

Ai For Industrial Iot Smart Infrastructure

This book is for strategists, leaders, managers, entrepreneurs who are so caught up in the daily pressures of business that they're missing key signals of their future reality. It's like driving a car heads down, staring at the dashboard, rather than heads up, looking through the windshield. We need to do both. The book is devoted to the practice of sensing, or scanning the horizon for signs of emerging trends. The sooner we see them, the better our response. Each chapter starts with a set of signals/data we observed that, taken together, helped us to reveal a trend. The impact of new technology on strategy is a theme of the book, and each chapter looks at how organizations are using new technologies to their advantage. The goal is to spark meaningful conversations within organizations: How could we participate in the collaborative economy? What could our CIO and our CMO be doing to drive strategy, innovation, and revenue growth? What could we do to leverage the Internet of Things and intelligent automation as catalysts of invention? Could we use MOOCs as pivots for corporate training, recruiting, and marketing? How might technology transform the manufacturing process, our supply chain, and the knowledge work that we do? Could we take advantage of the renaissance in domestic energy (oil and gas)? What could we be doing to counter cyber crime? What is our organization doing to tune into signals of emerging trends that may be relevant to us? In an environment where the pace of change is accelerating, sensing has become an essential discipline for all organizations. No matter your role in an organization, sensing emerging trends can make you more effective and more valuable in your work. If you've been working too heads-down lately and feel overwhelmed by data and deadlines, then this book is for you. It's a quick read designed to give you a heads up on your horizon.

Implement machine learning and deep learning techniques to perform predictive analytics on real-time IoT data
Key Features Discover quick solutions to common problems that you'll face while building smart IoT applications
Implement advanced techniques such as computer vision, NLP, and embedded machine learning
Build, maintain, and deploy machine learning systems to extract key insights from IoT data
Book Description Artificial intelligence (AI) is rapidly finding practical applications across a wide variety of industry verticals, and the Internet of Things (IoT) is one of them. Developers are looking for ways to make IoT devices smarter and to make users' lives easier. With this AI cookbook, you'll be able to implement smart analytics using IoT data to gain insights, predict outcomes, and make informed decisions, along with covering advanced AI techniques that facilitate analytics and learning in various IoT applications. Using a recipe-based approach, the book will take you through essential processes such as data collection, data analysis, modeling, statistics and monitoring, and deployment. You'll use real-life datasets from smart homes, industrial IoT, and smart devices to train and evaluate simple to complex models and make predictions using trained models. Later chapters will take you through the key challenges faced while implementing machine learning, deep learning, and other AI techniques, such as natural language processing (NLP), computer vision, and embedded machine learning for building smart IoT systems. In addition to this, you'll learn how to deploy models and improve their performance with ease. By the end of this book, you'll be able to package and deploy end-to-end AI apps and apply best practice solutions to common IoT problems. What you will learn
Explore various AI techniques to build smart IoT solutions from scratch
Use machine learning and deep learning techniques to build smart voice recognition and facial detection systems
Gain insights into IoT data using algorithms and implement them in projects
Perform anomaly detection for time series data and other types of IoT data
Implement embedded systems learning techniques for machine learning on small devices
Apply pre-trained machine learning models to an edge device
Deploy machine learning models to web apps and mobile using TensorFlow.js and Java
Who this book is for If you're an IoT practitioner looking to incorporate AI techniques to build smart IoT solutions without having to trawl through a lot of AI theory, this AI IoT book is for you. Data scientists and AI developers who want to build IoT-focused AI solutions will also find this book useful. Knowledge of the Python programming language and basic IoT concepts is required to grasp the concepts covered in this artificial intelligence book more effectively. This book explains the key feature to develop a complex and stable network that helps to gather the data to optimize the asset performance and maximize the production in the Industries leveraging on the cloud infrastructure and services. By the end, you can design the Industrial IoT network and the architecture for processing its data in the cloud.

As the number of Internet of Things (IoT) elements grows exponentially, their interactions can generate a massive amount of raw and multi-structured data. The challenge with this data explosion is to transform any raw data into information and knowledge, which can be used by people and systems to make intelligent decisions. Industrial IoT Application Architectures and Use Cases explores how artificial intelligence (AI), data analytics, and IoT technology combine to promote intelligent decision-making and automation in a range of industries. With faster, more stable AI algorithms and approaches, knowledge discovery and dissemination from IoT-device data can be simplified and streamlined. An era of powerful cognitive technology is beginning due to cloud-based cognitive systems that are forming the foundation of game-changing intelligent applications. This book presents next-generation use cases of IoT and IoT data analytics for a variety of industrial verticals as given below:
An Intelligent IoT framework for smart water management
An IoT-enabled smart traffic control system for congestion control and smart traffic management
An intelligent airport system for airport management and security surveillance
An IoT framework for healthcare to integrate and report patient information
Fuzzy scheduling with IoT for tracking and monitoring hotel assets
An IoT system for designing drainage systems and monitoring drainage pipes
Predictive maintenance of plant equipment to decide the actual mean time to malfunction
Integrated neural networks and IoT systems for predictive equipment maintenance
IoT integration in blockchain for smart waste management
This book also includes a chapter on the IoT paradigm and an overview of uses cases for personal, social, and industrial applications.

