

Protecting Industrial Control Systems From Electronic Threats By Joseph Weiss Published By Momentum Press 2010

The book, in addition to the cyber threats and technology, processes cyber security from many sides as a social phenomenon and how the implementation of the cyber security strategy is carried out. The book gives a profound idea of the most spoken phenomenon of this time. The book is suitable for a wide-ranging audience from graduate to professionals/practitioners and researchers. Relevant disciplines for the book are Telecommunications / Network security, Applied mathematics / Data analysis, Mobile systems / Security, Engineering / Security of critical infrastructure and Military science / Security.

This book constitutes revised selected papers from the 13th International Conference on Critical Information Infrastructures Security, CRITIS 2018, held in Kaunas, Lithuania, in September 2018. The 16 full papers and 3 short papers presented were carefully reviewed and selected from 61 submissions. They are grouped in the following topical sections: advanced analysis of critical energy systems, strengthening urban resilience, securing internet of things and industrial control systems, need and tool sets for industrial control system security, and advancements in governance and resilience of critical infrastructures.

This book, written by leaders in the protection field of critical infrastructures, provides an extended overview of the technological and operative advantages together with the security problems and challenges of the new paradigm of the Internet of Things in today's industry, also known as the Industry Internet of Things (IIoT). The incorporation of the new embedded technologies and the interconnected networking advances in the automation and monitoring processes, certainly multiplies the functional complexities of the underlying control system, whilst increasing security and privacy risks. The critical nature of the application context and its relevance for the well-being of citizens and their economy, attracts the attention of multiple, advanced attackers, with stealthy abilities to evade security policies, ex-filtrate information or exploit vulnerabilities. Some real-life events and registers in CERTs have already clearly demonstrated how the control industry can become vulnerable to multiple types of advanced threats whose focus consists in hitting the safety and security of the control processes. This book, therefore, comprises a detailed spectrum of research papers with highly analytical content and actuation procedures to cover the relevant security and privacy issues such as data protection, awareness, response and resilience, all of them working at optimal times. Readers will be able to comprehend the construction problems of the fourth industrial revolution and are introduced to effective, lightweight protection solutions which can be integrated as part of the new IIoT-based monitoring ecosystem.

Aimed at both the novice and expert in IT security and industrial control systems (ICS), this book will help readers gain a better understanding of protecting ICSs from electronic threats. Cyber security is getting much more attention and SCADA security (Supervisory Control and Data Acquisition) is a particularly important part of this field, as are Distributed Control Systems (DCS), Programmable Logic Controllers (PLCs), Remote Terminal Units (RTUs), Intelligent Electronic Devices (IEDs)-and all the other, field controllers, sensors, and drives, emission controls, and that make up the intelligence of modern industrial buildings and facilities. This book will help the reader better understand what is industrial control system cyber security, why is it different than IT security, what has really happened to date, and what needs to be done. Loads of practical advice is offered on everything from clarity on current cyber-security systems and how they can be integrated into general IT systems, to how to conduct risk assessments and how to obtain certifications, to future trends in legislative and regulatory issues affecting industrial security. Many people think of the Smart Grid as a power distribution group built on advanced smart metering—but that's just one aspect of a much larger and more complex system. The "Smart Grid" requires new technologies throughout energy generation, transmission and distribution, and even the homes and businesses being served by the grid. This also represents new information paths between these new systems and services, all of which represents risk, requiring a more thorough approach to where and how cyber security controls are implemented. This insight provides a detailed architecture of the entire Smart Grid, with recommended cyber security measures for everything from the supply chain to the consumer. Discover the potential of the Smart Grid Learn in depth about its systems See its vulnerabilities and how best to protect it

As a manager or engineer have you ever been assigned a task to perform a risk assessment of one of your facilities or plant systems? What if you are an insurance inspector or corporate auditor? Do you know how to prepare yourself for the inspection, decided what to look for, and how to write your report? This is a handbook for junior and senior personnel alike on what constitutes critical infrastructure and risk and offers guides to the risk assessor on preparation, performance, and documentation of a risk assessment of a complex facility. This is a definite "must read" for consultants, plant managers, corporate risk managers, junior and senior engineers, and university students before they jump into their first technical assignment.

