

1. Record Nr.	UNINA9910555250203321
Autore	Massaro Alessandro <1974->
Titolo	Electronics in advanced research industries : industry 4.0 to industry 5.0 advances // Alessandro Massaro
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons, Inc., , [2021] ©2021
ISBN	1-119-71689-6 1-119-71690-X 1-119-71688-8
Descrizione fisica	1 online resource (538 pages)
Disciplina	658.4038028563
Soggetti	Industry 4.0 Electronics - Safety measures
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- About the Author -- Chapter 1 State of the Art and Technology Innovation -- 1.1 State of the Art of Flexible Technologies in Industry -- 1.1.1 Sensors and Actuators Layer: I/O Layer -- 1.1.2 Agent/Firmware Layer: User Interface Layer -- 1.1.3 Gateway and Enterprise Service Bus Layer -- 1.1.4 IoT Middleware -- 1.1.5 Processing Layer -- 1.1.6 Application Layer -- 1.1.7 File Transfer Protocols -- 1.2 State of the Art of Scientific Approaches Oriented on Process Control and Automatisms -- 1.2.1 Architectures Integrating AI -- 1.2.2 AI Supervised and Unsupervised Algorithms -- 1.2.3 AI Image Processing -- 1.2.4 Production Process Mapping -- 1.2.5 Technologies of Industry 4.0 and Industry 5.0: Interconnection and Main Limits -- 1.2.6 Infrared Thermography in Monitoring Process -- 1.2.7 Key Parameters in Supply Chain and AI Improving Manufacturing Processes -- 1.3 Intelligent Automatic Systems in Industries -- 1.4 Technological Approaches to Transform the Production in Auto-Adaptive Control and Actuation Systems -- 1.5 Basic Concepts of Artificial Intelligence -- 1.6 Knowledge Upgrading in Industries -- References -- Chapter 2 Information Technology Infrastructures Supporting Industry 5.0

Facilities -- 2.1 Production Process Simulation and Object Design Approaches -- 2.1.1 Object Design of a Data Mining Algorithm: Block Functions and Parameter Setting -- 2.1.2 Example 1: BPM Modeling of Wheat Storage Process for Pasta Production -- 2.1.3 Example 2: Block Diagram Design of a Servo Valve Control and Actuation System -- 2.1.4 Example 3: Block Diagram of a Liquid Production System -- 2.1.5 Example 4: UML Design of a Programmable Logic Controller System -- 2.1.6 Example 5: Electronic Logic Timing Diagram -- 2.1.7 Example 6: AR System in Kitchen Production Process. 2.1.8 Example 7: Intelligent Canned Food Production Line -- 2.2 Electronic Logic Design Oriented on Information Infrastructure of Industry 5.0 -- 2.3 Predictive Maintenance: Artificial Intelligence Failure Predictions and Information Infrastructure Layout in the Temperature Monitoring Process -- 2.4 Defect Estimation and Prediction by Artificial Neural Network -- 2.4.1 Other Methodologies to Map and Read Production Failures and Defects -- 2.5 Defect Clustering and Classification: Combined Use of the K-Means Algorithm with Infrared Thermography for Predictive Maintenance -- 2.6 Facilities of a Prototype Network Implementing Advanced Technology: Example of an Advanced Platform Suitable for Industry 5.0 Integrating Predictive Maintenance -- 2.7 Predictive Maintenance Approaches -- 2.7.1 Preventive Maintenance and Predictive Maintenance Operations in the Railway Industry -- 2.8 Examples of Advanced Infrastructures Implementing AI -- 2.9 Examples of Telemedicine Platforms Integrating Advanced Facilities -- 2.9.1 Advanced Telecardiology Platform -- 2.9.2 Advanced Teleoncology Platform -- 2.9.3 Multipurpose E-Health Platform -- References -- Chapter 3 Human-Machine Interfaces -- 3.1 Mechatronic Machine Interface Architectures Integrating Sensor Systems -- 3.1.1 Multiple Mechatronic Boards Managing Different Production Stages -- 3.1.2 Mechatronic Boards Managing Component Processing -- 3.2 Machine-to-Machine Interfaces: New Concepts of Industry 5.0 -- 3.3 Production Line Command and Actuation Interfaces in Upgraded Systems -- 3.3.1 PLC, PAC, Industrial PC, and Improvements -- 3.3.2 SCADA Systems for Centralization of Data Production -- 3.4 McCulloch-Pitts Neurons and Logic Port for Automatic Decision-Making Setting Thresholds -- 3.5 Programmable Logic Controller I/O Ports Interfacing with AI Engine. 3.6 Human-Machine Interface for Data Transfer and AI Data Processing -- 3.7 Example of Interface Configuration of Temperature Control -- 3.8 AI Interfaces Oriented on Cybersecurity Attack Detection -- 3.9 AI Interfaces Oriented on Database Security -- 3.10 Cybersecurity Platform and AI Control Interface -- References -- Chapter 4 Internet of Things Solutions in Industry -- 4.1 Cloud Computing IoT -- 4.1.1 IoT Agent -- 4.1.2 IoT Gateway in Smart Environments -- 4.1.3 Basic Elements of a Smart Industry Environment Controlling Production -- 4.1.4 Augmented Reality Hardware and Cloud Computing Processing -- 4.1.5 Real-Time Control and Actuation -- 4.1.6 Localization Technologies in an Industrial Environment -- 4.1.7 GPU Processing Units -- 4.2 IoT and External Artificial Intelligence Engines -- 4.2.1 Artificial Engines and Server Location: Artificial Intelligence and Adaptive Production -- 4.2.2 IoT Security Systems in the Working Environment and Implementation Aspects -- 4.2.3 Example of Energy Power Control and Actuation: Energy Routing and Priority Load Management for Energy Efficiency -- 4.2.4 Online Configurators: Cloud DSS -- 4.3 Blockchain and IoT Data Storage Systems -- 4.3.1 Blockchain Implementation Rules -- 4.3.2 Blockchain and IoT Production Traceability -- 4.4 Mechatronic Machine Interface Architectures Integrating Sensor Systems -- 4.5 Multiple Mechatronic

