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EDITORIAL

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Real-time Internet of things and cyber-physical systems

The Internet of things (IoT) refers to the extension of traditional Internet connectivity into various devices and everyday objects equipped with low-power wireless capabilities, data analytics, and cloud services. Real-time IoT and cyber-physical systems (CPS) expand the conventional concept of IoT by further introducing timeliness in every aspect. In fact, real-time IoT and CPS refer to the coupling of and coordination between computational and physical entities in real time. For example, closed-loop control applications such as industrial IoT require end-to-end latency bounds, which can be satisfied by considering every aspect of wireless networking, processor scheduling, real-time cloud service, real-time data analytics, and so on.

In the near future, more and more societal infrastructures will depend on the tight integration of physical entities and computational platforms for convenience, safety, reliability, efficiency, resiliency, and so on. This obvious technology trend of the information era opens up new opportunities of a critical infrastructure of systems that use sensing, actuation, and real-time control over communication networks, which connect computational and physical entities. Consequently, it has become critical how we can design real-time IoT and CPS that are able to meet end-to-end real-time performance.

In response to the call for contribution, we received 12 paper submissions. After a careful review process, five outstanding papers were selected for this special section.

The first article, "Thriving on Chaos: Proactive Detection of Command and Control Domains in Internet of Things-Scale Botnets using DRIFT," by Spaulding et al proposes DRIFT, a system for detecting command and control domain names in IoT-scale botnets.

The second article, "Joint Energy and Latency Optimization for Upstream IoT Offloading Services in Fog Radio Access Networks," by Vu et al presents a joint energy and latency optimization method for upstream IoT offloading services in fog radio access networks, which can effectively provide load balancing while maintaining IoT service satisfaction.

The third article, "Resilient Architecture for Network and Control Co-Design under Wireless Channel Uncertainty in Cyber-Physical Systems," by Kim et al introduces a resilient architecture for network and control co-design, which can ensure control performance by adaptively adjusting the network and control parameters against wireless channel uncertainty in CPS.

The fourth article, "Exploring LTE-V Link Level Performance under V-CPS by Geometry Enhanced Winner II Channel Model," by Gong et al aims to build a novel real-time simulator for vehicular CPS that can reflect real-world driving scenarios by considering a realistic channel model.

The last article, "360-Degree Video Offloading Using Millimeter-Wave Communication for Cyberphysical System," by Kim et al presents an adaptive scheme of 360-degree video streaming over mmWave communication for CPS by considering optimized QoS for high-resolution video and offloading the tasks between a powerful PC and a mobile device.

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