Urban water and wastewater systems have an inherent vulnerability to both manmade and natural threats and disasters including droughts, earthquakes and terrorist attacks. It is well established that natural disasters including major storms, such as hurricanes and flooding, can effect water supply security and integrity. Earthquakes and terrorist attacks have many characteristics in common because they are almost impossible to predict and can cause major devastation and confusion. Terrorism is also a major threat to water security and recent attention has turned to the potential that these attacks have for disrupting urban water supplies. There is a need to introduce the related concept of Integrated Water Resources Management which emphasizes linkages between land-use change and hydrological systems, between ecosystems and human health, and between political and scientific aspects of water management. An expanded water security agenda should include a conceptual focus on vulnerability, risk, and resilience; an emphasis on threats, shocks, and tipping points; and a related emphasis on adaptive management given limited predictability. Internationally, concerns about water have often taken a different focus and there is also a growing awareness, including in the US, that water security should include issues related to quantity, climate change, and biodiversity impacts, in addition to terrorism. This presents contributions from a group of internationally recognized experts that attempt to address the four areas listed above and includes suggestions as to how to deal with related problems. It also addresses the new and potentially growing issue of cyber attacks against water and waste water infrastructure including descriptions of actual attacks, making it of interest to scholars and policy-makers concerned with protecting the water supply.

Critical Infrastructure Protection II describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. This book is the second volume in the annual series produced by the International Federation for Information Processing (IFIP)

Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of twenty edited papers from the Second Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection held at George Mason University, Arlington, Virginia, USA in the spring of 2008.

This book provides a comprehensive overview of the fundamental security of Industrial Control Systems (ICSs), including Supervisory Control and Data Acquisition (SCADA) systems and touching on cyber-physical systems in general. Careful attention is given to providing the reader with clear and comprehensive background and reference material for each topic pertinent to ICS security. This book offers answers to such questions as: Which specific operating and security issues may lead to a loss of efficiency and operation? What methods can be used to monitor and protect my system? How can I design my system to reduce threats? This book offers chapters on ICS cyber threats, attacks, metrics, risk, situational awareness, intrusion detection, and security testing, providing an advantageous reference set for current system owners who wish to securely configure and operate their ICSs. This book is appropriate for non-specialists as well. Tutorial information is provided in two initial chapters and in the beginnings of other chapters as needed. The book concludes with advanced topics on ICS governance, responses to attacks on ICS, and future security of the Internet of Things.

A chilling and revelatory appraisal of the new faces of espionage and warfare on the digital battleground Shortly after 9/11, Joel Brenner entered the inner sanctum of American espionage, first as the inspector general of the National Security Agency, then as the head of counterintelligence for the director of National Intelligence. He saw at close range the battleground on which adversaries are attacking us: cyberspace. Like the rest of us, governments and corporations inhabit "glass houses," all but transparent to a new generation of spies who operate remotely from such places as China, the Middle East, Russia, and even France. In this urgent wake-up call, Brenner draws on his extraordinary background to show what we can—and cannot—do to prevent cyber spies and hackers from compromising our security and stealing our latest technology.

The information infrastructure - comprising computers, embedded devices, networks and software systems - is vital to operations in every sector: chemicals, commercial facilities, communications, critical manufacturing, dams, defense industrial base, emergency services, energy, financial services, food and agriculture, government facilities, healthcare and public health, information technology, nuclear reactors, materials and waste, transportation systems, and water and wastewater systems. Global business and industry, governments, indeed society itself, cannot function if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection XI describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: Infrastructure Protection, Infrastructure Modeling and Simulation, Industrial Control System Security, and Internet of Things Security. This book is the eleventh volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of sixteen edited papers from the Eleventh Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at SRI International, Arlington, Virginia, USA in the spring of 2017. Critical Infrastructure Protection XI is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals with interests in homeland security.

