

TOPICS ON NOVEL SENSORS, MATERIALS, AND RELATED TECHNOLOGIES ON ARTIFICIAL INTELLIGENCE OF THINGS APPLICATIONS: PART 7-1

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 7-1 of this special issue, 14 excellent papers in four categories of sensors and materials fields have been selected.

(1) Physical/Mechanical Sensors: “Si₃N₄/Cr-based Ultra-broadband Optical Absorber Covering the UV–visible–mid-IR Range (300–3850 nm)” by Guo *et al.*, and “Efficient Ordinary-differential-equation-based Sparse Data Reconstruction Algorithms for Real-time Signal Denoising in IoT Sensor Networks” by Ren *et al.*, and “Learning Paradigms for Data-driven Fault Diagnosis in Parallel Delta Robots: A Review” by Fang *et al.*

(2) Bio Chemical Sensors: “Multi-source Medical Sensor Data Fusion Using Transformer for Preoperative Assessment of Placenta Accreta Spectrum” by Liu *et al.*

(3) Related Technologies: “An Edge-based Intelligent Sensing System for Access Control with Face Recognition and Temporal Suspicious-behavior Detection” by Chen *et al.*, and “Virtual Sensing for Real-time Emotion Monitoring in Interactive Media Systems Using Bullet Screen” by Liu and Tseng, and “Spatiotemporal Thermal Fault Prediction for Electromechanical Equipment Using High-density Sensor Arrays and Attention-enhanced Algorithm” by Yu *et al.*, and “Federated Learning Multi-sensor Data Fusion for Privacy-preserving and Wi-Fi Spoofing Detection in Sensor Networks” by Lin and Mao, and “Sensor-based Knowledge Graph Modeling of Cognitive Pathways in Brand Information Recognition” by Liu *et al.*, and “Frequency-modulated Continuous-wave-based Distributed Sensing System for Partial Insulation Defect Localization in Distribution Cables: Impact on Connected Electrical Equipment” by Zhang *et al.*, and “Sensor Data Processing for Wind Power Forecasting Based on Bidirectional Long Short-term Memory Network Optimized with K-dimensional Tree, Density-Based Spatial Clustering, and Robust Iterative Multi-objective Engine” by Wang *et al.*, and “Sensor Technologies for Worker Safety: Integration of Ultra-wideband and an Inertial Measurement Unit for Hazard Monitoring in a Water Treatment Facility” by Ho *et al.*

(4) Sensor Applications: “Deep Generative Channel Estimation for Ultra-wideband Multiple-input Multiple-output: Enabling Communication and Sensing in Industrial IoT” by Zhang and Liu, and “A Sensing-information-assisted Gravity Model Integrating IoT Logistics and Maritime Sensing Indicators for Trade Potential Assessment” by Pang *et al.*

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