Record Nr.	UNINA9910830752203321
Titolo	Integration of mechanical and manufacturing engineering with IoT : a digital transformation / / edited by R. Rajasekar, C. Moganapriya, M. Harikrishna Kumar, P. Sathish Kumar
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons, , [2023] ©2023
ISBN	9781119865001 1-119-86539-5 1-119-86538-7
Descrizione fisica	1 online resource (342 pages)
Disciplina	620.00285
Soggetti	Internet of things - Industrial applications Engineering - Data processing Manufacturing processes Mechanical engineering Production engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover Title Page Copyright Page Contents Preface Chapter 1 Evolution of Internet of Things (IoT): Past, Present and Future for Manufacturing Systems 1.1 Introduction 1.2 IoT Revolution 1.3 IoT 1.4 Fundamental Technologies 1.4.1 RFID and NFC 1.4.2 WSN 1.4.3 Data Storage and Analytics (DSA) 1.5 IoT Architecture 1.6 Cloud Computing (CC) and IoT 1.6.1 Service of

1.

Development -- 1.10 Current Issues and Challenges in IoT -- 1.10.1 Scalability -- 1.10.2 Issue of Trust -- 1.10.3 Service Availability --1.10.4 Security Challenges -- 1.10.5 Mobility Issues -- 1.10.6 Architecture for IoT -- 1.11 Conclusion -- References -- Chapter 2 Fourth Industrial Revolution: Industry 4.0 -- 2.1 Introduction -- 2.1.1 Global Level Adaption -- 2.2 Evolution of Industry -- 2.2.1 Industry 1.0 -- 2.2.2 Industry 2.0 -- 2.2.3 Industry 3.0 -- 2.2.4 Industry 4.0 (or) 14. 0 -- 2.3 Basic IoT Concepts and the Term Glossary -- 2.4 Industrial Revolution -- 2.4.1 I4.0 Core Idea -- 2.4.2 Origin of I4.0 Concept --2.5 Industry -- 2.5.1 Manufacturing Phases -- 2.5.2 Existing Process Planning vs. I4.0 -- 2.5.3 Software for Product Planning-A Link Between Smart Products and the Main System ERP -- 2.6 Industry Production System 4.0 (Smart Factory). 2.6.1 IT Support -- 2.7 I4.0 in Functional Field -- 2.7.1 I4.0 Logistics -- 2.7.2 Resource Planning -- 2.7.3 Systems for Warehouse Management -- 2.7.4 Transportation Management Systems -- 2.7.5 Transportation Systems with Intelligence -- 2.7.6 Information Security -- 2.8 Existing Technology in I4.0 -- 2.8.1 Applications of I4.0 in Existing Industries -- 2.8.2 Additive Manufacturing (AM) -- 2.8.3 Intelligent Machines -- 2.8.4 Robots that are Self-Aware -- 2.8.5 Materials that are Smart -- 2.8.6 IoT -- 2.8.7 The Internet of Things in Industry (IIoT) -- 2.8.8 Sensors that are Smart -- 2.8.9 System Using a Smart Programmable Logic Controller (PLC) -- 2.8.10 Software --2.8.11 Augmented Reality (AR)/Virtual Reality (VR) -- 2.8.12 Gateway for the Internet of Things -- 2.8.13 Cloud -- 2.8.14 Applications of Additive Manufacturing in I4.0 -- 2.8.15 Artificial Intelligence (AI) --2.9 Applications in Current Industries -- 2.9.1 I4.0 in Logistics -- 2.9.2 14.0 in Manufacturing Operation -- 2.10 Future Scope of Research --2.10.1 Theoretical Framework of I4.0 -- 2.11 Discussion and Implications -- 2.11.1 Hosting: Microsoft -- 2.11.2 Platform for the Internet of Things (IoT): Microsoft, GE, PTC, and Siemens -- 2.11.3 A Systematic Computational Analysis -- 2.11.4 Festo Proximity Sensor --2.11.5 Connectivity Hardware: HMS -- 2.11.6 IT Security: Claroty --2.11.7 Accenture Is a Systems Integrator -- 2.11.8 Additive Manufacturing: General Electric -- 2.11.9 Augmented and Virtual Reality: Upskill -- 2.11.10 ABB Collaborative Robots -- 2.11.11 Connected Vision System: Cognex -- 2.11.12 Drones/UAVs: PINC --2.11.13 Self-Driving in Vehicles: Clear Path Robotics -- 2.12 Conclusion -- References -- Chapter 3 Interaction of Internet of Things and Sensors for Machining -- 3.1 Introduction -- 3.2 Various Sensors Involved in Machining Process -- 3.2.1 Direct Method Sensors. 3.2.2 Indirect Method Sensors -- 3.2.3 Dynamometer -- 3.2.4 Accelerometer -- 3.2.5 Acoustic Emission Sensor -- 3.2.6 Current Sensors -- 3.3 Other Sensors -- 3.3.1 Temperature Sensors -- 3.3.2 Optical Sensors -- 3.4 Interaction of Sensors During Machining Operation -- 3.4.1 Milling Machining -- 3.4.2 Turning Machining --3.4.3 Drilling Machining Operation -- 3.5 Sensor Fusion Technique --3.6 Interaction of Internet of Things -- 3.6.1 Identification -- 3.6.2 Sensing -- 3.6.3 Communication -- 3.6.4 Computation -- 3.6.5 Services -- 3.6.6 Semantics -- 3.7 IoT Technologies in Manufacturing Process -- 3.7.1 IoT Challenges -- 3.7.2 IoT-Based Energy Monitoring System -- 3.8 Industrial Application -- 3.8.1 Integrated Structure --3.8.2 Monitoring the System Related to Service Based on Internet of Things -- 3.9 Decision Making Methods -- 3.9.1 Artificial Neural Network -- 3.9.2 Fuzzy Inference System -- 3.9.3 Support Vector Mechanism -- 3.9.4 Decision Trees and Random Forest -- 3.9.5 Convolutional Neural Network -- 3.10 Conclusion -- References --Chapter 4 Application of Internet of Things (IoT) in the Automotive

