Handbook on

Securing Cyber-Physical Critical Infrastructure



Foundations and Challenges

Sajal K. Das, Krishna Kant, Nan Zhang



Handbook On Securing Cyber Physical Critical Infrastructure

Aynne Kokas

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Handbook on Securing Cyber-physical Critical Infrastructure ,2012 Handbook on Securing Cyber-Physical Critical Infrastructure Sajal K Das, Krishna Kant, Nan Zhang, 2012-01-31 Introduction Securing Cyber Physical Infrastructures An Overview Part 1 Theoretical Foundations of Security Chapter 1 Security and Vulnerability of Cyber Physical Infrastructure Networks A Control Theoretic Approach Chapter 2 Game Theory for Infrastructure Security The Power of Intent Based Adversary Models Chapter 3 An Analytical Framework for Cyber Physical Networks Chapter 4 Evolution of Widely Spreading Worms and Countermeasures Epidemic Theory and Application Part 2 Security for Wireless Mobile Networks Chapter 5 Mobile Wireless Network Security Chapter 6 Robust Wireless Infrastructure against Jamming Attacks Chapter 7 Security for Mobile Ad Hoc Networks Chapter 8 Defending against Identity Based Attacks in Wireless Networks Part 3 Security for Sensor Networks Chapter 9 Efficient and Distributed Access Control for Sensor Networks Chapter 10 Defending against Physical Attacks in Wireless Sensor Networks Chapter 11 Node Compromise Detection in Wireless Sensor N on Securing Cyber-physical Critical Infrastructure Sajal K. Das, Krishna Kant, Nan Zhang, 2012 The worldwide reach of the Internet allows malicious cyber criminals to coordinate and launch attacks on both cyber and cyber physical infrastructure from anywhere in the world This purpose of this handbook is to introduce the theoretical foundations and practical solution techniques for securing critical cyber and physical infrastructures as well as their underlying computing and communication architectures and systems Examples of such infrastructures include utility networks e.g. electrical power grids ground transportation systems automotives roads bridges and tunnels airports and air traffic control systems wired and wireless communication and sensor networks systems for storing and distributing water and food supplies medical and healthcare delivery systems as well as financial banking and commercial transaction assets The handbook focus mostly on the scientific foundations and engineering techniques while also addressing the proper integration of policies and access control mechanisms for example how human developed policies can be properly enforced by an automated system

Cyber-Physical Security Robert M. Clark, Simon Hakim, 2016-08-10 This book focuses on the vulnerabilities of state and local services to cyber threats and suggests possible protective action that might be taken against such threats Cyber threats to U S critical infrastructure are of growing concern to policymakers managers and consumers Information and communications technology ICT is ubiquitous and many ICT devices and other components are interdependent therefore disruption of one component may have a negative cascading effect on others Cyber attacks might include denial of service theft or manipulation of data Damage to critical infrastructure through a cyber based attack could have a significant impact on the national security the economy and the livelihood and safety of many individual citizens Traditionally cyber security has generally been viewed as being focused on higher level threats such as those against the internet or the Federal government Little attention has been paid to cyber security at the state and local level However these governmental units play a critical

role in providing services to local residents and consequently are highly vulnerable to cyber threats The failure of these services such as waste water collection and water supply transportation public safety utility services and communication services would pose a great threat to the public Featuring contributions from leading experts in the field this volume is intended for state and local government officials and managers state and Federal officials academics and public policy **Principles of Cyber-Physical Systems** Sandip Roy, Sajal K. Das, 2020-10-15 This unique introduction to the foundational concepts of cyber physical systems CPS describes key design principles and emerging research trends in detail Several interdisciplinary applications are covered with a focus on the wide area management of infrastructures including electric power systems air transportation networks and health care systems Design control and optimization of cyber physical infrastructures are discussed addressing security and privacy issues of networked CPS presenting graph theoretic and numerical approaches to CPS evaluation and monitoring and providing readers with the knowledge needed to operate CPS in a reliable efficient and secure manner Exercises are included This is an ideal resource for researchers and graduate students in electrical engineering and computer science as well as for practitioners using cyber physical systems in aerospace and automotive engineering medical technology and large scale infrastructure operations **Cyber-Physical Systems: Architecture, Security and Application** Song Guo, Deze Zeng, 2018-09-20 This book provides an overview of recent innovations and achievements in the broad areas of cyber physical systems CPS including architecture networking systems applications security and privacy The book discusses various new CPS technologies from diverse aspects to enable higher level of innovation towards intelligent life The book provides insight to the future integration coordination and interaction between the physical world the information world and human beings The book features contributions from renowned researchers and engineers who discuss key issues from various perspectives presenting opinions and recent CPS related achievements Investigates how to advance the development of cyber physical systems Provides a joint consideration of other newly emerged technologies and concepts in relation to CPS like cloud computing big data fog computing and crowd sourcing Includes topics related to CPS such as architecture system networking application algorithm security and privacy

