Cyber Warfare Building The Scientific Foundation Advances In Information Security

This book is a multi-disciplinary analysis of cyber warfare, featuring contributions by leading experts from a mixture of academic and professional backgrounds. Cyber warfare, meaning interstate cyber aggression, is an increasingly important emerging phenomenon in international relations, with state-orchestrated (or apparently state-orchestrated) computer network attacks occurring in Estonia (2007), Georgia (2008) and Iran (2010). This method of waging warfare – given its potential to, for example, make planes fall from the sky or cause nuclear power plants to melt down – has the capacity to be as devastating as any conventional means of conducting armed conflict. Every state in the world now has a cyber-defence programme and over 120 states also have a cyber-attack programme. While the amount of literature on cyber warfare is growing within disciplines, our understanding of the subject has been limited by a lack of cross-disciplinary engagement. In response, this book, drawn from the fields of computer science, military strategy, international law, political science and military ethics, provides a critical overview of cyber warfare for those approaching the topic from whatever angle. Chapters consider the emergence of the phenomena of cyber warfare in international affairs; what cyber-attacks are from a technological standpoint; the extent to which cyber-attacks can be attributed to state actors; the strategic value and danger posed by cyber conflict; the legal regulation of cyber-attacks, both as international uses of force and as part of an on-going armed conflict, and the ethical implications of cyber warfare. This book will be of great interest to students of cyber warfare, cyber security, military ethics, international law, security studies and IR in general.

This book offers an introduction to Information Technology with regard to peace, conflict, and security research, a topic that it approaches from natural science, technical and computer science perspectives. Following an initial review of the fundamental roles of IT in connection with peace, conflict and security, the contributing authors address the rise of cyber conflicts via information warfare, cyber espionage, cyber defence and Darknets. The book subsequently explores recent examples of cyber warfare, including: • The Stuxnet attack on Iran's uranium refining capability • The hacking of the German Federal Parliament's internal communication system • The Wannacry malware campaign, which used software stolen from a US security agency to launch ransomware attacks worldwide The book then introduces readers to the concept of cyber peace, including a discussion of confidence and security-building measures. A section on Cyber Arms Control draws comparisons to global efforts to control chemical warfare, to reduce the risk of nuclear war, and to prevent the militarization of space. Additional topics include the security of critical information infrastructures, and cultural violence and peace in social media. The book concludes with an outlook on the future role of IT in peace and security. Information Technology for Peace and Security breaks new ground in a largely unexplored field of study, and offers a valuable asset for a broad readership including students, educators and working professionals in computer science, IT security, peace and conflict studies, and political science.

This book constitutes the refereed post-conference proceedings of the Second International Conference on Cyber Security and Computer Science, ICONCS 2020, held in Dhaka, Bangladesh, in February 2020. The 58 full papers were carefully reviewed and selected from 133 submissions. The papers detail new ideas, inventions, and application experiences to cyber security systems. They are organized in topical sections on optimization problems; image steganography and risk analysis on web applications; machine learning in disease diagnosis and monitoring; computer vision and image processing in health care; text and speech processing; machine learning in health care; blockchain applications; computer vision and image processing in health care; malware analysis; computer vision; future technology applications; computer networks; machine learning on imbalanced data; computer security; Bangla language processing.

These proceedings represent the work of contributors to the 16th International Conference on Cyber Warfare and Security (ICCWS 2021), hosted by joint collaboration of Tennessee Tech Cybersecurity Education, Research and Outreach Center (CEROC), Computer Science department and the Oak Ridge National Laboratory, Tennessee on 25-26 February 2021. The Conference Co-Chairs are Dr. Juan Lopez Jr, Oak Ridge National Laboratory, Tennessee, and Dr. Ambareen Siraj, Tennessee Tech's Cybersecurity Education, Research and Outreach Center (CEROC), and the Program Chair is Dr. Kalyan Perumalla, from Oak Ridge National Laboratory, Tennessee.

