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Editorial: Advanced Industrial Networks with IoT and Big Data

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1 Editorial:

Internet of Thing (IoT) has the potential to deliver exciting things across many sectors, from industry to social media and home. These networks of things are designed to measure real-world events and expected to control more than two billion connected devices to the internet by 2020. Due to the advantage of low-cost, easy to deploy, energy efficiency and mobility compared to the traditionally applied field bus, industrial wireless sensor network has become a promising approach for manufactures as well as plant designers. With the paradigm of IoT, Industrial Wireless Sensor Networks (IWSNs) are evolving to the global interconnection between management and factory products in the large-scale industry. It serves as a link between data collected from heterogeneous sources on site and business backend. Recently, IWSN integrated with IoT and Big Data is an attractive choice for industrial processes. The large-scale industry consists of dense wireless devices such as RFID tags for machine identification, sensors used for large-scale rotational equipment monitoring and fault diagnosis and many more. With the data acquisition across heterogeneous sources and intelligent processing of gathered data, one important aspect is to predict any dangerous situation like leakage of toxic gas in large scale pipeline. Furthermore, the layout design procedure in the industry to ensure connectivity and information flow is also a part of IoT paradigm. Thus, the primary concerns of IWSN integrated with IoT and Big Data are capability, reliability, and cost. This special issue focuses on exploring recent emerging technologies and research developments on industrial networks and intelligent systems to advance the step towards the smarter plants integrated with IoT and Big Data.

This special issue selects six high-quality papers. The first article titled "Optimal and Elastic Energy Trading for Green Microgrids: A two-layer Game Approach" authored by Zhou et al. discusses the energy trading mechanism for microgrids. The article employs a two-layer game approach to achieve optimal and elastic energy trading for microgrids and significantly improved the utilization of microgrids' green energy. The proposed algorithms can reach the equilibriums where the players achieve optimal utilities. Finally, the existence and uniqueness of the equilibriums in the energy trading mechanism for microgrids are discussed.

Cloud-Radio Access Networks (C-RANs) that becomes an attractive solution to meet the enormous demand for diverse communications decouples the BaseBand processing Unit (BBU) from the Remote Radio Head (RRH). In the article "When Green Energy Meets Cloud Radio Access Network: Joint Optimization Towards Brown Energy Minimization", Guo et al. consider the network energy consumption and investigated a joint RRH-BBU association and energy sharing problem towards brown energy usage minimization in green energy powered C-RAN. A two-phase heuristic polynomial-time algorithm is proposed to minimize the computation complexity of solving mixed integer linear programming (MILP).

The third article titled "Diffusion Distance-Based Predictive Tracking for Continuous Objects in Industrial Wireless Sensor Networks" by Liu et al. proposes a diffusion distance-based predictive tracking algorithm is proposed for Industrial Wireless Sensor Networks (IWSNs) to track the boundary of a continuous object after the occurrence of a leak. To achieve high energy-efficiency, a sleep-wake cycle is introduced to select a subset of nodes in the process of tracking, while the rest of the nodes stay idle until an object approaches. Finally, a cluster-based competitive mechanism is proposed for reporting the location of boundary nodes.

In the next article with the title "A Simplified Interference Model for Outdoor Millimeter-wave Networks", Jiang et al. consider the Millimeter-wave (mmWave) communication that becomes an emerging technology for wireless networks to

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support the Industry 4.0 implementation. They investigated the accuracy of an interference model for outdoor mmWave networks that assumes impenetrable obstacles and neglects the sidelobes. They quantify the error of regarding statistical distribution of the signal-to-noise-plus-interference ratio for outdoor mmWave networks under different antenna array settings.

The fifth article titled "Data Driven Cyber-Physical System for Landslide Detection" introduces a data-driven cyber-physical system is introduced to detect landslides, one of the most dangerous natural disasters. This proposed system is composed of Wi-Sun acceleration sensors to detect the acceleration of the nearby environment in a 3D domain. Moreover, low computational complexity-based landslide detection mechanism is proposed. The proposed scheme aims to save the energy consumption without any significant degradation in the detection performance. Furthermore, results from the field test verify the system's effectiveness.

The last article titled "Contract-theoretic Approach for Delay Constrained Offloading in Vehicular Edge Computing Networks" by Zhang et al. proposes a new Vehicular Edge Computing (VEC) framework to model the computation offloading process of the mobile vehicles running on a bidirectional road. They adopted a contract theoretic approach to design optimal offloading strategies for the VEC service provider, to maximize the revenue of the provider while enhancing the utilities of the vehicles. To further improve the utilization of the computing resources of the VEC servers, the authors incorporate task priority distinction as well as an additional resource providing into the design of the offloading scheme.

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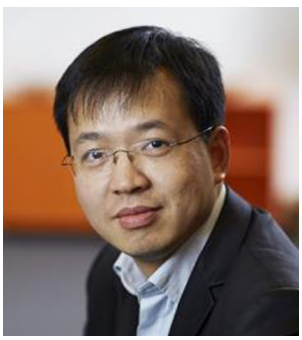

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