

SPECIAL ISSUE ON NOVEL SENSORS, MATERIALS, AND RELATED TECHNOLOGIES ON ARTIFICIAL INTELLIGENCE OF THINGS APPLICATIONS PART 5-1

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 5-1 of this special issue, 15 excellent papers in three categories of sensors and materials fields have been selected.

(1) Physical/Mechanical Sensors: "Design of Gravity Casting Parameters for Bearing Seat in Wind Turbine by Multi-objective Optimization Approach" by Wei *et al*, and "One-time-varying

Sliding Mode Control and Adaptive-type Control of State Synchronization for Unified Chaotic Systems” by Yang, and “Kurtosis-guided Adaptive Wavelet Thresholding Method for Enhancing Fault Feature Extraction in Advanced Vibration Sensors” by Liu, and “Advanced Noninvasive Capacitive Coupling Sensors for Online Frequency-modulated Continuous-wave-based Localization of Insulation Defects in Cross-linked Polyethylene Cables” by Zhang *et al.*

(2) Related Technologies: “Real-time Mental Health Monitoring: Multisensor Technology and Machine Learning” by Shi, and “Detecting Learning Behaviors Using Deep-learning-based Classroom Teaching Quality Analysis System” by Liu *et al.*, and “High-precision Software-defined Sensing for Smart Retail and Interactive 3D Displays” by Ying and Hung, and “Thermomechanical Coupling Analysis and Process Window Optimization for Ultrahigh-strength 22MnB5 Steel in Hot Stamping: Simulation Study Using Sensor Data” by Lu *et al.*, and “Sensor Array Signal Classification Algorithm Based on Big Data Mining Fusion” by Bi *et al.*

(3) Sensor Applications: “Machine-learning-based Solution for Thin-film Quality in Chemical Vapor Deposition Coating Processes” by Liao *et al.*, and “Integration of Sensor Technology in Branding and Disseminating Intangible Cultural Heritage” by Liu *et al.*, and “Advanced Multimodal Sensors in Elderly Care: Assessing Economic Viability and Clinical Effectiveness” by Li and Wei, and “Sensing Technologies and Hardware Requirements for Health and Safety Monitoring of Pets Using IoT Microchips: Fuzzy Analytic Hierarchy Process-based Evaluation” by Wang *et al.*, and “Edge Computing Resource-Balanced Scheduling: Solving Efficiency and Load Issues via Hybrid Genetic–Ant Colony Optimization Algorithm” by Liu *et al.*, and “IoT Sensor-enabled Smart Guiding Systems for Heritage Village Tourism: Linking System Performance to Revisit Intention” by Lu *et al.*

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