Industry -- 4.1 Introduction -- 4.2 Need For IoT in Automobile Field --4.3 Fault Diagnosis in Automobile -- 4.4 Automobile Security and Surveillance System in IoT-Based -- 4.5 A Vehicle Communications --4.6 The Smart Vehicle -- 4.7 Connected Vehicles -- 4.7.1 Vehicle-to-Vehicle (V2V) Communications -- 4.7.2 Vehicle-to-Infrastructure (V2I) Communications -- 4.7.3 Vehicle-to-Pedestrian (V2P) Communications -- 4.7.4 Vehicle to Network (V2N) Communication -- 4.7.5 Vehicle to Cloud (V2C) Communication -- 4.7.6 Vehicle to Device (V2D) Communication -- 4.7.7 Vehicle to Grid (V2G) Communications -- 4.8 Conclusion -- References -- Chapter 5 IoT for Food and Beverage Manufacturing -- 5.1 Introduction -- 5.2 The Influence of IoT in a Food Industry.

5.2.1 Management -- 5.2.2 Workers -- 5.2.3 Data -- 5.2.4 IT -- 5.3 A Brief Review of IoT's Involvement in the Food Industry -- 5.4 Challenges to the Food Industry and Role of IoT -- 5.4.1 Handling and Sorting Complex Data -- 5.4.2 A Retiring Skilled Workforce -- 5.4.3 Alternatives for Supply Chain Management -- 5.4.4 Implementation of IoT in Food and Beverage Manufacturing -- 5.4.5 Pilot -- 5.4.6 Plan --5.4.7 Proliferate -- 5.5 Applications of IoT in a Food Industry -- 5.5.1 IoT for Handling of Raw Material and Inventory Control -- 5.5.2 Factory Operations and Machine Conditions Using IoT -- 5.5.3 Quality Control With the IoT -- 5.5.4 IoT for Safety -- 5.5.5 The Internet of Things and Sustainability -- 5.5.6 IoT for Product Delivery and Packaging -- 5.5.7 IoT for Vehicle Optimization -- 5.5.8 IoT-Based Water Monitoring Architecture in the Food and Beverage Industry -- 5.6 A FW Tracking System Methodology Based on IoT -- 5.7 Designing an IoT-Based Digital FW Monitoring and Tracking System -- 5.8 The Internet of Things (IoT) Architecture for a Digitized Food Waste System -- 5.9 Hardware Design: Intelligent Scale -- 5.10 Software Design --References -- Chapter 6 Opportunities: Machine Learning for Industrial IoT Applications -- 6.1 Introduction -- 6.2 I-IoT Applications -- 6.3 Machine Learning Algorithms for Industrial IoT -- 6.3.1 Supervised Learning -- 6.3.2 Semisupervised Learning -- 6.3.3 Unsupervised Learning -- 6.3.4 Reinforcement Learning -- 6.3.5 The Most Common and Popular Machine Learning Algorithms -- 6.4 I-IoT Data Analytics -- 6.4.1 Tools for IoT Analytics -- 6.4.2 Choosing the Right IoT Data Analytics Platforms -- 6.5 Conclusion -- References -- Chapter 7 Role of IoT in Industry Predictive Maintenance -- 7.1 Introduction -- 7.2 Predictive Maintenance -- 7.3 IPdM Systems Framework and Few Key Methodologies.