This companion provides the most comprehensive and up-to-date comparative overview of the cyber-security strategies and doctrines of the major states and actors in Europe, North America, South America, Africa, and Asia. The volume offers an introduction to each nation's cyber-security strategy and policy, along with a list of resources in English that may be consulted for those wishing to go into greater depth. Each chapter is written by a leading academic or policy specialist, and contains the following sections: overview of national cyber-security strategy; concepts and definitions; exploration of cyber-security issues as they relate to international law and governance; critical examinations of cyber partners at home and abroad; legislative developments and processes; dimensions of cybercrime and cyberterrorism; implications of cyber-security policies and strategies. This book will be of much interest to students and practitioners in the fields of cyber-security, national security, strategic studies, foreign policy, and international relations.

This textbook surveys the knowledge base in automated and resilient cyber deception. It features four major parts: cyber deception reasoning frameworks, dynamic decision-making for cyber deception, network-based deception, and malware deception. An important distinguishing characteristic of this book is its inclusion of student exercises at the end of each chapter. Exercises include technical problems, short-answer discussion questions, or hands-on lab exercises, organized at a range of difficulties from easy to advanced,. This is a useful textbook for a wide range of classes and degree levels within the security arena and other related topics. It's also suitable for researchers and practitioners with a variety of cyber security backgrounds from novice to experienced.

This definitive reference resource on cyber warfare covers all aspects of this headline topic, providing historical context of cyber warfare and an examination its rapid development into a potent technological weapon of the 21st century. • Provides comprehensive coverage of the major individuals, organizations, impacts, and issues related to cyber warfare that enables readers to better understanding of the impact of cyber warfare on modern conflicts • Includes a detailed chronology that documents the evolution and use of cyber warfare over the past few decades • Supplies further readings and a lengthy bibliography that offer a wealth of options to students conducting extensive research on the subject

This volume addresses context from three comprehensive perspectives: first, its importance, the issues surrounding context, and its value in the laboratory and the field; second, the theory guiding the AI used to model its context; and third, its applications in the field (e.g., decision-making). This breadth poses a challenge. The book analyzes how the environment (context) influences human perception, cognition and action. While current books approach context narrowly, the major contribution of this book is to provide an in-depth review over a broad range of topics for a computational context no matter its breadth. The volume outlines numerous strategies and techniques from world-class scientists who have adapted their research to solve different problems with AI, in difficult environments and complex domains to address the many computational challenges posed by context. Context can be clear, uncertain or an illusion. Clear contexts: A father praising his child; a trip to the post office to buy stamps; a policewoman asking for identification. Uncertain contexts: A sneak attack; a surprise witness in a courtroom; a shout of "Fire! Fire!" Contexts as illusion: Humans fall prey to illusions that machines do not (Adelson's checkerboard illusion versus a photometer). Determining context is not easy when disagreement exists, interpretations vary, or uncertainty reigns. Physicists like Einstein (relativity), Bekenstein (holographs) and Rovelli (universe) have written that reality is not what we commonly believe. Even outside of awareness, individuals act differently whether alone or in teams. Can computational context with AI adapt to clear and uncertain contexts, to change over time, and to individuals, machines or robots as well as to teams? If a program automatically "knows" the context that improves performance or decisions, does it matter whether context is clear, uncertain or illusory? Written and edited by world class leaders from across the field of autonomous systems research, this volume carefully considers the computational systems being constructed to determine context for individual agents or teams, the challenges they face, and the advances they expect for the science of context.

This book explores the political process behind the construction of cyber-threats as one of the quintessential security threats of modern times in the US. Myriam Dunn Cavelty posits that cyber-threats are definable by their unsubstantiated nature. Despite this, they have been propelled to the forefront of the political agenda. Using an innovative theoretical approach, this book examines how, under what conditions, by whom, for what reasons, and with what impact cyber-threats have been moved on to the political agenda. In particular, it analyses how governments have used threat frames, specific interpretive schemata about what counts as a threat or risk and how to respond to this threat. By approaching this subject from a security studies angle, this book closes a gap between practical and theoretical academic approaches. It also contributes to the more general debate about changing practices of national security and their implications for the international community.

The primary function of the intelligence analyst is to make sense of information about the world, but the way analysts do that work will look profoundly different a decade from now. Technological changes will bring both new advances in conducting analysis and new risks related to technologically based activities and communications around the world. Because these changes are virtually inevitable, the Intelligence Community will need to make sustained collaboration with researchers in the social and behavioral sciences (SBS) a key priority if it is to adapt to these changes in the most productive ways. A Decadal Survey Of The Social and Behavioral Sciences provides guidance for a 10-year research agenda. This report identifies key opportunities in SBS research for strengthening intelligence analysis and offers ideas for integrating the knowledge and perspectives of researchers from these fields into the planning and design of efforts to support intelligence analysis.

