

| | |
|-------------------------|--|
| 1. Record Nr. | UNINA9910767572903321 |
| Titolo | EcoMechatronics : challenges for evolution, development and sustainability // edited by Peter Hehenberger, Maki Habib, and David Bradley |
| Pubbl/distr/stampa | Cham, Switzerland : , : Springer, , [2023] ©2023 |
| ISBN | 3-031-07555-2 |
| Descrizione fisica | 1 online resource (378 pages) |
| Disciplina | 620.0042 |
| Soggetti | Mechatronics Renewable energy sources Engineering design |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Nota di bibliografia | Includes bibliographical references and index. |
| Nota di contenuto | Intro -- Foreword -- Contents -- Editors and Contributors -- EcoMechatronics: Concepts, Objectives and Outcomes -- Introduction -- Synergy of Digital, Sustainable and Agile Transformations for EcoMechatronics -- The EcoMechatronics-Paradigm -- Goals, Structure and Content of the Book -- References -- Methods + Technologies -- Re-envisioning Innovation for Sustainability -- Introduction -- What is Sustainability? -- Nature, Inspiration and Learning -- Sustainability Assessment and Life Cycle -- EcoMechatronics -- Braking System-An EcoMechatronic Case Study -- Conclusions -- References -- Mechatronic Applications in Respect of Sustainability and Climate Change -- Introduction -- The Technology of Sustainability -- Connectivity Web -- EcoMechatronics-Technology of Climate Change -- Power Generation -- Advanced Electronics and Battery Chemistry -- Green Power -- The Global Population Needs Access to Verified Data -- The Strategy of Mitigating Blocking-How EcoMechatronics Can Affect Political and Civil Change -- The Mechatronics of Food Supply -- The Mechatronics of General Transportation and Batteries-Transportation Contributes an Estimated 32% to CO2 Emissions: Technology Can Stop Most of This -- Global Impact on the Local-EcoMechatronics Helps Identify the Cause |

and Effect of the Climate Feedback Loops, Tipping Points and Other Complex Relationships -- Applying Advanced Sensors-Rapid Development in Sensor Technology Across All Domains of EcoMechatronics Delivers Solutions -- The Effect of the Foregoing Paths on Sustainability and Resilience-The Conferences of COP, Paris Accord, the Noble Prize Group and Stockholm Institute Indicates that Even if Governments Are Not Moving Fast Enough, Others Are! [8, 28] -- Conclusions -- References -- EcoMechatronics and Bioinspired Design Ecology, Circular Economy, and Sustainability -- Introduction. Bioinspiration: Biomimicry, Circular Economy, and Sustainability -- Bioinspiration -- Biomimicry: Ecosystem and Circular Economy -- Biomimetic Design and Sustainability -- Biomimicry: Ecology, Circular Economy, and Sustainability -- Engineering Design Methodologies -- Bioinspired Design Methodologies -- Need for Effective Bioinspired Design and Tools -- Conclusions -- References -- A Holistic and Sustainable View on the Product Creation Process for Mechatronic Systems -- Introduction -- Background -- Viewpoints on Methodological Approaches for Mechatronics -- Applications -- Conclusions -- References -- Applied Sensor Technologies -- Introduction -- Sensor Technologies -- Electromyography (EMG) Sensors -- Inertial Measurement Units (IMUs) -- Force Sensors -- Vision Sensors -- Analytical Methods -- Heuristic Methods -- Machine Learning Methods -- Deep Learning Methods -- Case Studies -- Wearable Assistive Robots for Locomotion Activities -- Recognition of Walking Activities and Assistance -- Future Directions in Research and Sensor Technologies -- Conclusions -- References -- MBSE for Mechatronic Systems Design with Human, Energetic, Cyber, and Physical Aspects -- Introduction -- New Conceptual Framework for Mechatronic Systems -- MBSE as a Support to EcoMechatronics -- A Layered System Model for the Insulin Pump -- Specification Matrix for EcoMechatronics Design -- Conclusions, Future Work -- References -- Concurrent Multi-domain Modelling and Simulation for Energy-Efficient Mechatronic Systems -- Introduction -- Performance-Based Versus Sustainability-Based Design -- The Design and Development of Sustainable Mechatronic Systems -- The Concurrent Multi-domain Modelling and Simulation for Mechatronic System Development -- Case Study: Hangar Sliding Door System -- Discussion -- Conclusions -- References -- Artificial Intelligence, Ethics and Privacy. Introduction -- Artificial Intelligence -- Ethics and Ethical Issues -- Privacy and Privacy Issues -- The Role of Big Data -- Exemplars -- Algorithmic Discrimination -- Business Models -- Health Care -- Military Systems -- Vehicle Systems -- Conclusions -- References -- Applications -- Mechatronic Applications in Rail Systems and Technologies -- Introduction -- Industry Vision -- Embedding Mechatronics in Transport -- Military Aerospace -- Automotive Systems -- Rail -- The Rail Vehicle 'Opportunity Space' -- Power and Propulsion -- Active Suspension Systems -- Braking Systems -- More or All Electric Trains -- Rail Mechatronics -- Fully Integrated Vehicle -- Systems Perspective: What Can We Achieve with Control? -- Examples of 'Enabling Technology' Projects -- Vehicle Mechatronics -- Infrastructure Mechatronics -- Systems Mechatronics -- Conclusions -- References -- Sustainable Mechatronic Solution for Agricultural Precision Farming Inspired by Space Robotics Technologies -- Introduction -- Mechatronic Approach With a Focus on Energy Consumption of The Systems -- Design Methodology -- Energy Focused Mechatronic Modelling -- AgriRover Design as an Example -- Perception of Agricultural Environment Through Vision -- An Energy Efficient Path Planning for a Field Trial -- Dynamic Energy Modelling

