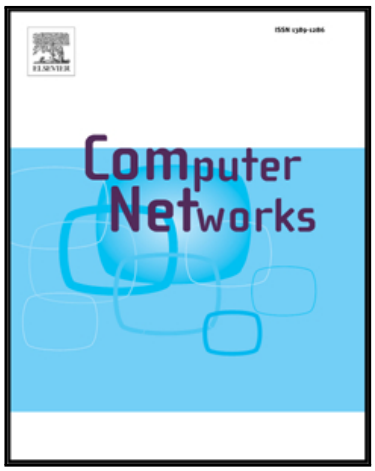

Industrial Technologies and Applications for the Internet of Things

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Industrial Technologies and Applications for the Internet of Things

Recently, the widespread deployment of Wireless Sensor Networks (WSN), embedded computing and inexpensive sensors has fostered the rise of an Industrial Internet of Things (IIoT). IIoT is the direct motivation and drive for the industrial upgrading, e.g., Industry 4.0. With the support of emerging technologies, IIoT is capable of continuously capturing information from various sensors and objects, securely sending sensor readings to cloud-based data centers, and seamlessly adjusting manufacturing parameters via a closed loop system. IIoT can effectively detect failures and trigger maintenance processes, autonomously reacting to unexpected changes in production. However, it is challenging to capture, semantically analyze and employ data in a coherent manner from heterogeneous, sensor-enabled devices (e.g., industrial equipment, assembly lines, and transport trucks) owing to the lack of unified measurement tools, collection protocols, standardized APIs and security guidelines.

This special issue on Industrial Technologies and Applications for the Internet of Things solicits the manuscripts on rigorous research on theories, methodologies, tools and testbeds for IIoT. In response to the call for papers, we were pleased to receive 55 manuscripts from all over the world, which was far beyond our expectation. Only 15 papers were selected from a total of 55 submissions. Each paper was carefully reviewed by peer review and guest editors. In the following, we will overview the accepted papers that reflect recent advances.

In the paper entitled “Closed-loop design evolution of engineering system using condition monitoring through internet of things and cloud computing”, Xia et al. propose an evolution design framework to achieve continuous design improvement for an engineering system through the use of a machine condition monitoring system. In the proposed framework, they illustrate the mechanisms that Internet of Things and cloud computing use to address the enduring challenges in massive data acquisition, transmission, storage and processing. They also point out that dynamic design requirements and potential design weakness can be resolved through condition monitoring, design weakness detection and evolutionary design optimization.

Wireless charging techniques provide a promising way to solve the energy constraint problem in industrial wireless rechargeable sensor networks. In the paper entitled “A grid-based joint routing and charging algorithm for industrial wireless rechargeable sensor networks”, Han et al. put forward a routing and charging algorithm to proactively solve the charging problem. The algorithm consists of two steps. Firstly, a new routing protocol is designed based on charging characteristics of the charger to achieve local energy balance. Secondly, the proposed protocol recommends a charging schedule associated with charging points on the basis of energy consumption to achieve global energy balance. The extensive simulation results demonstrate the superiority of the proposed algorithm regarding prolonging lifetime of the nodes.

IIoT needs a huge amount of location-based sensory data to provide the different services. Mobile Crowdsourcing Systems (MCS) are an important information source for IIoT. MCS usually needs some personal information of participants, such as trajectories, which may cause privacy leakage and reduce the participants’ enthusiasm for data collection. To improve data sensing and aggregation for IIoT, in the paper named “Privacy-preserving QOI-aware participant coordination for mobile crowdsourcing”, Zhang et al. propose a participant coordination framework. This framework can not only protect the participants’ privacy, but also prohibit the malicious participant’s behaviors.

Ruhul et al. in the paper named “Design of anonymity preserving three-factor authenticated key exchange protocol for wireless sensor network” propose a communication model and authentication protocol IoT-based wireless sensor networks. In their protocol all the sensor nodes and the Gateway Node (GWN) are connected through the Internet. In such an environment, all the sensor nodes are allowed to sense and control a remote user,