Countering Cyber Sabotage: Introducing Consequence-Driven, Cyber-Informed Engineering (CCE) introduces a new methodology to help critical infrastructure owners, operators and their security practitioners make demonstrable improvements in securing their most important functions and processes. Current best practice approaches to cyber defense struggle to stop targeted attackers from creating potentially catastrophic results. From a national security perspective, it is not just the damage to the military, the economy, or essential critical infrastructure companies that is a concern. It is the cumulative, downstream effects from potential regional blackouts, military mission kills, transportation stoppages, water delivery or treatment issues, and so on. CCE is a validation that engineering first principles can be applied to the most important cybersecurity challenges and in so doing, protect organizations in ways current approaches do not. The most pressing threat is cyber-enabled sabotage, and CCE begins with the assumption that well-resourced, adaptive adversaries are already in and have been for some time, undetected and perhaps undetectable. Chapter 1 recaps the current and near-future states of digital technologies in critical infrastructure and the implications of our near-total dependence on them. Chapters 2 and 3 describe the origins of the methodology and set the stage for the more in-depth examination that follows. Chapter 4 describes how to prepare for an engagement, and chapters 5-8 address each of the four phases. The CCE phase chapters take the reader on a more granular walkthrough of the methodology with examples from the field, phase objectives, and the steps to take in each phase. Concluding chapter 9 covers training options and looks towards a future where these concepts are scaled more broadly.

The information infrastructure - comprising computers, embedded devices, networks and software systems - is vital to day-to-day operations in every sector: information and telecommunications, banking and finance, energy, chemicals and hazardous materials, agriculture, food, water, public health, emergency services, transportation, postal and shipping, government and defense. Global business and industry, governments, indeed society itself, cannot function effectively if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection VIII describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: control systems security, infrastructure security, infrastructure modeling and simulation, risk and impact assessment, and advanced techniques. This book is the eighth volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of seventeen edited papers from the 8th Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at SRI International, Arlington, Virginia, DC, USA in the spring of 2014. Critical Infrastructure Protection VIII is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals

with interests in homeland security.

The information infrastructure – comprising computers, embedded devices, networks and software systems – is vital to operations in every sector: chemicals, commercial facilities, communications, critical manufacturing, dams, defense industrial base, emergency services, energy, financial services, food and agriculture, government facilities, healthcare and public health, information technology, nuclear reactors, materials and waste, transportation systems, and water and wastewater systems. Global business and industry, governments, indeed society itself, cannot function if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection XII describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: Themes and Issues; Infrastructure Protection; Infrastructure Modeling and Simulation; Industrial Control Systems Security. This book is the twelfth volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of fifteen edited papers from the Twelfth Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at SRI International, Arlington, Virginia, USA in the spring of 2018. Critical Infrastructure Protection XII is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals with interests in homeland security.

The availability and security of many services we rely upon—including water treatment, electricity, healthcare, transportation, and financial transactions—are routinely put at risk by cyber threats. The Handbook of SCADA/Control Systems Security is a fundamental outline of security concepts, methodologies, and relevant information pertaining to the supervisory control and data acquisition (SCADA) systems and technology that quietly operate in the background of critical utility and industrial facilities worldwide. Divided into five sections, the book examines topics comprising functions within and throughout industrial control systems (ICS) environments. Topics include: Emerging trends and threat factors that plague the ICS security community Risk methodologies and principles that can be applied to safeguard and secure an automated operation Methods for determining events leading to a cyber incident, and methods for restoring and mitigating issues—including the importance of critical communications The necessity and reasoning behind implementing a governance or compliance program A strategic roadmap for the development of a secured SCADA/control systems environment, with examples Relevant issues concerning the maintenance, patching, and physical localities of ICS equipment How to conduct training exercises for SCADA/control systems The final chapters outline the data relied upon for accurate processing, discusses emerging issues with data overload, and provides insight into the possible future direction of ISC security. The book supplies crucial information for securing industrial automation/process control systems as part of a critical infrastructure protection program. The content has global applications for securing essential governmental and economic systems that have evolved into present-day security nightmares. The authors present a "best practices" approach to securing business management environments at the strategic, tactical, and operational levels.