Artificial Intelligence to Solve Pervasive Internet of Things Issues discusses standards and technologies and wide-ranging technology areas and their applications and challenges, including discussions on architectures, frameworks, applications, best practices, methods and techniques required for integrating AI to resolve IoT issues. Chapters also provide step-by-step measures, practices and solutions to tackle vital decision-making and practical issues affecting IoT technology, including autonomous devices and computerized systems. Such issues range from adopting, mitigating, maintaining, modernizing and protecting AI and IoT infrastructure components such as scalability, sustainability, latency, system decentralization and maintainability. The book enables readers to explore, discover and implement new solutions for integrating AI to solve IoT issues. Resolving these issues will help readers address many real-world applications in areas such as scientific research, healthcare, defense, aeronautics, engineering, social media, and many others. Discusses intelligent techniques for the implementation of Artificial Intelligence

in Internet of Things Prepared for researchers and specialists who are interested in the use and integration of IoT and Artificial Intelligence technologies

This book provides an overview of the next generation Internet of Things (IoT), ranging from research, innovation, development priorities, to enabling technologies in a global context. It is intended as a standalone in a series covering the activities of the Internet of Things European Research Cluster (IERC), including research, technological innovation, validation, and deployment. The text builds on the ideas put forward by the European Research Cluster, the IoT European Platform Initiative (IoT-EPI), the IoT European Large-Scale Pilots Programme and the IoT European Security and Privacy Projects, presenting global views and state-of-the-art results regarding the next generation of IoT research, innovation, development, and deployment. The IoT and Industrial Internet of Things (IIoT) are evolving towards the next generation of Tactile IoT/IIoT, bringing together hyperconnectivity (5G and beyond), edge computing, Distributed Ledger Technologies (DLTs), virtual and augmented reality (VR/AR), and AI transformation. Following the wider adoption of consumer IoT, the next generation of IoT/IIoT innovation for business is driven by industries, addressing interoperability issues and providing new end-to-end security solutions to face continuous threats. The advances of AI technology in vision, speech recognition, natural language processing and dialog are enabling the development of end-to-end intelligent systems encapsulating multiple technologies, delivering services in real-time using limited resources. These developments are focusing on designing and delivering embedded and hierarchical AI solutions in IoT/IIoT, edge computing, using distributed architectures, DLTs platforms and distributed end-to-end security, which provide real-time decisions using less data and computational resources, while accessing each type of resource in a way that enhances the accuracy and performance of models in the various IoT/IIoT applications. The convergence and combination of IoT, AI and other related technologies to derive insights, decisions and revenue from sensor data provide new business models and sources of monetization. Meanwhile, scalable, IoT-enabled applications have become part of larger business objectives, enabling digital transformation with a focus on new services and applications. Serving the next generation of Tactile IoT/IIoT real-time use cases over 5G and Network Slicing technology is essential for consumer and industrial applications and support reducing operational costs, increasing efficiency and leveraging additional capabilities for real-time autonomous systems. New IoT distributed architectures, combined with system-level architectures for edge/fog computing, are evolving IoT platforms, including AI and DLTs, with embedded intelligence into the hyperconnectivity infrastructure. The next generation of IoT/IIoT technologies are highly transformational, enabling innovation at scale, and autonomous decision-making in various application domains such as healthcare, smart homes, smart buildings, smart cities, energy, agriculture, transportation and autonomous vehicles, the military, logistics and supply chain, retail and wholesale, manufacturing, mining and oil and gas.

The book will help you get well-versed with different techniques in Artificial Intelligence such as machine learning, deep learning, natural language processing and more to build smart IoT systems. By the end of the book, you will have practical knowledge on how to implement and manipulate text, audio, and speech data within the IoT system.

This book provides a comprehensive overview of the most relevant research and standardization results in the area of wireless networking for Industrial IoT, covering both critical and massive connectivity. Most chapters in this book are intended to serve as short tutorials of particular topics, highlighting the main developments and ideas, as well as giving an outlook of the upcoming research challenges. The book is divided into four parts. The first part focuses on challenges, enablers and standardization efforts for reliable low-latency communication in Industrial IoT networks. The next part focuses on massive IoT, which requires cost- and energy-efficient technology components to efficiently connect a massive number of low-cost IoT devices. The third part covers three enabling technologies in the context of Industrial IoT: Security, Machine Learning/Artificial Intelligence and Edge Computing. These enablers are applicable to both connectivity types, critical and massive IoT. The last part covers aspects of Industrial IoT related to connected transportation that are important in, for example, warehouse and port logistics, product delivery and transportation among industries. Presents a comprehensive guide to concepts and research challenges in wireless networking for Industrial IoT; Includes an introduction and overview of such topics as 3GPP standardization for Industrial IoT, Time Sensitive Networking, system dependability over wireless networks, energy-efficient wireless networks, IoT security, ML/AI for Industrial IoT and connected transportation systems; Features contributions by well-recognized experts from both academia and industry.