Homeland Security and Critical Infrastructure Protection Ryan K. Baggett, Brian K. Simpkins, 2018-07-11 A compelling overview of systems and strategies implemented to safeguard U S resources from a plethora of threats the vulnerabilities and security gaps in these infrastructure systems and options to enable the future security of the homeland Since the first edition of this book was published in 2009 significant changes have occurred in the security landscape both domestically and internationally This second edition is thoroughly updated to reflect those changes offering a complete review of the various security and resilience measures currently in place and potential strategies to safeguard life and property within the U S homeland As noted in the U S Department of Homeland Security s National Preparedness Goal the mission area of protection is vital to the homeland in its focus on actions to protect people vital interests and our nation s way

of life With that in mind this book discusses strategies such as risk analysis and assessment information sharing and continuity planning The authors focus on relevant and timely threats and hazards facing specific infrastructure components including but not limited to agriculture and food banking and finance water energy telecommunications and transportation The dynamic posture of critical infrastructure security and resilience CISR underscores the importance of an integrated layered all hazards approach In describing this approach the book includes new chapters on planning and guidance public and private partnerships cyber issues and threats and careers in infrastructure protection Additions such as discussion questions learning objectives and fundamental concepts for each chapter provide additional direction for instructors and Security and Privacy in Cyber-Physical Systems Houbing Song, Glenn A. Fink, Sabina Jeschke, 2017-09-11 Written by a team of experts at the forefront of the cyber physical systems CPS revolution this book provides an in depth look at security and privacy two of the most critical challenges facing both the CPS research and development community and ICT professionals It explores in depth the key technical social and legal issues at stake and it provides readers with the information they need to advance research and development in this exciting area Cyber physical systems CPS are engineered systems that are built from and depend upon the seamless integration of computational algorithms and physical components Advances in CPS will enable capability adaptability scalability resiliency safety security and usability far in excess of what today s simple embedded systems can provide Just as the Internet revolutionized the way we interact with information CPS technology has already begun to transform the way people interact with engineered systems In the years ahead smart CPS will drive innovation and competition across industry sectors from agriculture energy and transportation to architecture healthcare and manufacturing A priceless source of practical information and inspiration Security and Privacy in Cyber Physical Systems Foundations Principles and Applications is certain to have a profound impact on ongoing R D and education at the confluence of security privacy and CPS Cyber Security for Cyber Physical Systems Saqib Ali, Taiseera Al Balushi, Zia Nadir, Omar Khadeer Hussain, 2018-03-06 This book is a pioneering yet primary general reference resource on cyber physical systems and their security concerns Providing a fundamental theoretical background and a clear and comprehensive overview of security issues in the domain of cyber physical systems it is useful for students in the fields of information technology computer science or computer engineering where this topic is a substantial emerging Information Systems Security Venkata Ramana Badarla, Surya Nepal, Rudrapatna K. area of study Shyamasundar, 2022-12-10 This book constitutes the refereed proceedings of the 18th International Conference on Information Systems Security ICISS 2022 held in Tirupati India during December 16 20 2022 The 8 full papers and 5 short papers included in this book were carefully reviewed and selected from 55 submissions They were organized in topical sections as follows ostinato cross host attack correlation through attack activity similarity detection DKS PKI a distributed key server architecture for public keyinfrastructure generating set evaluation of bloom filter hardening techniques in

privaterecord linkage etc Industrial Cyber-Physical Systems Sascha Julian Oks, 2024-03-14 Cyber physical systems CPS are one of the key concepts of Industry 4 0 Despite their great potentials for industrial value creation there are challenges such as a significant increase in complexity as a result of which the development status of Industry 4 0 is behind expectations This book addresses this issue with the following research design In addition to providing a comprehensive foundation of industrial CPS and Industry 4.0 four studies are conducted each consisting of an exploratory research part and a design science research DSR part In doing so four perspectives are directed at the topic of industrial CPS A systemic a stakeholder centered an organizational and a holistic In conclusion the contributions are integrated in a summary and the artifacts are incorporated into an overarching methodological framework Thus theoretical contributions are derived and concrete practical recommendations for the main target groups of organizations educational institutions and international delegations provided **Digital Forensics and Cyber Crime** Joshua I. James, Frank Breitinger, 2015-10-02 This book constitutes the refereed proceedings of the 7th International Conference on Digital Forensics and Cyber Crime ICDF2C 2015 held in Seoul South Korea in October 2015 The 14 papers and 3 abstracts were selected from 40 submissions and cover diverse topics ranging from tactics of cyber crime investigations to digital forensic education network forensics and international cooperation in digital investigations **Guide to Automotive Connectivity and Cybersecurity** Dietmar P.F. Möller, Roland E. Haas, 2019-04-03 This comprehensive text reference presents an in depth review of the state of the art of automotive connectivity and cybersecurity with regard to trends technologies innovations and applications The text describes the challenges of the global automotive market clearly showing where the multitude of innovative activities fit within the overall effort of cutting edge automotive innovations and provides an ideal framework for understanding the complexity of automotive connectivity and cybersecurity Topics and features discusses the automotive market automotive research and development and automotive electrical electronic and software technology examines connected cars and autonomous vehicles and methodological approaches to cybersecurity to avoid cyber attacks against vehicles provides an overview on the automotive industry that introduces the trends driving the automotive industry towards smart mobility and autonomous driving reviews automotive research and development offering background on the complexity involved in developing new vehicle models describes the technologies essential for the evolution of connected cars such as cyber physical systems and the Internet of Things presents case studies on Car2Go and car sharing car hailing and ridesharing connected parking and advanced driver assistance systems includes review questions and exercises at the end of each chapter The insights offered by this practical guide will be of great value to graduate students academic researchers and professionals in industry seeking to learn about the advanced methodologies in automotive connectivity and cybersecurity Trafficking Data Aynne Kokas, 2023 In Trafficking Data Aynne Kokas looks at how technology firms in the two largest economies in the world the United States and China have exploited government policy and the lack thereof to gather information on citizens putting US

