

SPECIAL ISSUE ON NOVEL SENSORS, MATERIALS, AND RELATED TECHNOLOGIES ON ARTIFICIAL INTELLIGENCE OF THINGS APPLICATIONS: PART 6-2

PREFACE



In recent years, the booming economic development in Asia, particularly the leading manufacturing industries from automobiles, machinery, computers, communication, consumer products, and flat panel displays to semiconductors and micro/nano areas have attracted intense attention among universities, research institutions, and many industrial corporations. Therefore, applications of novel sensors, materials, and related technologies in electronic and mechanical devices have become rapidly developing fields. Manufacturing is the economic lifeline of a country and has been regarded as a labor-intensive industry. To reduce production costs, devices for the Internet of Things (IoT) have been widely developed. IoT is composed of most integrated end devices and facilities, such as intelligent sensors for internal control, industrial systems, mobile terminal systems, floor control systems, and home intelligent facilities. Smart devices and external control information are utilized with the hope of attracting companies that manufacture high-value-added products in the fields of aerospace, automotive, Information Technology (IT) molds, textiles, optoelectronics, watches, medical devices, automation, energy, and semiconductor-related parts and components to drive the country's economy. Therefore, the key to maintaining a competitive advantage in domestic manufacturing in the future still relies on the development of novel manufacturing and precision machinery-related technologies.

In addition, artificial intelligence (AI) is intelligence exhibited by machines, particularly computer systems. The artificial intelligence of things (AIoT) is the combination of AI technologies with IoT infrastructure to achieve more efficient IoT operations, improve human-machine interactions and enhance data management and analytics. The scope of this special issue entitled "Novel Sensors, Materials, and Related Technologies on Artificial Intelligence of Things Applications" covers fundamental and novel sensors, materials, and technologies related to AIoT for electronic, mechanical, and electrical engineering, including their synthesis and integration with many elements, the design of electronic and optical devices, sensing technologies, evaluation of various performance characteristics, and exploration of their broad applications to industry, environmental control, materials analyses, and so forth. In part 6-2 of this special issue, 16 excellent papers in five categories of sensors and materials fields have been selected.

- (1) Physical/Mechanical Sensors: “Design and Experimental Validation of a Multi-output Power Management Unit for a Multiple-particles Analyzer under Dynamic-load and Thermal-vacuum Conditions” by Cheng *et al.*, and “Automated Cylindrical Electromagnetic Shielding Enclosure with Ferrite-based Microwave-absorbing O-rings” by Chen *et al.*, and “Sensor-oriented Finite Element Analysis of Helmet Impact Response for Human Head Protection” by Chi *et al.*
- (2) Bio chemical Sensors: “Real-time Monitoring of CO₂ Capture and Syngas Production Using Integrated Sensing Systems and Waste Platinum Catalyst” by Jou and Lee.
- (3) Materials: “Alternating Current Etching Method for Fabrication of High-performance Aluminum Electrolytic Capacitors” by Lin *et al.*, and “Optimization Parameters for Ceramic Crown Crack Repair with Strength and Biocompatibility Testing” by Chien *et al.*
- (4) Related Technologies: “Adaptive Control of Occupant Comfort in Dynamic Architecture Using Sensor Data” by Wei and Chen, and “Optimization of Sensor Network for Automated Chip Sorting and Carbon Emission Reduction: Fuzzy Analytic Hierarchy Process-based Decision-making” by Zhijie *et al.*, and “Application of Battery Energy Storage Systems for Power Demand Smoothing in Industrial Machinery and Equipment” by Hsu *et al.*, and “Sensor-based Digital Twins: Perceptual and Spatial Evaluation by Comparing Physical and Virtual Reality Exhibitions” by Zhang and Lin, and “Analysis of Thermal Behavior in Liquid-cooling Battery Systems for Electric Vehicles Exposed to Solar Irradiance” by Deng *et al.*, and “Cloud-based Workplace Safety System Using Multi-algorithm Integrated Sensor Data Fusion” by Ho *et al.*
- (5) Sensor Applications: “Targeted Fitness Improvement Through Aerobic Exercise Using Advanced Sensors and Internet of Things” by Deng *et al.*, and “Improvement for Embedded Firmware Emulation Applying FirmAE” by Kuo *et al.*, and “Analyses of Stress and Strain in the Optic Nerve of Eyeballs with Different Axial Lengths under G-forces” by Lee *et al.*, and “Design and Implementation of a Sensor-integrated Intelligent Task Management System Based on Hierarchical Agent Collaboration and Dynamic Negotiation” by Chen *et al.*

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