"The fusion of AI and IoT enables the systems to be predictive, prescriptive, and autonomous, and this convergence has evolved the nature of emerging applications from being assisted to augmented, and ultimately to autonomous intelligence. This book discusses algorithmic applications in the field of machine learning and IoT with pertinent applications. It further discusses challenges and future directions in the machine learning area and develops understanding of its role in technology, in terms of IoT security issues. Pertinent applications described include speech recognition, medical diagnosis, optimizations, predictions, and security aspects. Features: Focuses on algorithmic and practical parts of the artificial intelligence approaches in IoT applications. Discusses supervised and unsupervised machine learning for IoT data and devices. Presents an overview of the different algorithms related to Machine learning and IoT. Covers practical case studies on industrial and smart home automation. Includes implementation of AI from case studies in personal and industrial IoT. This book aims at Researchers and Graduate students in Computer Engineering, Networking Communications, Information Science Engineering, and Electrical Engineering"--

Modern factories are experiencing rapid digital transformation supported by emerging technologies, such as the Industrial Internet of things (IIOT), industrial big data and cloud technologies, deep learning and deep analytics, AI, intelligent robotics, cyber-physical systems and digital twins, complemented by visual computing (including new forms of artificial vision with machine learning, novel HMI, simulation, and visualization). This is evident in the global trend of Industry 4.0. The impact of these technologies is clear in the context of high-performance manufacturing. Important improvements can be achieved in productivity, systems reliability, quality verification, etc. Manufacturing processes, based on advanced mechanical principles, are enhanced by big data analytics on industrial sensor data. In current machine tools and systems, complex sensors gather useful data, which is captured, stored, and processed with edge, fog, or cloud computing. These processes improve with digital monitoring, visual data analytics, AI, and computer vision to achieve a more productive and reliable smart factory. New value chains are also emerging from these technological changes. This book addresses these topics, including

contributions deployed in production, as well as general aspects of Industry 4.0.

The Cyber Ecosystem can be a replica of our natural ecosystem where different living and non-living things interact with each other to perform specific tasks. Similarly, the different entities of the cyber ecosystem collaborate digitally with each other to revolutionize our lifestyle by creating smart, intelligent, and automated systems/processes. The main actors of the cyber ecosystem, among others, are the Internet of Things (IoT), Artificial Intelligence (AI), and the mechanisms providing cybersecurity. This book documents how this blend of technologies is powering a digital sustainable socio-economic infrastructure which improves our life quality. It offers advanced automation methods fitted with amended business and audits models, universal authentication schemes, transparent governance, and inventive prediction analysis.

Blockchain and artificial intelligence (AI) in industrial internet of things is an emerging field of research at the intersection of information science, computer science, and electronics engineering. The radical digitization of industry coupled with the explosion of the internet of things (IoT) has set up a paradigm shift for industrial and manufacturing companies. There exists a need for a comprehensive collection of original research of the best performing methods and state-of-the-art approaches in this area of blockchain, AI, and the industrial internet of things in this new era for industrial and manufacturing companies. Blockchain and AI Technology in the Industrial Internet of Things compares different approaches to the industrial internet of things and explores the direct impact blockchain and AI technology have on the betterment of the human life. The chapters provide the latest advances in the field and provide insights and concerns on the concept and growth of the industrial internet of things. While including research on security and privacy, supply chain management systems, performance analysis, and a variety of industries, this book is ideal for professionals, researchers, managers, technologists, security analysts, executives, practitioners, researchers, academicians, and students looking for advanced research and information on the newest technologies, advances, and approaches for blockchain and AI in the industrial internet of things.

The 24 chapters in this book provides a deep overview of robotics and the application of AI and IoT in robotics. It contains the exploration of AI and IoT based intelligent automation in robotics. The various algorithms and frameworks for robotics based on AI and IoT are presented, analyzed, and discussed. This book also provides insights on application of robotics in education, healthcare, defense and many other fields which utilize IoT and AI. It also introduces the idea of smart cities using robotics.