Cyber Warfare Techniques, Tactics and Tools for Security Practitioners provides a comprehensive look at how and why digital warfare is waged. This book explores the participants, battlefields, and the tools and techniques used during today's digital conflicts. The concepts discussed will give students of information security a better idea of how cyber conflicts are carried out now, how they will change in the future, and how to detect and defend against espionage, hacktivism, insider threats and non-state actors such as organized criminals and terrorists. Every one of our systems is under attack from multiple vectors - our defenses must be ready all the time and our alert systems must detect the threats every time. This book provides concrete examples and real-world guidance on how to identify and defend a network against malicious attacks. It considers relevant technical and factual information from an insider's point of view, as well as the ethics, laws and consequences of cyber war and how computer criminal law may change as a result. Starting with a definition of cyber warfare, the book’s 15 chapters discuss the following topics: the cyberspace battlefield; cyber doctrine; cyber warriors; logical, physical, and psychological weapons; computer network exploitation; computer network attack and defense; non-state actors in computer network operations; legal system impacts; ethics in cyber warfare; cyberspace challenges; and the future of cyber war. This book is a valuable resource to those involved in cyber warfare activities, including policymakers, penetration testers, security professionals, network and systems administrators, and college instructors. The information provided on cyber tactics and attacks can also be used to assist in developing improved and more efficient procedures and technical defenses. Managers will find the text useful in improving the overall risk management strategies for their organizations. Provides concrete examples and real-world guidance on how to identify and defend your network against malicious attacks Dives deeply into relevant technical and factual information from an insider's point of view Details the ethics, laws and consequences of cyber war and how computer criminal law may change as a result

This textbook offers an accessible introduction to the historical, technical, and strategic context of cyber conflict. The international relations, policy, doctrine, strategy, and operational issues associated with computer network attack, computer network exploitation, and computer network defense are collectively referred to as cyber warfare. This new textbook provides students with a comprehensive perspective on the technical, strategic, and policy issues associated with cyber conflict as well as an introduction to key state and non-state actors. Specifically, the book provides a comprehensive overview of these key issue areas: the historical emergence and evolution of cyber warfare, including the basic characteristics and methods of computer network attack, exploitation, and defense; a theoretical set of perspectives on conflict in the digital age from the point of view of international relations (IR) and the security studies field; the current national perspectives, policies, doctrines, and strategies relevant to cyber warfare; and an examination of key challenges in international law, norm development, and the potential impact of cyber warfare on future international conflicts. This book will be of much interest to students of cyber conflict and other forms of digital warfare, security studies, strategic studies, defense policy, and, most broadly, international relations.

Intelligence-Led Security: How to Understand, Justify and Implement a New Approach to Security is a concise review of the concept of Intelligence-Led Security. Protecting a business, including its information and intellectual property, physical infrastructure, employees, and reputation, has become increasingly difficult. Online threats come from all sides: internal leaks and external adversaries; domestic hacktivists and overseas cybercrime syndicates; targeted threats and mass attacks. And these threats run the gamut from targeted to indiscriminate to entirely accidental. Among thought leaders and advanced organizations, the consensus is now clear. Defensive security measures: antivirus software, firewalls, and other technical controls and post-attack mitigation strategies are no longer sufficient. To adequately protect company assets and ensure business continuity, organizations must be more proactive. Increasingly, this proactive stance is being summarized by the phrase Intelligence-Led Security: the use of data to gain insight into what can happen, who is likely to be involved, how they are likely to attack and, if possible, to predict when attacks are likely to come. In this book, the authors review the current threat-scape and why it requires this new approach, offer a clarifying definition of what Cyber Threat Intelligence is, describe how to communicate its value to business, and lay out concrete steps toward implementing Intelligence-Led Security. Learn how to create a proactive strategy for digital security Use data analysis and threat forecasting to predict and prevent attacks before they start Understand the fundamentals of today's threatscape and how best to organize your defenses

The Oxford Handbook of Cyber Security presents forty-eight chapters examining the technological, economic, commercial, and strategic aspects of cyber security, including studies at the international, regional, amd national level.