Boards Managing Different Production Stages -- References -- Chapter 5 Advanced Robotics -- 5.1 Collaborative Robotics in Industry and Protocols -- 5.1.1 Data Protocols -- 5.1.2 Basic Concepts of Robotic Arms and Control Improvement -- 5.1.3 Collaborative Exoskeleton Communication System Protocols -- 5.1.4 Advanced Robotics and Intelligent Automation in Manufacturing: Logic Conditions and PLC Programming -- 5.2 Artificial Intelligence in Advanced Robotics and Auto-Adaptive Movement.

5.2.1 General Technological Aspects about Auto-Adaptive Motion in Advanced Robotics -- 5.2.1.1 Main Aspects of Electrostatic Actuators -- 5.2.1.2 Microelectromechanical System Electrostatic Actuators -- 5.2.1.3 Piezoelectric Actuators -- 5.2.1.4 DC Motor Actuation -- 5.2.1.5 Intelligent Control Integrating AI: Speed Regulation -- 5.2.2 Improvement of Collaborative Exoskeletons by Auto-Adaptive Solutions Implementing Artificial Intelligence -- 5.3 Human-Robot Self-Learning Collaboration in Industrial Applications and Electronic Aspects -- 5.3.1 DC-DC Converter -- 5.3.2 Voltage Source Inverter -- 5.3.3 Current-Source Inverter -- 5.3.4 DC Voltage Source -- 5.3.5 Capacitor and Reactor Effects on Signal Control -- 5.3.6 Human-Robot System and Learning Approaches -- 5.3.6.1 Example of PID Implementation of Self-Adapting Gains -- 5.3.7 Unsupervised Learning Approaches -- 5.3.8 Soft Robotics for Intelligent Collaborative Robotics -- 5.4 Robotics in Additive Manufacturing -- 5.4.1 Additive Manufacturing in Industrial Production and Spray Technique -- 5.4.2 Artificial Intelligence Applications in Additive Manufacturing -- 5.4.3 Advanced Electronic for Design-to-Product Transformation: Laser Texturing Manufacturing and Artificial Intelligence -- References -- Chapter 6 Advanced Optoelectronic and Micro-/Nanosensors -- 6.1 Nanotechnology Laboratories in Industries -- 6.1.1 Facilities for Micro-/Nanosensor Fabrication and Characterization -- 6.2 Micro- and Nanosensors as Preliminary Prototypes for Industry Research -- 6.2.1 Nanocomposite Optoelectronic Sensors and Optoelectronic Circuits for Pressure Sensors -- 6.2.1.1 Optical Fiber Nanocomposite Tip -- 6.2.2 Plasmonic Probes -- 6.2.3 Nanocomposite Pressure Sensor -- 6.2.4 Nanocomposite Sensor for Liquid Detection Systems and Fluid Loss Systems.

6.2.4.1 Nanocomposite Sensor for Liquid Detection Systems Based on a Pillar-Type Layout -- 6.2.4.2 Micro- and Nanosensors in the Monitoring of Production Processes: Leakage Monitoring -- 6.2.5 Examples of Digital MEMS/NEMS Sensors: Technological Aspects and Applications -- 6.2.5.1 Thin Film MEMS -- 6.2.5.2 Nanoprobes for Medical Imaging -- 6.2.5.3 Diamond Thin Film Devices: Sensing Improvements -- 6.3 Multisensor Systems and Big Data Synchronization of Micro-/Nanoprobes -- References -- Chapter 7 Image Vision Advances -- 7.1 Defect Classification by Artificial Intelligence and Data Processor Units -- 7.1.1 Artificial Intelligence Algorithms and Automatism for Defect Classification: Case Study of Tire Production -- 7.1.2 Welding Classification and Nondestructive Testing Suitable for the Quality Check -- 7.1.2.1 Watershed Image Segmentation and Automatic Welding Defect Classification -- 7.1.3 Encoding and Decoding Circuits in Artificial Intelligence Data Processing -- 7.1.4 Electronic Logic Port Implementations: Pixel Matrix Logic Condition -- 7.2 Image Vision Architectures and Electronic Design -- 7.2.1 Infrared Thermography Monitoring Industrial Processes -- 7.2.1.1 Welding Image Vision Processing and Architecture Design: Radiometric Post Processing -- 7.2.2 Electronic and Firmware for Inline Image Monitoring Systems: Hole Precision in Milling Quality Processes -- 7.2.3 Image Vision and Predictive Maintenance by Artificial

Intelligence -- 7.2.3.1 Profilometer for Image Vision -- 7.2.3.2 In-Line
3D Image Vision AI System Integrating Profilometer and Image
Processing -- 7.2.4 Augmented Reality Systems and Artificial Neural
Networks: Image Vision Supporting Production Processes -- 7.2.5
Infrared Thermography Circuit Design and Automated System -- 7.3
Image Segmentation and Image Clustering.
7.3.1 Electronic and Firmware for In-Line Monitoring Systems: Camera
Connection.