This book comprises the select proceedings of the International Conference on Emerging Trends in Traditional and Technical Textiles (ICETT 2019), and examines the latest developments and automation in the field of textile technology. The topics covered include geotextiles, filters, medical textiles, functional finishing of textiles, composites, sustainable textile materials, and pollution in the textile industry. The book also discusses various aspects of traditional textiles including traditional methods of designing textiles, traditional textiles as a new avatar for technical textiles, traditional and technical assets of Indian and Asian culture: phulkari, bagh, kalamkari and chope embroideries. This book can be useful for students, researchers, and professionals working in traditional textile design and technical textile applications.

Cities are the next frontier for artificial intelligence to permeate. As smart urban environments become possible, probable, and even preferred, artificial intelligence offers the chance for even further advancement through infrastructure and industry boosting. Opportunity overflows, but without thorough research to guide a complicated development and implementation process, urban environments can become disorganized and outright dangerous for citizens. AI-Based Services for Smart Cities and Urban Infrastructure is a collection of innovative research that explores artificial intelligence (AI) applications in urban planning. In addition, the book looks at how the internet of things and AI can work together to enable a real smart city and discusses state-of-the-art techniques in urban infrastructure design, construction, operation, maintenance, and management. While highlighting a broad range of topics including construction management, public transportation, and smart agriculture, this book is ideally designed for engineers, entrepreneurs, urban planners, architects, policymakers, researchers, academicians, and students.

Blockchain technology allows value exchange without the need for a central authority and ensures trust powered by its decentralized architecture. As such, the growing use of the internet of things (IoT) and the rise of artificial intelligence (AI) are to be benefited immensely by this technology that can offer devices and applications data security, decentralization, accountability, and reliable authentication. Bringing together blockchain technology, AI, and IoT can allow these tools to complement the strengths and weaknesses of the others and make systems more efficient.

Multidisciplinary Functions of Blockchain Technology in AI and IoT Applications deliberates upon prospects of blockchain technology using AI and IoT devices in various application domains. This book contains a comprehensive collection of chapters on machine learning, IoT, and AI in areas that include security issues of IoT, farming, supply chain management, predictive analytics, and natural languages processing. While highlighting these areas, the book is ideally intended for IT industry professionals, students of computer science and software engineering, computer scientists, practitioners, stakeholders, researchers, and academicians interested in updated and advanced research surrounding the functions of blockchain technology in AI and IoT applications across diverse fields of research.

Written by experts on innovation and growth, this book provides the necessary tools to systematically develop and sustain profitable innovation pipelines. In a hypercompetitive global market, businesses must innovate to survive; yet the failure rate for innovation is extremely high. Strategists and thought leaders, Cheryl Perkins and Dr. Sanjay Mazumdar, offer a sophisticated yet practical approach for implementing successful innovation. Leveraging thought-provoking questions and powerful templates, the book outlines how companies can leverage core strengths, build internal innovation capabilities, partner effectively, and identify the promising areas to pursue. In addition, the book highlights emerging innovations in several major industries, providing fodder to fuel creative thinking and exploration of possible applications across a variety of different industries. Managers and leaders will welcome the innovation insights and examples, as well as the templates to build an organization's plan to diagnose patterns of innovation, identify opportunities, and apply emerging innovations in their own industries and businesses.

This publication highlights the fast-moving technological advancement and infiltration of Artificial Intelligence into society. Concepts of evolution of society through interconnectivity are explored, together with how the fusion of human and technological interaction leading to Augmented Humanity is fast becoming more than just an endemic phase, but a cultural phase shift to digital societies. It aims to balance both the positive progressive outlooks such developments bring with potential issues that may stem from innovation of this kind, such as the invasive procedures of bio hacking or ethical connotations concerning the usage of digital twins. This publication will also give the reader a good level of understanding on fundamental cyber defence principles, interactions with Critical National Infrastructure (CNI) and the Command, Control, Communications and Intelligence (C3I) decision-making framework. A detailed view of the cyber-attack landscape will be garnered; touching on the tactics, techniques and procedures used, red and blue teaming initiatives, cyber resilience and the protection of larger scale systems. The integration of AI, smart societies, the human-centric approach and Augmented Humanity is discernible in the exponential growth, collection and use of [big] data; concepts woven throughout the diversity of topics covered in this publication; which also discusses the privacy and transparency of data ownership, and the potential dangers of exploitation through social media. As humans are become ever more interconnected, with the prolificacy of smart wearable devices and wearable body area networks, the availability of and abundance of user data and metadata derived from individuals has grown exponentially. The notion of data ownership, privacy and situational awareness are now at the forefront in this new age.