In the past few years, with the evolution of advanced persistent threats and mutation techniques, sensitive and damaging information from a variety of sources have been exposed to possible corruption and hacking. Machine learning, artificial intelligence, predictive analytics, and similar disciplines of cognitive science applications have been found to have significant applications in the domain of cyber security. Machine Learning and Cognitive Science Applications in Cyber Security examines different applications of cognition that can be used to detect threats and analyze data to capture malware. Highlighting such topics as anomaly detection, intelligent platforms, and triangle scheme, this publication is designed for IT specialists, computer engineers, researchers, academicians, and industry professionals interested in the impact of machine learning in cyber security and the methodologies that can help improve the performance and reliability of machine learning applications.

This book constitutes the proceedings of the Third International Conference on Science of Cyber Security, SciSec 2021, held in Shanghai, China, in August 2021. The 17 full papers and 5 short papers presented in this volume were carefully reviewed and selected from 50 submissions. These papers cover the following subjects: Cyber Security, Detection, Machine Learning and much more.

This book investigates the goals and policy aspects of cyber security education in the light of escalating technical, social and geopolitical challenges. The past ten years have seen a tectonic shift in the significance of cyber security education.

Once the preserve of small groups of dedicated educators and industry professionals, the subject is now on the frontlines of geopolitical confrontation and business strategy. Global shortages of talent have created pressures on corporate and national policy for workforce development. Cyber Security Education offers an updated approach to the subject as we enter the next decade of technological disruption and political threats. The contributors include scholars and education practitioners from leading research and education centres in Europe, North America and Australia. This book provides essential reference points for education policy on the new social terrain of security in cyberspace and aims to reposition global debates on what education for security in cyberspace can and should mean. This book will be of interest to students of cyber security, cyber education, international security and public policy generally, as well as practitioners and policy-makers.

This book contains the refereed proceedings of the 5th Annual Global Innovation and Knowledge Academy, GIKA 2015, held in Valencia, Spain, in July 2015. The theme of the conference was “New Knowledge Impacts on Designing Implementable Innovative Realities.” The GIKA conference offers a unique opportunity for researchers, professionals, and students to present and exchange ideas concerning management, information systems, and business economics and see its implications in the real world. The 13 contributions accepted for GIKA 2015 were selected from 102 submissions and include research that contributes to the creation of a solid evidence base concerning new information and communication technologies for knowledge management, measuring the impact and diffusion of new technologies within organizations, and highlighting the role of new technologies and tools in the relationships between knowledge management and organizational innovation.

An authoritative, single-volume introduction to cybersecurity addresses topics ranging from phishing and electrical-grid takedowns to cybercrime and online freedom, sharing illustrative anecdotes to explain how cyberspace security works and what everyday people can do to protect themselves. Simultaneous.

Cybersecurity has become a topic of concern over the past decade as private industry, public administration, commerce, and communication have gained a greater online presence. As many individual and organizational activities continue to evolve in the digital sphere, new vulnerabilities arise. Cybersecurity Policies and Strategies for Cyberwarfare Prevention serves as an integral publication on the latest legal and defensive measures being implemented to protect individuals, as well as organizations, from cyber threats. Examining online criminal networks and threats in both the public and private spheres, this book is a necessary addition to the reference collections of IT specialists, administrators, business managers, researchers, and students interested in uncovering new ways to thwart cyber breaches and protect sensitive digital information.

Besides becoming more complex, destructive, and coercive, military cyber threats are now ubiquitous, and it is difficult to imagine a future conflict that would not have a cyber dimension. This book presents the proceedings of CYDEF2018, a collaborative workshop between NATO and Japan, held in Tokyo, Japan, from 3 – 6 April 2018 under the umbrella of the NATO Science for Peace and Security Programme. It is divided into 3 sections: policy and diplomacy; operations and technology; and training and education, and covers subjects ranging from dealing with an evolving cyber threat picture to maintaining a skilled cyber workforce. The book serves as a unique reference for some of the most pressing challenges related to the implementation of effective cyber defense policy at a technical and operational level, and will be of interest to all those working in the field of cybersecurity.