7.3.1 Detection and Collection of Data -- 7.3.2 Initial Processing of Collected Data -- 7.3.3 Modeling as Per Requirement -- 7.3.4 Influential Parameters -- 7.3.5 Identification of Best Working Path --7.3.6 Modifying Output With Respect Sensed Input -- 7.4 Economics of PdM -- 7.5 PdM for Production and Product -- 7.6 Implementation of IPdM -- 7.6.1 Manufacturing with Zero Defects -- 7.6.2 Sense of the Windsene INDSENSE -- 7.7 Case Studies -- 7.7.1 Area 1-Heavy Ash Evacuation -- 7.7.2 Area 2-Seawater Pumps -- 7.7.3 Evaporators --7.7.4 System Deployment Considerations in General -- 7.8 Automotive Industry-Integrated IoT -- 7.8.1 Navigation Aspect -- 7.8.2 Continual Working of Toll Booth -- 7.8.3 Theft Security System -- 7.8.4 Black Box-Enabled IoT -- 7.8.5 Regularizing Motion of Emergency Vehicle --7.8.6 Pollution Monitoring System -- 7.8.7 Timely Assessment of Driver's Condition -- 7.8.8 Vehicle Performance Monitoring -- 7.9 Conclusion -- References -- Chapter 8 Role of IoT in Product Development -- 8.1 Introduction -- 8.1.1 Industry 4.0 -- 8.2 Need to Understand the Product Architecture -- 8.3 Product Development Process -- 8.3.1 Criteria to Classify the New Products -- 8.3.2 Product

	Configuration 8.3.3 Challenges in Product Development while Developing IoT Products (Data-Driven Product Development) 8.3.4 Role of IoT in Product Development for Industrial Applications 8.3.5 Impacts and Future Perspectives of IoT in Product Development 8.4 Conclusion References Chapter 9 Benefits of IoT in Automated Systems 9.1 Introduction 9.2 Benefits of Automation 9.2.1 Improved Productivity 9.2.2 Efficient Operation Management 9.2.3 Better Use of Resources 9.2.4 Cost-Effective Operation 9.2.5 Improved Work Safety 9.2.6 Software Bots 9.2.7 Enhanced Public Sector Operations 9.2.8 Healthcare Benefits. 9.3 Smart City Automation.
Sommario/riassunto	This book broadly explores the latest developments of IoT and its integration into mechanical and manufacturing engineering. It details the fundamental concepts and recent developments in IoT & Industry 4.0 with special emphasis on the mechanical engineering platform for such issues as product development and manufacturing, environmental monitoring, automotive applications, energy management, and renewable energy sectors. Topics and related concepts are portrayed comprehensively so that readers can develop expertise and knowledge in the field of IoT. It is packed with reference tables and schematic diagrams for the most commonly used processes and techniques, thereby providing a resource on the basic principles and application of IoT in manufacturing sectors.