Industrial internet of things (IIoT) is changing the face of industry by completely redefining the way stakeholders, enterprises, and machines connect and interact with each other in the industrial digital ecosystem. Smart and connected factories, in which all the machinery transmits real-time data, enable industrial data analytics for improving operational efficiency, productivity, and industrial processes, thus creating new business opportunities, asset utilization, and connected services. IIoT leads factories to step out of legacy environments and arcane processes towards open digital industrial ecosystems. Innovations in the Industrial Internet of Things (IIoT) and Smart Factory is a pivotal reference source that discusses the development of models and algorithms for predictive control of industrial operations and focuses on optimization of industrial operational efficiency, rationalization, automation, and maintenance. While highlighting topics such as artificial intelligence, cyber security, and data collection, this book is ideally designed for engineers, manufacturers, industrialists, managers, IT consultants, practitioners, students, researchers, and industrial industry professionals.

This book presents methods for advancing green IoT sensor networks and IoT devices. Three main methods presented are: a standalone system to support IoT devices that is informed by the amount of energy the solar array system can produce; a model of securing a building's main power supply against unauthorized use; and security of the IoT devices and their networks. For each, the authors outline the methods, presents security and privacy issues, and their solutions. The work suggests a layered approach to expose security issues and challenges at each layer of the IoT architecture and proposes techniques used to mitigate these challenges. Finally, perspectives are drawn and discussed for future directions in securing IoT sensor networks, covering evolving areas such as artificial intelligence, blockchain technology, sensor Internet of People, context-aware sensing, cloud infrastructure, security and privacy, and the Internet of Everything.

Discover how the Internet of Things will change the information and communication technology industry in the next decade The Intelligent Internet of Things explores a unique type of Internet of Things (IoT) architecture, for example, the Web of Things (WoT) with its open character that breaks the barriers among various IoT vertical applications. The authors—noted experts on the topic—examine and compare key technologies from physical to platform level, especially the Narrow Band Internet of Things (NB-IoT) technology. They discuss applications with different data transmission requirements that are typical to IoT. The text also describes the requirements of WoT applications on 5G and includes detailed information on WoT technologies. The Intelligent Internet of Things examines three typical WoT applications: the monitoring application of south-to-north water diversion projects; smart driving applications; and network optimization applications. In addition, the text explores testing and authentication of IoT key technologies, with the required equipment, platform, and outdoor environment development. This important book: Provides information on what IoT/WoT is, when to use it, how to provide IoT services with certain technologies, and more Discusses restful architecture, main protocols (ZigBee, 6lowpan, CoAP, HTML5) Explores key technologies on different layers (sensing, gathering, application) Examines how IoT will change the information and communication technology industry Written for professionals working in IoT development, management and big data analytics, Intelligent Internet of Things offers an overview of IoT architecture, key technology, current applications and future development of the technology.

The Industry 4.0 revolution is changing the world around us. Artificial intelligence and machine learning, automation and robotics, big data, Internet of Things, augmented reality, virtual reality, and creativity are the tools of Industry 4.0. Improved collaboration is seen between smart systems and humans, which merges humans' critical and cognitive thinking abilities with highly accurate and fast industrial automation. Securing IoT in Industry 4.0 Applications with Blockchain examines the role of IoT in Industry 4.0 and how it can be made secure through various technologies including blockchain. The book begins with an in-depth look at IoT and discusses applications, architecture, technologies, tools, and programming languages. It then examines blockchain and cybersecurity, as well as how blockchain achieves cybersecurity. It also looks at cybercrimes and their preventive measures and issues related to IoT security and trust.

Features An overview of how IoT is used to improve the performance of Industry 4.0 systems The evolution of the Industrial Internet of Things (IIoT), its proliferation and market share, and some examples across major industries An exploration of how smart farming is helping farmers prevent plant disease The concepts behind the Internet of Nano Things (IoNT), including the

nanomachine and nanonetwork architecture and nano-communication paradigms A look at how blockchains can enhance cybersecurity in a variety of applications, including smart contracts, transferring financial instruments, and Public Key Infrastructure An overview of the structure and working of a blockchain, including the types, evolution, benefits, and applications of blockchain to industries A framework of technologies designed to shield networks, computers, and data from malware, vulnerabilities, and unauthorized activities An explanation of the automation system employed in industries along with its classification, functionality, flexibility, limitations, and applications