If you’re involved in cybersecurity as a software developer, forensic investigator, or network administrator, this practical guide shows you how to apply the scientific method when assessing techniques for protecting your information systems. You’ll learn how to conduct scientific experiments on everyday tools and procedures, whether you’re evaluating corporate security systems, testing your own security product, or looking for bugs in a mobile game. Once author Josiah Dykstra gets you up to speed on the scientific method, he helps you focus on standalone, domain-specific topics, such as cryptography, malware analysis, and system security engineering. The latter chapters include practical case studies that demonstrate how to use available tools to conduct domain-specific scientific experiments. Learn the steps necessary to conduct scientific experiments in cybersecurity Explore fuzzing to test how your software handles various inputs Measure the performance of the Snort intrusion detection system Locate malicious “needles in a haystack” in your network and IT environment Evaluate cryptography design and application in IoT products Conduct an experiment to identify relationships between similar malware binaries Understand system-level security requirements for enterprise networks and web services

Proceedings of the 48th Session of the International Seminars on Nuclear War and Planetary Emergencies held in Erice, Sicily. This Seminar has again gathered, in 2015, over one hundred scientists from 43 countries in an interdisciplinary effort that has been going on for the last 32 years, to examine and analyze planetary problems which had been followed up, all year long, by the World Federation of Scientists' Permanent Monitoring Panels.

The important and rapidly emerging new field known as 'cyber threat intelligence' explores the paradigm that defenders of computer networks gain a better understanding of their adversaries by understanding what assets they have available for an attack. In this book, a team of experts examines a new type of cyber threat intelligence from the heart of the malicious hacking underworld - the dark web. These highly secure sites have allowed anonymous communities of malicious hackers to exchange ideas and techniques, and to buy/sell malware and exploits. Aimed at both cybersecurity practitioners and researchers, this book represents a first step toward a better understanding of malicious hacking communities on the dark web and what to do about them. The authors examine real-world darkweb data through a combination of human and automated techniques to gain insight into these communities, describing both methodology and results.

This book gathers the latest research results of scientists from different countries who have made essential contributions to the novel analysis of cyber security. Addressing open problems in the cyber world, the book consists of two parts. Part I focuses on cyber operations as a new tool in global security policy, while Part II focuses on new cyber security technologies when building cyber power capabilities. The topics discussed include strategic perspectives on cyber security and cyber warfare, cyber security implementation, strategic communication, trusted computing, password cracking, systems security and network security among others.

The Basics of Cyber Warfare provides readers with fundamental knowledge of cyber war in both theoretical and practical aspects. This book explores the principles of cyber warfare, including military and cyber doctrine, social engineering, and offensive and defensive tools, tactics and procedures, including computer network exploitation (CNE), attack (CNA) and defense (CND). Readers learn the basics of how to defend against espionage, hacking, insider threats, state-sponsored attacks, and non-state actors (such as organized criminals and terrorists). Finally, the book looks ahead to emerging aspects of cyber security technology and trends, including cloud computing, mobile devices, biometrics and nanotechnology. The Basics of Cyber Warfare gives readers a concise overview of these threats and outlines the ethics, laws and consequences of cyber warfare. It is a valuable resource for policy makers, CEOs and CIOs, penetration testers, security administrators, and students and instructors in information security. Provides a sound understanding of the tools and tactics used in cyber warfare. Describes both offensive and defensive tactics from an insider's point of view. Presents doctrine and hands-on techniques to understand as cyber warfare evolves with technology.

Cyber-security is a matter of rapidly growing importance in industry and government. This book provides insight into a range of data science techniques for addressing these pressing concerns.The application of statistical and broader data science techniques provides an exciting growth area in the design of cyber defences. Networks of connected devices, such as enterprise computer networks or the wider so-called Internet of Things, are all vulnerable to misuse and attack, and data science methods offer the promise to detect such behaviours from the vast collections of cyber traffic data sources that can be obtained. In many cases, this is achieved through anomaly detection of unusual behaviour against understood statistical models of normality.This volume presents contributed papers from an international conference of the same name held at Imperial College. Experts from the field have provided their latest discoveries and review state of the art technologies.