The information infrastructure - comprising computers, embedded devices, networks and software systems - is vital to day-to-day operations in every sector: information and telecommunications, banking and finance, energy, chemicals and hazardous materials, agriculture, food, water, public health, emergency services, transportation, postal and shipping, government and defense. Global business and industry, governments, indeed society itself, cannot function effectively if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection VII describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: themes and issues; control systems security; infrastructure security; infrastructure modeling and simulation; and risk assessment. This book is the seventh volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of fifteen edited papers from the Seventh Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at George Washington University, Washington, DC, USA in the spring of 2013. Critical Infrastructure Protection VII is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals with interests in homeland security. Jonathan Butts is an Assistant Professor of Computer Science at the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, USA. Sujeet Shenoj is the F.P. Walter Professor of Computer Science and a Professor of Chemical Engineering at the University of Tulsa, Tulsa, Oklahoma, USA.

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IT-SEC protects the information. SEC-OT protects physical, industrial operations from information, more specifically from attacks embedded in information. When the consequences of compromise are unacceptable ? unscheduled downtime, impaired product quality and damaged equipment ? software-based IT-SEC defences are not enough. Secure Operations Technology (SEC-OT) is a perspective, a methodology, and a set of best practices used at secure industrial sites. SEC-OT demands cyber-physical protections - because all software can be compromised. SEC-OT strictly controls the flow of information ? because all information can encode attacks. SEC-OT uses a wide range of attack capabilities to determine the strength of security postures - because nothing is secure. This book documents the Secure Operations Technology approach, including physical offline and online protections against cyber attacks and a set of twenty standard cyber-attack patterns to use in risk assessments.

This comprehensive handbook covers fundamental security concepts, methodologies, and relevant information pertaining to supervisory control and data acquisition (SCADA) and other industrial control systems used in utility and industrial facilities worldwide. A community-based effort, it collects differing expert perspectives, ideas, and attitudes r

This book provides profound insights into industrial control system resilience, exploring fundamental and advanced topics and including practical examples and scenarios to support the theoretical approaches. It examines issues related to the safe operation of control systems, risk analysis and assessment, use of attack graphs to evaluate the resiliency of control systems, preventive maintenance, and malware

detection and analysis. The book also discusses sensor networks and Internet of Things devices. Moreover, it covers timely responses to malicious attacks and hazardous situations, helping readers select the best approaches to handle such unwanted situations. The book is essential reading for engineers, researchers, and specialists addressing security and safety issues related to the implementation of modern industrial control systems. It is also a valuable resource for students interested in this area.

This book presents the latest trends in attacks and protection methods of Critical Infrastructures. It describes original research models and applied solutions for protecting major emerging threats in Critical Infrastructures and their underlying networks. It presents a number of emerging endeavors, from newly adopted technical expertise in industrial security to efficient modeling and implementation of attacks and relevant security measures in industrial control systems; including advancements in hardware and services security, interdependency networks, risk analysis, and control systems security along with their underlying protocols. Novel attacks against Critical Infrastructures (CI) demand novel security solutions. Simply adding more of what is done already (e.g. more thorough risk assessments, more expensive Intrusion Prevention/Detection Systems, more efficient firewalls, etc.) is simply not enough against threats and attacks that seem to have evolved beyond modern analyses and protection methods. The knowledge presented here will help Critical Infrastructure authorities, security officers, Industrial Control Systems (ICS) personnel and relevant researchers to (i) get acquainted with advancements in the field, (ii) integrate security research into their industrial or research work, (iii) evolve current practices in modeling and analyzing Critical Infrastructures, and (iv) moderate potential crises and emergencies influencing or emerging from Critical Infrastructures.

Currently, the international cybersecurity environment is tense. While until recently, cyber threats were considered primarily in relation to the theft of confidential information and extortion, governments are now increasingly talking about cyber weapons and the possibility of physical damage to critical infrastructure. This can be achieved by attacking industrial control systems (ICS) that connect the world of information technology and real industrial processes. Traditionally, systems of this class were poorly protected from cyber threats, or not protected at all, which now puts entire industries at risk. This paper discusses practical issues of ICS protection and in particular, issues related to the design of secure ICS architectures.