"This book provides perspectives of academics and industrial practitioners offering the latest innovations and applications of artificial intelligence (AI), Internet-of-Things (IoT) and cognitive based smart systems to provide information for all those interested in AI, IoT and Cognitive Technologies in emerging and developed economies in terms of their respective development situation toward public policies, technologies and intellectual capital, innovation systems, competition and strategies, marketing and growth capability, governance and relegation model etc"-- AI, Edge, and IoT Smart Agriculture integrates applications of IoT, edge computing, and data analytics for sustainable agricultural development and introduces Edge of Thing-based data analytics and IoT for predictability of crop, soil, and plant disease occurrence for improved sustainability and increased profitability. The book also addresses precision irrigation, precision horticulture, greenhouse IoT, livestock monitoring, IoT ecosystem for agriculture, mobile robot for precision agriculture, energy monitoring, storage management, and smart farming. The book provides an overarching focus on sustainable environment and sustainable economic development through smart and e-agriculture. Providing a medium for the exchange of expertise and inspiration, contributions from both smart agriculture and data mining researchers around the world provide foundational insights. The book provides practical application opportunities for the resolution of real-world problems, including contributions from the data mining, data analytics, Edge of Things, and cloud research communities working in the farming production sector. The book offers broad coverage of the concepts, themes, and instruments of this important and evolving area of IOT-based agriculture, Edge of Things and cloud-based farming, Greenhouse IOT, mobile agriculture, sustainable agriculture, and big data analytics in agriculture toward smart farming. Integrates sustainable agriculture, Greenhouse IOT, precision agriculture, crops monitoring, crops controlling to prediction, livestock monitoring, and farm management Presents data mining techniques for precision agriculture, including weather prediction, plant disease prediction, and decision support for crop and soil selection Promotes the importance and uses in managing the agro ecosystem for food security Emphasizes low energy usage options for low cost and environmental sustainability

Artificial Intelligence for IoT Cookbook Over 70 recipes for building AI solutions for smart homes, industrial IoT, and smart cities Packt Publishing Ltd

As technology continues to saturate modern society, agriculture has started to adopt digital computing and data-driven innovations. This emergence of "smart" farming has led to various advancements in the field, including autonomous equipment and the collection of climate, livestock, and plant data. As connectivity and data management continue to revolutionize the farming industry, empirical research is a necessity for understanding these technological developments. Artificial Intelligence and IoT-Based Technologies for Sustainable Farming and Smart Agriculture provides emerging research exploring the theoretical and practical aspects of critical technological solutions within the farming industry. Featuring coverage on a broad range of topics such as crop monitoring, precision livestock farming, and agronomic data processing, this book is ideally designed for farmers, agriculturalists, product managers, farm holders, manufacturers, equipment suppliers, industrialists, governmental professionals, researchers, academicians, and students seeking current research on technological applications within agriculture and farming.

This book is a collection of selected papers presented at the First International Conference on Industrial IoT, Big Data and Supply Chain (IIoTBDSC), held as an online conference due to COVID-19 (initially to be held in Macao, Special Administration Region (SAR) of China), during September 15–17, 2020. It includes novel and innovative work from experts, practitioners, scientists and decision-makers from academia and industry. It brings multi-disciplines together on IIoT, data science, cloud computing, software engineering approaches to design, development, testing and quality of products and services.

This book introduces Industrial AI in multiple dimensions. Industrial AI is a systematic discipline which focuses on developing, validating and deploying various machine learning algorithms for industrial applications with sustainable performance. Combined with the state-of-the-art sensing, communication and big data analytics platforms, a systematic Industrial AI methodology will allow integration of physical systems with computational models. The concept of Industrial AI is in infancy stage and may encompass the collective use of technologies such as Internet of Things, Cyber-Physical Systems and Big Data Analytics under the Industry 4.0 initiative where embedded computing devices, smart objects and the physical environment interact with each other to reach intended goals. A broad range of Industries including automotive, aerospace, healthcare, semiconductors, energy, transportation, mining, construction, and industrial automation could harness the power of Industrial AI to gain insights into the invisible relationship of the operation conditions and further use that insight to optimize their uptime, productivity and efficiency of their operations. In terms of predictive maintenance, Industrial AI can detect incipient changes in the system and predict the remains useful life and further to optimize maintenance tasks to avoid disruption to operations.

By 2020, experts forecast that up to 28 billion devices will be connected to the Internet with only one third of them being computers, smartphones and tablets. The remaining two thirds will be other "devices"--sensors, terminals, household appliances, thermostats, televisions, automobiles, production machinery, urban infrastructure and many other "things"--which traditionally have not been Internet enabled. This "Internet of Things" (IoT) represents a remarkable transformation of the way in which our world will soon interact. Much like the World Wide Web connected computers to networks, and the next evolution connected people to the Internet and other people, IoT looks poised to interconnect devices, people, environments, virtual objects and machines in ways that only science fiction writers could have imagined. In a nutshell, the Internet of Things (IoT) is the convergence of connecting people, things, data and processes. It is transforming our life, business and everything in between. Secure and Smart Internet of Things explores many aspects of the Internet of Things and explains many of the completed principles of IoT and the new advances in IoT including the use of Fog Computing, AI, and Blockchain technology. The topics discussed in the book include: - Internet of Things (IoT) - Industrial Internet of Things (IIoT) - Fog Computing - Artificial Intelligence - Blockchain Technology - Network Security - Zero-Trust Model - Data Analytics - Digital Transformation - DDoS - Smart Devices