Do you know what weapons are used to protect against cyber warfare and what tools to use to minimize their impact? How can you gather intelligence that will allow you to configure your system to ward off attacks? Online security and privacy issues are becoming more and more significant every day, with many instances of companies and governments mishandling (or deliberately misusing) personal and financial data. Organizations need to be committed to defending their own assets and their customers' information. Designing and Building a Security Operations Center will show you how to develop the organization, infrastructure, and capabilities to protect your company and your customers effectively, efficiently, and discreetly. Written by a subject expert who has consulted on SOC implementation in both the public and private sector, Designing and Building a Security Operations Center is the go-to blueprint for cyber-defense. Explains how to develop and build a Security Operations Center Shows how to gather invaluable intelligence to protect your organization Helps you evaluate the pros and cons behind each decision during the SOC-building process

With the continued progression of technologies such as mobile computing and the internet of things (IoT), cybersecurity has swiftly risen to a prominent field of global interest. This has led to cyberattacks and cybercrime becoming much more sophisticated to a point where cybersecurity can no longer be the exclusive responsibility of an organization’s information technology (IT) unit. Cyber warfare is becoming a national issue and causing various governments to reevaluate the current defense strategies they have in place.

Cyber Security Auditing, Assurance, and Awareness Through CSAM and CATRAM provides emerging research exploring the practical aspects of reassessing current cybersecurity measures within organizations and international governments and improving upon them using audit and awareness training models, specifically the Cybersecurity Audit Model (CSAM) and the Cybersecurity Awareness Training Model (CATRAM). The book presents multi-case studies on the development and validation of these models and frameworks and analyzes their implementation and ability to sustain and audit national cybersecurity strategies. Featuring coverage on a broad range of topics such as forensic analysis, digital evidence, and incident management, this book is ideally designed for researchers, developers, policymakers, government officials, strategists, security professionals, educators, security analysts, auditors, and students seeking current research on developing training models within cybersecurity management and awareness.

As recently as five years ago, securing a network meant putting in a firewall, intrusion detection system, and installing antivirus software on the desktop. Unfortunately, attackers have grown more nimble and effective, meaning that traditional security programs are no longer effective. Today's effective cyber security programs take these best practices and overlay them with intelligence. Adding cyber threat intelligence can help security teams uncover events not detected by traditional security platforms and correlate seemingly disparate events across the network. Properly-implemented intelligence also makes the life of the security practitioner easier by helping him more effectively prioritize and respond to security incidents. The problem with current efforts is that many security practitioners don't know how to properly implement an intelligence-led program, or are afraid that it is out of their budget. Building an Intelligence-Led Security Program is the first book to show how to implement an intelligence-led program in your enterprise on any budget. It will show you how to implement a security information a security information and event management system, collect and analyze logs, and how to practice real cyber threat intelligence. You'll learn how to understand your network in-depth so that you can protect it in the best possible way. Provides a roadmap and direction on how to build an intelligence-led information security program to protect your company. Learn how to understand your network through logs and client monitoring, so you can effectively evaluate threat intelligence. Learn how to use popular tools such as BIND, SNORT, squid, STIX, TAXII, CyBox, and splunk to conduct network intelligence.

Stuxnet to Sunburst: 20 Years of Digital Exploitation and Cyberwarfare takes the reader on a journey from the terrorist attacks of 9/11 onwards and the massive insatiable appetite, focus and investment by the Five Eyes agencies, in particular the U.S., to build capability of digital eavesdropping and industrial espionage. With tens of trillions of dollars moving throughout hundreds of thousands of staff,and many contractors draining the country of intelligence and technical capability, the quest was simple and the outcome horrifying. No one in the world has connected the dots, until now. From digital eavesdropping and manipulation of the agencies to Stuxnet, this book covers how the world's first use of digital code and digital certificates for offensive purposes against the Iranians and their nuclear power facilities, caused collateral damage. Proceeding to today's SolarWinds attack, code-named Sunburst, the same methods of exploitation and manipulation originally used by the agencies are now being used against companies and governments with devastating effects. The solarWinds breach has caused knock-on breaches to thousands of client companies including the U.S. government and is estimated to cost more than one trillion dollars. The monster has truly been turned against its creator and due to the lack of security and defence, breaches are occurring daily at an alarming rate. The U.S. and UK governments have little to no answer. Teh book also contains a chapter on breaches within the COVID-19 sector from research to immunisation and the devastating December 2020 breach of SolarWinds.