and Simulation -- Field Tests -- Comparison of Simulation and Field Test Results -- Future EcoMechatronic Development -- AgriRover Enabled New Energy Efficient and Sustainable Approach to Food Production -- An Energy Optimization Method in Path Planning for Multiple Robots -- Conclusions -- References -- The Achievement of Sustainability in the Built Environment -- Introduction -- Technologies -- Antonio Brancati School -- Construction and Environmental Issues -- Smart Building Technologies -- Heating, Lighting and Ventilation -- Lighting -- Ventilation.

Green Solution Awards -- Issues and Concerns -- Future Trajectories -- Smart Cities and Big Data -- People -- Conclusions -- References -- Eco-Design of Mechatronic Hydropower Device in River -- Introduction -- Cycloidal Turbine with Optimal Blade Pitch Control -- Hydraulic Transmission System -- Mechatronic Control System -- Conclusion and Future Work -- References -- Micro/Nanopositioning Systems with Piezoelectric Actuators and Their Role in Sustainability and Ecosystems -- Introduction -- Role of Piezo-Actuated Micro/Nanopositioning Systems in Biodiversity Protection and Sustainable Manufacturing -- Different Types of Piezoelectric Actuators in Micro/Nanopositioners -- Different Types of Sensors Used in Micro/Nanopositioners -- Control System of Micro/Nanopositioners -- Conclusions -- References -- Eco Motion Planning for Mechatronic Systems -- Introduction -- Literature Review -- A Paradigmatic Test Case: A Robotic Cell -- Energy Optimization -- Linear Unit -- SCARA Robot -- Analysis of the Cell -- Analysis of the Robot Joint Motion -- Conclusion -- References -- Minimization of CO₂-Footprint of Hybrid Propulsion Systems for Mobility and Power-Tool Applications -- Introduction -- Mechatronic Powertrain -- Hybrid Powertrain Concepts -- Development Process -- Research and Concept Development Phase -- Pre-development -- Product Development -- Development Framework -- Production Technology and Material Matrix -- Computer-Aided Design Software -- Longitudinal Vehicle Dynamics Simulation LDS -- Examples -- Concept and Layout of a Hybrid Propulsion for Power Sport Vehicles -- Concept and Layout of a Hybrid Propulsion for Hand-Held Power Tool -- Summary -- References -- Education -- Developing Education in Mechatronics to Support the Challenges for Evolution, Development, and Sustainability -- Introduction -- Background.

Learn from Yesterday-Live for Today -- Background -- A Brief Reflection on Mechatronics History -- A Brief Reflection of Historic Mechatronics Founders -- A Brief Reflection of Mechatronics Education History -- Key Competencies Required to Approach the Challenges of the Future -- Looking Back: Tool Integration, Systems Modeling, and Communication -- A Current Study on Mechatronics Product Development -- 5 People or 1000 People? Small Project or Large Project? -- Shaping Education -- Embedded Systems and Systems Engineering -- International Council of Systems Engineering, INCOSE -- ITRL-Moving System Boundaries -- Proposing a Way Forward -- Bachelor's Degree Level -- Master's Degree Level -- Life-Long Learning -- Conclusions -- References -- Education and Simulation for Electric and Mechatronic Systems in Renewable Energy -- Introduction -- Overview of Applications -- Educational Methods -- Textbook -- Numerical Examples -- Animation -- Design Tool -- Simulation and Animation -- Virtual Prototype -- Laboratory Assignment -- Remote Laboratory -- Verify Laboratory Results with Simulation Results -- Modeling Domains -- Mathematics of Modeling -- Block Diagram -- Circuit Model -- Finite Elements -- Thermal Mathematics Example -- Modeling Detail -- First Grade Courses -- Detailed Simulation --

Control Design -- Example Simulation -- Drive Cycle -- Electric Vehicle Simulation -- Worked-Out Example -- Companion Website -- Conclusions -- References -- Robot-Assisted Teaching-The Future of Education? -- Introduction -- Part I-Kristina Kerwin -- The Researcher's View -- The Theory of Learning -- Vygotsky's Cultural-Historical Theory -- Case Study-The Efficacy of Teaching STEM Subjects to Primary School Age Students Using LEGO Robots -- Design of Experiment -- Results -- Level of Surface and Deep Learning Data Analysis -- Conclusion-The Researcher's View.
Part II-Robert Rayner.
