

Guest Editorial

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In recent years, the word “smart” has been extensively used in numerous technology domains ranging from smart devices to smart cities. Such “smart” technologies generally aim at creating a smart environment to shape human lifestyles and improve human wellbeing. Various enhancements on the underlying building blocks – cutting across communication systems, networking, and applications – are critical to creating a smarter environment. The future 5G communication systems are expected to fulfil more demanding communication requirements and applications such as providing real-time smart surveillance application through more efficient video streaming. In networking, seamless data acquisition and data collection are seen as crucial to materialising multimedia-based wireless sensor networks. With the advancements of communication and networking technologies, innovative applications that benefit the environment such as smart microgrids and smart buildings are expected to flourish. The seven articles in this Special Issue investigate some of the hottest research challenges in this topic.

The first challenge addressed relates to the deployment of future communication systems. In “Wireless Back-haul: A Software Defined Network Enabled Wireless Back-haul Network Architecture for Future 5G Networks” by Christian Niephaus et al., a wireless Backhaul architecture, which implements the software defined (or smart) concepts, is presented to deal with more challenging requirements of communication in terms of bandwidth, latency and supported services.

The second article, “Fuzzy Logic Inference System-based Hybrid Quality Prediction Model for Wireless 4kUHD H.265-coded Video Streaming” by Mohammed Alreshoodi et al., predicts the perceptual quality of 4kUHD video streaming in wireless transmission using a no-reference model, namely a fuzzy logic system. The simulation results show that the proposed approach improves the accuracy of prediction.

The third article, “Comparative Performance Analysis of Subcarrier Assignment for Real-time Video Traffic” by J. Benita and R. Jayaparvathy, proposes a subcarrier assignment strategy for video traffic, which sends video, bursts over multiple blocks of orthogonal frequency-division multiple access subcarriers simultaneously considering the interference characteristics of the channel. The simulation results show that the throughput and delay performances improve when compared to traditional approaches.

Network optimisation is a challenging and essential topic to support smart applications in future networks. The fourth article, “Centralised Cum Sub-centralised Scheme for Multi-event Coverage and Optimum Camera Activation in Wireless Multimedia Sensor Networks” by Sushree Bibhuprada, B. Priyadarshini and Suvasini Panigrahi, optimises the coverage of a region monitoring multiple events while reducing the number of unnecessarily activated cameras and redundant data transmissions in order to reduce energy consumption.

The fifth article, “Performance Optimisation for Visitor Information Systems using Smart Sensors and Analysis of Trial Data” by Tim Farnham optimises the delivery of contents based on user behaviours and network performance so that users can receive the contents before they are used by smart applications. Results show that a prediction model that intelligently prefetches

content reduces false classifications and improves the availability of the contents.

Smart microgrids are a promising technology to materialise the electric power system in smart buildings. The sixth article, “Review and Retrofitted Architectures to Form Reliable Smart Microgrid Networks for Urban Buildings” by Y.V. Pavan Kumar and Ravikumar Bhimasingu, presents a review of state-of-the-art architectures, including the IEC-61850 architecture, for smart microgrids, and suggests a retrofitted IEC-61850 architecture that provides link-level redundancy in order to improve the availability and reliability of microgrids.

In large buildings, there is an urgent need for monitoring and analysis of energy consumption, and the environmental conditions, such as the temperature, humidity, solar radiations and air quality of the buildings. The seventh article, “Experimental Testing of a Random Neural Network Smart Controller using a Single Zone Test Chamber” by Abbas Javed et al., estimates the number of occupants inside a room using a neural network approach based on the information gathered from sensor nodes. The appropriate configurations of the energy control systems of the building help to maintain a comfortable environment. The proposed approach has been shown to improve the accuracy of the estimations.

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