As the sophistication of cyber-attacks increases, understanding how to defend critical infrastructure systems—energy production, water, gas, and other vital systems—becomes more important, and heavily mandated. Industrial Network Security, Second Edition arms you with the knowledge you need to understand the vulnerabilities of these distributed supervisory and control systems. The book examines the unique protocols and applications that are the foundation of industrial control systems, and provides clear guidelines for their protection. This how-to guide gives you thorough understanding of the unique challenges facing critical infrastructures, new guidelines and security measures for critical infrastructure protection, knowledge of new and evolving security tools, and pointers on SCADA protocols and security implementation. All-new real-world examples of attacks against control systems, and more diagrams of systems Expanded coverage of protocols such as 61850, Ethernet/IP, CIP, ISA-99, and the evolution to IEC62443 Expanded coverage of Smart Grid security New coverage of signature-based detection, exploit-based vs. vulnerability-based detection, and signature reverse engineering

The information infrastructure—comprising computers, embedded devices, networks and software systems—is vital to day-to-day operations in every sector: information and telecommunications, banking and finance, energy, chemicals and hazardous materials, agriculture, food, water, public health, emergency services, transportation, postal and shipping, government and defense. Global business and industry, governments, indeed society itself, cannot function effectively if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: Themes and Issues, Control Systems Security, Cyber-Physical Systems Security, Infrastructure Security, Infrastructure Modeling and Simulation, Risk and Impact Assessment. This book is the ninth volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of nineteen edited papers from the Ninth Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at SRI International, Arlington, Virginia, USA in the spring of 2015. Critical Infrastructure Protection IX is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals with interests in homeland security. Mason Rice is an Assistant Professor of Computer Science at the Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, USA. Sujeet Shenoj is the F.P. Walter Professor of Computer Science and a Professor of Chemical Engineering at the University of Tulsa, Tulsa, Oklahoma, USA.

How to manage the cybersecurity of industrial systems is a crucial question. To implement relevant solutions, the industrial manager must have a clear understanding of IT systems, of communication networks and of control-command systems. They must also have some knowledge of the methods used by attackers, of the standards and regulations involved and of the available security solutions. Cybersecurity of Industrial Systems presents these different subjects in order to give an in-depth overview and to help the reader manage the cybersecurity of their installation. The book addresses these issues for both classic SCADA architecture systems and Industrial Internet of Things (IIoT) systems. Your one-step guide to understanding industrial cyber security, its control systems, and its operations. About This Book Learn about endpoint protection such as anti-malware implementation, updating, monitoring, and sanitizing user workloads and mobile devices Filled with practical examples to help you secure critical infrastructure systems efficiently A step-by-step guide that will teach you the techniques and methodologies of building robust infrastructure systems Who This Book Is For If you are a security professional and want to ensure a robust environment for critical infrastructure systems, this book is for you. IT professionals interested in getting into the cyber security domain or who are looking at gaining industrial cyber security certifications will also find this book useful. What You Will Learn Understand industrial cybersecurity, its control systems and operations Design security-oriented architectures, network segmentation, and security support services Configure event monitoring systems, anti-malware applications, and endpoint security Gain knowledge of ICS risks, threat detection, and access management Learn about patch management and life cycle management Secure your industrial control systems from design through retirement In Detail With industries expanding, cyber attacks have increased significantly. Understanding your control system's vulnerabilities and learning techniques to defend critical infrastructure systems from cyber threats is increasingly important. With the help of real-world use cases, this book will teach you the methodologies and security measures necessary to protect critical infrastructure systems and will get you up to speed with identifying unique challenges. Industrial cybersecurity begins by introducing Industrial Control System (ICS) technology, including ICS architectures, communication media, and protocols. This is followed by a

presentation on ICS (in) security. After presenting an ICS-related attack scenario, securing of the ICS is discussed, including topics such as network segmentation, defense-in-depth strategies, and protective solutions. Along with practical examples for protecting industrial control systems, this book details security assessments, risk management, and security program development. It also covers essential cybersecurity aspects, such as threat detection and access management. Topics related to endpoint hardening such as monitoring, updating, and anti-malware implementations are also discussed. Style and approach A step-by-step guide to implement Industrial Cyber Security effectively.

