the Accuracy of Underage Facial Age Estimation	177
Felix Anda, Brett Becker, David Lillis, Nhien-An Le-Khac and Mark Scanlon	177
Track 9: Applications of Artificial Intelligence to Cyber Security	
Chapter 27	
Acoustic Emanation of Haptics as a Side-Channel for Gesture-Typing Attacks	
Jonathan Francis Roscoe and Max Smith-Creasey	185
Chapter 28	
Al Crimes: A Classification	
Fadi Sibai	189
Chapter 29	
Cost-Effective OCR Implementation to Prevent Phishing on Mobile Platforms	197
Yunjia Wang, Yang Liu, Tiejun Wu and Ishbel Duncan	197
Chapter 30	
Evaluation of Machine Learning Algorithms for Anomaly Detection	205
Nebrase Elmrabit, Feixiang Zhou, Fengyin Li and Huiyu Zhou	200
Track 10: Emerging Nations & Risk Management	
Chapter 31	
Adapting STPA-sec for Socio-technical Cyber Security Challenges in Emerging Nations: A Case	
Study in Risk Management for Rwandan HealthCare	213
Joseph Kaberuka and Christopher Johnson	
Chapter 32 Towards Sequeity Attack and Bick Assessment during Forly System Design	
Towards Security Attack and Risk Assessment during Early System Design	222
Lukas Gressl, Michael Krisper, Christian Steger and Ulrich Neffe	
Track 11: Social Media Analytics, Communities & Learning	
Chapter 33	
Blurring lines between fiction and reality: Perspectives of experts on marketing effectiveness of virtual	
influencers	
Evangelos Moustakas, Nishtha Lamba, Dina Mahmoud and C Ranganathan	230
Chapter 34	
Social big data: A Twitter text mining approach to the communication of universities during the	
Lebanese protests	
Katia Raya, Nicole D'almeida and Maroun Chamoun	236
Chapter 35	
Introducing & Evaluating 'Nutrition Facts' for Online Content	0.4.4
Matthew Spradling, Jeremy Straub and Jay Strong	244
Track 12: Cyber Security Education	
Chapter 36	
Think Smart, Play Dumb: Analyzing Deception in Hardware Trojan Detection Using Game Theory	
Tapadhir Das, Abdelrahman Eldosouky and Shamik Sengupta	252
Chapter 27	
Chapter 37 Epistemological Questions for Cybersecurity	
Timothy D. Williams	260
Timothy D. Williams	
Track 13: Cyber Security, Privacy & Ethics	
Chapter 38	
Technical codes' potentialies in cyber security: A contextual approach on the ethics of small digital	
organizations in France	004
Theo Simon and Bertrand Venard	264

Chapter 39	
Privacy Protection Behaviours: a diversity of individual strategies	
Bertrand Venard	272
Chapter 40	
Insider Threat Detection: A Solution in Search of a Problem	
Jordan Schoenherr and Robert Thomson	279
Chapter 41	
Platform for monitoring and clinical diagnosis of arboviruses using computational models	
Sebastião Rogério da Silva Neto, Thomás Tabosa de Oliveira, Vanderson Sampaio, Theo Lynn and	
Patricia Endo	286
Track 14: Data Science & Machine Learning for Cyber Security	
Chapter 42	
Secure Framework for Anti-Money-Laundering using Machine Learning and Secret Sharing	000
Arman Zand, James Orwell and Eckhard Pfluegel	289
Track 15: Security Testing & Continuous Vulnerability Assessment	
Chapter 43	
Automated Vulnerability Testing via Executable Attack Graphs	000
Drew Malzahn, Zachary Birnbaum and Cimone Wright-Hamor	296
Track 16: Emerging Technologies, IoT & Bots	
Chapter 44	
Testing and Hardening IoT Devices Against the Mirai Botnet	306
Christopher Kelly, Nikolaos Pitropakis, Sean Mckeown and Costas Lambrinoudakis	300
Track 17: Blockchain & Crypto	
Chapter 45	
ethVote: Towards secure voting with distributed ledgers	04.4
Johannes Mols and Emmanouil Vasilomanolakis	314
Chapter 46	
A DLT-based Trust Framework for IoT Ecosystems	200
Tharindu Ranathunga, Ramona Marfievici, Alan McGibney and Susan Rea	322