With the explosive growth of mobile computing and Internet of Things (IoT) applications, as exemplified by AR/VR, smart city, and video/audio surveillance, billions of mobile and IoT devices are being connected to the Internet, generating zillions of bytes of data at the network edge. Driven by this trend, there is an urgent need to push the frontiers of artificial intelligence (AI) to the network edge to fully unleash the potential of IoT big data. Indeed, the marriage of edge computing and AI has resulted in innovative solutions, namely edge intelligence or edge AI. Nevertheless, research and practice on this emerging inter-disciplinary field is still in its infancy stage. To facilitate the dissemination of the recent advances in edge intelligence in both academia and industry, this book conducts a comprehensive and detailed survey of the recent research efforts and also showcases the authors' own research progress on edge intelligence. Specifically, the book first reviews the background and present motivation for AI running at the network edge. Next, it provides an overview of the overarching architectures, frameworks, and emerging key technologies for deep learning models toward training/inference at the network edge. To illustrate the research problems for edge intelligence, the book also showcases four of the authors' own research projects on edge intelligence, ranging from rigorous theoretical analysis to studies based on realistic implementation. Finally, it discusses the applications, marketplace, and future research opportunities of edge intelligence. This emerging interdisciplinary field offers many open problems and yet also tremendous opportunities, and this book only touches the tip of iceberg. Hopefully, this book will elicit escalating attention, stimulate fruitful discussions, and open new directions on edge intelligence.

To sustain and stay at the top of the market and give absolute comfort to the consumers, industries are using different strategies and technologies. Natural language processing (NLP) is a technology widely penetrating the market, irrespective of the industry and domains. It is extensively applied in businesses today, and it is the buzzword in every engineer's life. NLP can be implemented in all those areas where artificial intelligence is applicable either by simplifying the communication process or by refining and analyzing information. Neural machine translation has improved the imitation of professional translations over the years. When applied in neural machine translation, NLP helps educate neural machine networks. This can be used by industries to translate low-impact content including emails, regulatory texts, etc. Such machine translation tools speed up communication with partners while enriching other business interactions. Deep Natural Language Processing and AI Applications for Industry 5.0 provides innovative research on the latest findings, ideas, and applications in fields of interest that fall under the scope of NLP including computational linguistics, deep NLP, web analysis, sentiments analysis for business, and industry perspective. This book covers a wide range of topics such as deep learning, deepfakes, text mining, blockchain technology, and more, making it a crucial text for anyone interested in NLP and artificial intelligence, including academicians, researchers, professionals, industry experts, business analysts, data scientists, data analysts, healthcare system designers, intelligent system designers, practitioners, and students.

Delve into industrial digital transformation and learn how to implement modern business strategies powered by digital technologies as well as organization and cultural optimization Key Features Identify potential industry disruptors from various business domains and emerging technologies Leverage existing resources to identify new avenues for generating digital revenue Boost digital transformation with cloud computing, big data, artificial intelligence (AI), and the Internet of Things (IoT) Book Description Digital transformation requires the ability to identify opportunities across industries and apply the right technologies and tools to achieve results. This book is divided into two parts with the first covering what digital transformation is and why it is important. The second part focuses on how digital transformation works. After an introduction to digital transformation, you will explore the transformation journey in logical steps and understand how to build business cases and create productivity benefit statements. Next, you'll delve into advanced topics relating to overcoming various challenges. Later, the book will take you through case studies in both private and public sector organizations. You'll explore private sector organizations such as industrial and hi-tech manufacturing in detail and get to grips with public sector organizations by learning how transformation can be achieved on a global scale and how the resident experience can be improved. In addition to this, you will understand the role of artificial intelligence, machine learning and deep learning in digital transformation. Finally, you'll discover how to create a playbook that can ensure success in digital transformation. By the end of this book, you'll be well-versed with industrial digital transformation and be able to apply your skills in the real world. What you will learn Get up to speed with digital transformation and its important aspects Explore the skills that are needed to execute the transformation Focus on the concepts of Digital Thread and Digital Twin Understand how to leverage the ecosystem for successful transformation Get to grips with various case studies spanning industries in both private and public sectors Discover how to execute transformation at a global scale Find out how AI delivers value in the transformation journey Who this book is for This book is for IT leaders, digital strategy leaders, line-of-business leaders, solution architects, and IT business partners looking for digital transformation opportunities within their organizations. Professionals from service and management consulting firms will also find this book useful. Basic knowledge of enterprise IT and some intermediate knowledge of identifying digital revenue streams or internal transformation opportunities are required to get started with this book.

Smart Sensor Networks (WSNs) using AI have left a mark on the lives of all by aiding in various sectors, such as manufacturing, education, healthcare, and monitoring of the environment and industries. This book covers recent AI applications and explores aspects of modern sensor technologies and the systems needed to operate them. The book reviews the fundamental concepts of gathering, processing, and analyzing different AI-based models and methods. It covers recent WSN techniques for the purpose of effective network management on par with the standards laid out by international organizations in related fields and focuses on both core concepts along with major applicational areas. The book will be used by technical developers, academicians, data sciences, industrial professionals, researchers, and students interested in the latest innovations on problem-oriented processing techniques in sensor networks using IoT and evolutionary computer applications for Industry 4.0.