Discover modern tactics, techniques, and procedures for pentesting industrial control systems Key Features Become well-versed with offensive ways of defending your industrial control systems Learn about industrial network protocols, threat hunting, Active Directory compromises, SQL injection, and much more Build offensive and defensive skills to combat industrial cyber threats Book Description The industrial cybersecurity domain has grown significantly in recent years. To completely secure critical infrastructure, red teams must be employed to continuously test and exploit the security integrity of a company's people, processes, and products. This pentesting book takes a slightly different approach than most by helping you to gain hands-on experience with equipment that you'll come across in the field. This will enable you to understand how industrial equipment interacts and operates within an operational environment. You'll start by getting to grips with the basics of industrial processes, and then see how to create and break the process, along with gathering open source intel to create a threat landscape for your potential customer. As you advance, you'll find out how to install and utilize offensive techniques used by professional hackers. Throughout the book, you'll explore industrial equipment, port and service discovery, pivoting, and much more, before finally launching attacks against systems in an industrial network. By the end of this penetration testing book, you'll not only understand how to analyze and navigate the intricacies of an industrial control system (ICS), but you'll also have developed essential offensive and defensive skills to proactively protect industrial networks from modern cyberattacks. What you will learn Set up a starter-kit ICS lab with both physical and virtual equipment Perform open source intel-gathering pre-engagement to help map your attack landscape Get to grips with the Standard Operating Procedures (SOPs) for penetration testing on industrial equipment Understand the principles of traffic spanning and the importance of listening to customer networks Gain fundamental knowledge of ICS communication Connect physical operational technology to engineering workstations and supervisory control and data acquisition (SCADA) software Get hands-on with directory scanning tools to map web-based SCADA solutions Who this book is for If you are an ethical hacker, penetration tester, automation engineer, or IT security professional looking to maintain and secure industrial networks from adversaries, this book is for you. A basic understanding of cybersecurity and recent cyber events will help you get the most out of this book.

This book constitutes the refereed proceedings of the First Conference on Cybersecurity of Industrial Control Systems, CyberICS 2015, and the First Workshop on the Security of Cyber Physical Systems, WOS-CPS 2015, held in Vienna, Austria, in September 2015 in conjunction with ESORICS 2015, the 20th annual European Symposium on Research in Computer Security. The 6 revised full papers and 2 short papers of CyberICS 2015 presented together with 3 revised full papers of WOS-CPS 2015 were carefully reviewed and selected from 28 initial submissions. CyberICS 2015 focuses on topics covering ICSs, including cyber protection and cyber defense of SCADA systems, plant control systems, engineering workstations, substation equipment, programmable logic controllers, PLCs, and other industrial control system. WOS-CPS 2015 deals with the Security of Cyber Physical Systems, that exist everywhere around us, and range in size, complexity and criticality, from embedded systems used in smart vehicles, to SCADA systems in smart grids to control systems in water distribution systems, to smart transportation systems etc.

This book provides a comprehensive overview of the key concerns as well as research challenges in designing secure and resilient Industrial Control Systems (ICS). It will discuss today's state of the art security architectures and couple it with near and long term research needs that compare to the baseline. It will also establish all discussions to generic reference architecture for ICS that reflects and protects high consequence scenarios. Significant strides have been made in making industrial control systems secure. However, increasing connectivity of ICS systems with commodity IT devices and significant human interaction of ICS systems during its operation regularly introduces newer threats to these systems resulting in ICS security defenses always playing catch-up. There is an emerging consensus that it is very important for ICS missions to survive cyber-attacks as well as failures and continue to maintain a certain level and quality of service. Such resilient ICS design requires one to be proactive in understanding and reasoning about evolving threats to ICS components, their potential effects on the ICS mission's survivability goals, and identify ways to design secure resilient ICS systems. This book targets primarily educators and researchers working in the area of ICS and Supervisory Control And Data Acquisition (SCADA) systems security and resiliency. Practitioners responsible for security deployment, management and governance in ICS and SCADA systems would also find this book useful. Graduate students will find this book to be a good starting point for research in this area and a reference source.