This edited volume features a wide spectrum of the latest computer science research relating to cyber deception. Specifically, it features work from the areas of artificial intelligence, game theory, programming languages, graph theory, and more. The work presented in this book highlights the complex and multi-facted aspects of cyber deception, identifies the new scientific problems that will emerge in the domain as a result of the complexity, and presents novel approaches to these problems. This book can be used as a text for a graduate-level survey/seminar course on cutting-edge computer science research relating to cyber-security, or as a supplemental text for a regular graduate-level course on cyber-security.

These proceedings represent the work of contributors to the 19th European Conference on Cyber Warfare and Security (ECCWS 2020), supported by University of Chester, UK on 25-26 June 2020. The Conference Co-chairs are Dr Thaddeus Eze and Dr Lee Speakman, both from University of Chester and the Programme Chair is Dr Cyril Onwubiko from IEEE and Director, Cyber Security Intelligence at Research Series Limited. ECCWS is a well-established event on the academic research calendar and now in its 19th year the key aim remains the opportunity for participants to share ideas and meet. The conference was due to be held at University of Chester, UK, but due to the global Covid-19 pandemic it was moved online to be held as a virtual event. The scope of papers will ensure an interesting conference. The subjects covered illustrate the wide range of topics that fall into this important and ever-growing area of research.

Move beyond the foundations of machine learning and game theory in cyber security to the latest research in this cutting-edge field In Game Theory and Machine Learning for Cyber Security, a team of expert security researchers delivers a collection of central research contributions from both machine learning and game theory applicable to cybersecurity. The distinguished editors have included resources that address open research questions in game theory and machine learning applied to cyber security systems and examine the strengths and limitations of current game theoretic models for cyber security. Readers will explore the vulnerabilities of traditional machine learning algorithms and how they can be mitigated in an adversarial machine learning approach. The book offers a comprehensive suite of solutions to a broad range of technical issues in applying game theory and machine learning to solve cyber security challenges. Beginning with an introduction to foundational concepts in game theory, machine learning, cyber security, and cyber deception, the editors provide readers with resources that discuss the latest in hypergames, behavioral game theory, adversarial machine learning, generative adversarial networks, and multi-agent reinforcement learning. Readers will also enjoy: A thorough introduction to game theory for cyber deception, including scalable algorithms for identifying stealthy attackers in a game theoretic framework, honeypot allocation over attack graphs, and behavioral games for cyber deception An exploration of game theory for cyber security, including actionable game-theoretic adversarial intervention detection against persistent and advanced threats Practical discussions of adversarial machine learning for cyber security, including adversarial machine learning in 5G security and machine learning-driven fault injection in cyber-physical systems In-depth examinations of generative models for cyber security Perfect for researchers, students, and experts in the fields of computer science and engineering, Game Theory and Machine Learning for Cyber Security is also an indispensable resource for industry professionals, military personnel, researchers, faculty, and students with an interest in cyber security.

Insights into the true history of cyber warfare, and the strategies, tactics, and cybersecurity tools that can be used to better defend yourself and your organization against cyber threat. Key Features Define and determine a cyber-defence strategy based on current and past real-life examples Understand how future technologies will impact cyber warfare campaigns and society Future-ready yourself and your business against any cyber threat Book Description The era of cyber warfare is now upon us. What we do now and how we determine what we will do in the future is the difference between whether our businesses live or die and whether our digital self survives the digital battlefield. Cyber Warfare - Truth, Tactics, and Strategies takes you on a journey through the myriad of cyber attacks and threats that are present in a world powered by AI, big data, autonomous vehicles, drones video, and social media. Dr. Chase Cunningham uses his military background to provide you with a unique perspective on cyber security and warfare. Moving away from a reactive stance to one that is forward-looking, he aims to prepare people and organizations to better defend themselves in a world where there are no borders or perimeters. He demonstrates how the cyber landscape is growing infinitely more complex and is continuously evolving at the speed of light. The book not only covers cyber warfare, but it also looks at the political, cultural, and geographical influences that pertain to these attack methods and helps you understand the motivation and impacts that are likely in each scenario. Cyber Warfare - Truth, Tactics, and Strategies is as real-life and up-to-date as cyber can possibly be, with examples of actual attacks and defense techniques, tools. and strategies presented for you to learn how to think about defending your own systems and data. What you will learn Hacking at scale - how machine learning (ML) and artificial intelligence (AI) skew the battlefield Defending a boundaryless enterprise Using video and audio as weapons of influence Uncovering DeepFakes and their associated attack vectors Using voice augmentation for exploitation Defending when there is no perimeter Responding tactically to counter-campaign-based attacks Who this book is for This book is for any engineer, leader, or professional with either a responsibility for cyber security within their organizations, or an interest in working in this ever-growing field.