This book provides an overview of the emerging smart connected world, and discusses the roles and the usage of underlying semantic computing and Internet-of-Things (IoT) technologies. The book comprises ten chapters overall, grouped in two parts. Part I "Smart Connected World: Overview and Technologies" consists of seven chapters and provides a holistic overview of the smart connected world and its supporting tools and technologies. Part II "Applications and Case Studies" consists of three chapters that describe applications and case studies in manufacturing, smart cities, health, and more. Each chapter is self-contained and can be read independently; taken together, readers get a bigger picture of the technological and application landscape of the smart connected world. This book is of interest for researchers, lecturers, and practitioners in Semantic Web, IoT and related fields. It can serve as a reference for instructors and students taking courses in hybrid computing getting abreast of cutting edge and future directions of a connected ecosystem. It will also benefit industry professionals like software engineers or data scientists, by providing a synergy between Web technologies and applications. This book covers the most important topics on the emerging field of the smart connected world. The contributions from leading active researchers and practitioners in the field are thought provoking and can help in learning and further research. The book is a valuable resource that will benefit academics and industry. It will lead to further research and advancement of the field. Bharat K. Bhargava, Professor of Computer

Science, Purdue University, United States

Build smarter systems by combining artificial intelligence and the Internet of Things--two of the most talked about topics today Key Features Leverage the power of Python libraries such as TensorFlow and Keras to work with real-time IoT data Process IoT data and predict outcomes in real time to build smart IoT models Cover practical case studies on industrial IoT, smart cities, and home automation Book Description There are many applications that use data science and analytics to gain insights from terabytes of data. These apps, however, do not address the challenge of continually discovering patterns for IoT data. In Hands-On Artificial Intelligence for IoT, we cover various aspects of artificial intelligence (AI) and its implementation to make your IoT solutions smarter. This book starts by covering the process of gathering and preprocessing IoT data gathered from distributed sources. You will learn different AI techniques such as machine learning, deep learning, reinforcement learning, and natural language processing to build smart IoT systems. You will also leverage the power of AI to handle real-time data coming from wearable devices. As you progress through the book, techniques for building models that work with different kinds of data generated and consumed by IoT devices such as time series, images, and audio will be covered. Useful case studies on four major application areas of IoT solutions are a key focal point of this book. In the concluding chapters, you will leverage the power of widely used Python libraries, TensorFlow and Keras, to build different kinds of smart AI models. By the end of this book, you will be able to build smart AI-powered IoT apps with confidence. What you will learn Apply different AI techniques including machine learning and deep learning using TensorFlow and Keras Access and process data from various distributed sources Perform supervised and unsupervised machine learning for IoT data Implement distributed processing of IoT data over Apache Spark using the MLlib and H2O.ai platforms Forecast time-series data using deep learning methods Implementing AI from case studies in Personal IoT, Industrial IoT, and Smart Cities Gain unique insights from data obtained from wearable devices and smart devices Who this book is for If you are a data science professional or a machine learning developer looking to build smart systems for IoT, Hands-On Artificial Intelligence for IoT is for you. If you want to learn how popular artificial intelligence (AI) techniques can be used in the Internet of Things domain, this book will also be of benefit. A basic understanding of machine learning concepts will be required to get the best out of this book.

This contributed volume provides the state-of-the-art development on security and privacy for cyber-physical systems (CPS) and industrial Internet of Things (IIoT). More specifically, this book discusses the security challenges in CPS and IIoT systems as well as how Artificial Intelligence (AI) and Machine Learning (ML) can be used to address these challenges. Furthermore, this book proposes various defence strategies, including intelligent cyber-attack and anomaly detection algorithms for different IIoT applications. Each chapter corresponds to an important snapshot including an overview of the opportunities and challenges of realizing the AI in IIoT environments, issues related to data security, privacy and application of blockchain technology in the IIoT environment. This book also examines more advanced and specific topics in AI-based solutions developed for efficient anomaly detection in IIoT environments. Different AI/ML techniques including deep representation learning, Snapshot Ensemble Deep Neural Network (SEDNN), federated learning and multi-stage learning are discussed and analysed as well. Researchers and professionals working in computer security with an emphasis on the scientific foundations and engineering techniques for securing IIoT systems and their underlying computing and communicating systems will find this book useful as a reference. The content of this book will be particularly useful for advanced-level students studying computer science, computer technology, cyber security, and information systems. It also applies to advanced-level students studying electrical engineering and system engineering, who would benefit from the case studies.

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