The Smart Grid security ecosystem is complex and multi-disciplinary, and relatively under-researched compared to the traditional information and network security disciplines. While the Smart Grid has provided increased efficiencies in monitoring power usage, directing power supplies to serve peak power needs and improving efficiency of power delivery, the Smart Grid has also opened the way for information security breaches and other types of security breaches. Potential threats range from meter manipulation to directed, high-impact attacks on critical infrastructure that could bring down regional or national power grids. It is essential that security measures are put in place to ensure that the Smart Grid does not succumb to these threats and to safeguard this critical infrastructure at all times. Dr. Florian Skopik is one of the leading researchers in Smart Grid security, having organized and led research consortia and panel discussions in this field. Smart Grid Security will provide the first truly holistic view of leading edge Smart Grid security research. This book does not focus on vendor-specific solutions, instead providing a complete presentation of forward-looking research in all

areas of Smart Grid security. The book will enable practitioners to learn about upcoming trends, scientists to share new directions in research, and government and industry decision-makers to prepare for major strategic decisions regarding implementation of Smart Grid technology. Presents the most current and leading edge research on Smart Grid security from a holistic standpoint, featuring a panel of top experts in the field. Includes coverage of risk management, operational security, and secure development of the Smart Grid. Covers key technical topics, including threat types and attack vectors, threat case studies, smart metering, smart home, e- mobility, smart buildings, DERs, demand response management, distribution grid operators, transmission grid operators, virtual power plants, resilient architectures, communications protocols and encryption, as well as physical security.

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A practical guide to deploying digital forensic techniques in response to cyber security incidents About This Book Learn incident response fundamentals and create an effective incident response framework Master forensics investigation utilizing digital investigative techniques Contains real-life scenarios that effectively use threat intelligence and modeling techniques Who This Book Is For This book is targeted at Information Security professionals, forensics practitioners, and students with knowledge and experience in the use of software applications and basic command-line experience. It will also help professionals who are new to the incident response/digital forensics role within their organization. What You Will Learn Create and deploy incident response capabilities within your organization Build a solid foundation for acquiring and handling suitable evidence for later analysis Analyze collected evidence and determine the root cause of a security incident Learn to integrate digital forensic techniques and procedures into the overall incident response process Integrate threat intelligence in digital evidence analysis Prepare written documentation for use internally or with external parties such as regulators or law enforcement agencies In Detail Digital Forensics and Incident Response will guide you through the entire spectrum of tasks associated with incident response, starting with preparatory activities associated with creating an incident response plan and creating a digital forensics capability within your own organization. You will then begin a detailed examination of digital forensic techniques including acquiring evidence, examining volatile memory, hard drive assessment, and network-based evidence. You will also explore the role that threat intelligence plays in the incident response process. Finally, a detailed section on preparing reports will help you prepare a written report for use either internally or in a courtroom. By the end of the book, you will have mastered forensic techniques and incident response and you will have a solid foundation on which to increase your ability to investigate such incidents in your organization. Style and approach The book covers practical scenarios and examples in an enterprise setting to give you an understanding of how digital forensics integrates with the overall response to cyber security incidents. You will also learn the proper use of tools and techniques to investigate common cyber security incidents such as malware infestation, memory analysis, disk analysis, and network analysis.