national security at risk Kokas shows how US corporations influence on tech regulation paved the way for exploitative data gathering not just by US corporations but by Chinese corporations as well To resolve this issue in the US requires changing foundational values not just in the tech ecosystem but in the relationship between industry and government in the United Encyclopedia of Cloud Computing San Murugesan, Irena Bojanova, 2016-05-09 The Encyclopedia of Cloud Computing provides IT professionals educators researchers and students with a compendium of cloud computing knowledge Authored by a spectrum of subject matter experts in industry and academia this unique publication in a single volume covers a wide range of cloud computing topics including technological trends and developments research opportunities best practices standards and cloud adoption Providing multiple perspectives it also addresses questions that stakeholders might have in the context of development operation management and use of clouds Furthermore it examines cloud computing s impact now and in the future The encyclopedia presents 56 chapters logically organized into 10 sections Each chapter covers a major topic area with cross references to other chapters and contains tables illustrations side bars as appropriate Furthermore each chapter presents its summary at the beginning and backend material references and additional resources for further information **Cryptoeconomics** Jing Li, Dusit Niyato, Zhu Han, 2023-11-16 The book offers a succinct overview of the technical components of blockchain networks also known as distributed digital ledger networks Written from an academic perspective it surveys ongoing research challenges as well as existing literature Several chapters illustrate how the mathematical tools of game theory and algorithmic mechanism design can be applied to the analysis design and improvement of blockchain network protocols Using an engineering perspective insights are provided into how the economic interests of different types of participants shape the behaviors of blockchain systems Readers are thus provided with a paradigm for developing blockchain consensus protocols and distributed economic mechanisms that regulate the interactions of system participants thus leading to desired cooperative behaviors in the form of system equilibria This book will be a vital resource for students and scholars of this budding field **Data Engineering and Applications** Jitendra Agrawal, Rajesh K. Shukla, Sanjeev Sharma, Chin-Shiuh Shieh, 2024-08-30 This book comprises select proceedings from the 4th International Conference on Data Engineering and Applications IDEA 2022 The contents discuss novel contributions and latest developments in the domains of data structures and data management algorithms information retrieval and information integration social data analytics IoT and data intelligence Industry 4 0 and digital manufacturing data fusion natural language processing geolocation handling image video and signal processing ICT applications and e governance among others This book is of interest to researchers in academia and industry working in big data data mining machine learning data science and their associated learning systems and applications Mobile and Wireless Technologies 2017 Kuinam J. Kim, Nikolai Joukov, 2017-06-14 This book gathers the proceedings of the 4th International Conference on Mobile and Wireless Technology ICMWT held in Kuala Lumpur Malaysia in June 2017 an event that provides researchers and

practitioners from both academia and industry with a platform to keep them abreast of cutting edge developments in the field The peer reviewed and accepted papers presented here address topics in a number of major areas Mobile Wireless Networks and Applications Security in Mobile and Wireless Mobile Data Management and Applications Mobile Software Multimedia Communications Wireless Communications and Services Application and Business **Information Security Applications** Kyung-Hyune Rhee, Jeong Hyun Yi, 2015-01-21 This book constitutes the thoroughly refereed proceedings of the 15th International Workshop on Information Security Applications WISA 2014 held on Jeju Island Korea in August 2014 The 30 revised full papers presented in this volume were carefully reviewed and selected from 69 submissions. The papers are organized in topical sections such as malware detection mobile security vulnerability analysis applied cryptography network security cryptography hardware security and critical infrastructure security and policy **Computer Security -- ESORICS** 2012 Sara Foresti, Moti Yung, Fabio Martinelli, 2012-08-19 This book constitutes the refereed proceedings of the 17th European Symposium on Computer Security ESORICS 2012 held in Pisa Italy in September 2012 The 50 papers included in the book were carefully reviewed and selected from 248 papers The articles are organized in topical sections on security and data protection in real systems formal models for cryptography and access control security and privacy in mobile and wireless networks counteracting man in the middle attacks network security users privacy and anonymity location privacy voting protocols and anonymous communication private computation in cloud systems formal security models identity based encryption and group signature authentication encryption key and password security malware and phishing and software security

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