WINNER OF THE FT & McKINSEY BUSINESS BOOK OF THE YEAR AWARD 2021 The instant New York Times bestseller 'A terrifying exposé' The Times 'Part John le Carré . . . Spellbinding' New Yorker 'Engaging and troubling . . . This secretive market is difficult to penetrate, but Perlroth has dug deeper than most' Economist Zero day: a software bug that allows a hacker to break in and scamper through the world's computer networks invisibly until discovered. One of the most coveted tools in a spy's arsenal, a zero day has the power to tap into any iPhone, dismantle safety controls at a chemical plant and shut down the power in an entire nation – just ask the Ukraine. Zero days are the blood diamonds of the security trade, pursued by nation states, defense contractors, cybercriminals, and security defenders alike. In this market, governments aren't regulators; they are clients – paying huge sums to hackers willing to turn over gaps in the Internet, and stay silent about them. This Is How They Tell Me the World Ends is cybersecurity reporter Nicole Perlroth's discovery, unpacked. A intrepid journalist unravels an opaque, code-driven market from the outside in – encountering spies, hackers, arms dealers, mercenaries and a few unsung heroes along the way. As the stakes get higher and higher in the rush to push the world's critical infrastructure online, This Is How They Tell Me the World Ends is the urgent and alarming discovery of one of the world's most extreme threats.

This book features a wide spectrum of the latest computer science research relating to cyber warfare, including military and policy dimensions. It is the first book to explore the scientific foundation of cyber warfare and features research from the areas of artificial intelligence, game theory, programming languages, graph theory and more. The high-level approach and emphasis on scientific rigor provides insights on ways to improve cyber warfare defense worldwide. Cyber Warfare: Building the Scientific Foundation targets researchers and practitioners working in cyber security, especially government employees or contractors. Advanced-level students in computer science and electrical engineering with an interest in security will also find this content valuable as a secondary textbook or reference.

There is little doubt that cyber-space has become the battle space for confrontations. However, to conduct cyber operations, a new armory of weapons needs to be employed. No matter how many, or how sophisticated an aggressor’s kinetic weapons are, they are useless in cyber-space. This book looks at the milieu of the cyber weapons industry, as well as the belligerents who use cyber weapons. It discusses what distinguishes these hardware devices and software programs from computer science in general. It does this by focusing on specific aspects of the topic—contextual issues of why cyber-space is the new battleground, defensive cyber weapons, offensive cyber weapons, dual-use weapons, and the implications these weapons systems have for practice. Contrary to popular opinion, the use of cyber weapons is not limited to nation states; though this is where the bulk of news reporting focuses. The reality is that there isn’t a sector of the political-economy that is immune to cyber skirmishes. So, this book looks at cyber weapons not only by national security agencies and the military, but also by law enforcement, and the business sector—the latter includes administrations termed non-government organisations (NGOs). This book offers study material suitable for a wide-ranging audience—students, professionals, researchers, policy officers, and ICT specialists.

This book documents and explains civil defence preparations for national cyber emergencies in conditions of both peace and war. The volume analyses the escalating sense of crisis around state-sponsored cyber attacks that has emerged since 2015, when the United States first declared a national emergency in cyberspace. It documents a shift in thinking in the USA, from cooperative resilience-oriented approaches at national level to more highly regulated, state-led civil defence initiatives. Although the American response has been mirrored in other countries, the shift is far from universal. Civil defence strategies have come into play but the global experience of that has not been consistent or even that successful. Containing contributions from well-placed scholars and practitioners, this volume reviews a selection of national experiences (from the USA, Australia, India, China, Estonia, and Finland) and a number of key thematic issues (information weapons, alliance coordination, and attack simulations). These demonstrate a disconnect between the deepening sense of vulnerability and the availability of viable solutions at the national level. Awareness of this gap may ultimately lead to more internationally oriented cooperation, but the trend for now appears to be more conflictual and rooted in a growing sense of insecurity. This book will be of much interest to students of cyber security, homeland security, disaster management, and international relations, as well as practitioners and policy-makers.