The information infrastructure - comprising computers, embedded devices, networks and software systems - is vital to day-to-day operations in every sector: information and telecommunications, banking and finance, energy, chemicals and hazardous materials, agriculture, food, water, public health, emergency services, transportation, postal and shipping, government and defense. Global business and industry, governments, indeed society itself, cannot function effectively if major components of the critical information infrastructure are degraded, disabled or destroyed. Critical Infrastructure Protection describes original research results and innovative applications in the interdisciplinary field of critical infrastructure protection. Also, it highlights the importance of weaving science, technology and policy in crafting sophisticated, yet practical, solutions that will help secure information, computer and network assets in the various critical infrastructure sectors. Areas of coverage include: themes and issues; control systems security; infrastructure modeling and simulation; risk and impact assessment. This book is the tenth volume in the annual series produced by the International Federation for Information Processing (IFIP) Working Group 11.10 on Critical Infrastructure Protection, an international community of scientists, engineers, practitioners and policy makers dedicated to advancing research, development and implementation efforts focused on infrastructure protection. The book contains a selection of fourteen edited papers from the Tenth Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, held at SRI International, Arlington, Virginia, USA in the spring of 2016. Critical Infrastructure Protection is an important resource for researchers, faculty members and graduate students, as well as for policy makers, practitioners and other individuals with interests in homeland security.

Version 1.0. This guidebook provides information for enhancing the security of Supervisory Control and Data Acquisition Systems (SCADA) and Industrial Control Systems (ICS). The information is a comprehensive overview of industrial control system security, including administrative controls, architecture design, and security technology. This is a guide for enhancing security, not a how-to manual for building an ICS, and its purpose is to teach ICS managers, administrators, operators, engineers, and other ICS staff what security concerns they should be taking into account. Other related products: National Response Framework, 2008 is available here: <https://bookstore.gpo.gov/products/sku/064-000-00044-6> National Strategy for Homeland Security (October 2007) is available here: <https://bookstore.gpo.gov/products/sku/041-001-00657-5> New Era of Responsibility: Renewing America's Promise can be found here: <https://bookstore.gpo.gov/products/sku/041-001-00660-5>

The increased use of technology is necessary in order for industrial control systems to maintain and monitor industrial, infrastructural, or environmental processes. The need to secure and identify threats to the system is equally critical. Securing Critical Infrastructures and Critical Control Systems: Approaches for Threat Protection provides a full and detailed understanding of the vulnerabilities and security threats that exist within an industrial control system. This collection of research defines and analyzes the technical, procedural, and managerial responses to securing these systems.

In today's modernized market, many fields are utilizing internet technologies in their everyday methods of operation. The industrial sector is no different as these technological solutions have provided several benefits including reduction of costs, scalability, and efficiency improvements. Despite this, cyber security remains a crucial risk factor in industrial control systems. The same public and corporate solutions do not apply to this specific district because these security issues are more complex and intensive. Research is needed that explores new risk assessment methods and security mechanisms that professionals can apply to their

modern technological procedures. Cyber Security of Industrial Control Systems in the Future Internet Environment is a pivotal reference source that provides vital research on current security risks in critical infrastructure schemes with the implementation of information and communication technologies. While highlighting topics such as intrusion detection systems, forensic challenges, and smart grids, this publication explores specific security solutions within industrial sectors that have begun applying internet technologies to their current methods of operation. This book is ideally designed for researchers, system engineers, managers, networkers, IT professionals, analysts, academicians, and students seeking a better understanding of the key issues within securing industrial control systems that utilize internet technologies.

As industrial control systems (ICS), including SCADA, DCS, and other process control networks, become Internet-facing, they expose crucial services to attack. Threats like Duqu, a sophisticated worm found in the wild that appeared to share portions of its code with the Stuxnet worm, emerge with increasing frequency. Explaining how to develop and implement an effective cybersecurity program for ICS, Cybersecurity for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS provides you with the tools to ensure network security without sacrificing the efficiency and functionality of ICS. Highlighting the key issues that need to be addressed, the book begins with a thorough introduction to ICS. It discusses business, cost, competitive, and regulatory drivers and the conflicting priorities of convergence. Next, it explains why security requirements differ from IT to ICS. It differentiates when standard IT security solutions can be used and where SCADA-specific practices are required. The book examines the plethora of potential threats to ICS, including hi-jacking malware, botnets, spam engines, and porn dialers. It outlines the range of vulnerabilities inherent in the ICS quest for efficiency and functionality that necessitates risk behavior such as remote access and control of critical equipment. Reviewing risk assessment techniques and the evolving risk assessment process, the text concludes by examining what is on the horizon for ICS security, including IPv6, ICSv6 test lab designs, and IPv6 and ICS sensors.

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