Optical Wireless Communications (OWC) systems have gained significant interest within the wireless communications community. Reflecting this surge of interest, the IEEE’s OWC Task Group, known as IEEE/OSA/PEL/SE/TF/OWC, are expected to release the official version of the TG7/v7 standard in 2019. Alongside the three existing PHY modes, the IEEE 802.15.7/v7 includes three further modes (PHY IV, V, and VI) to support image sensor-based vehicle-to-everything (V2X) communications, indoor scenarios, and screen modulations. As such, OWC is expected to be commercially deployed in the near future.

Presently, OWC can branch out into several core technologies according to the following transmission distances: (i) short-range links, such as visible light communications (VLC), optical camera communications (OCC) or image sensor communications (ISC), screen (data embedding) transmission, display communications, and light fidelity (LiFi); (ii) long-range links, such as free space optical communications (FSO) and invisible light based communications (IVLC) using ultraviolet (UV) and near-infrared (NIR) as well as mid-infrared (MIR). In comparison with VLC, IVLC undergoes much less hostile transmission impairments in certain indoor and outdoor communication environments due to favorable channel properties induced from a lower transmission loss. For this reason, IVLC has the potential to open up a new era in optical wireless technologies.

Despite the potential and future scopes of existing and newly emerging subdisciplines within OWC, there are several challenges that need to be properly addressed. These include the limited bandwidth and slow modulation response of transmit light-emitting diodes (LEDs), limited transmission distance, mobility support, application-specific technologies, and the mitigation of adverse atmospheric effects.

This special issue therefore aims to publish original research articles and review articles that provide a forum to showcase recent advances, applications, and solutions to existing or new challenges in general OWC as well as newly emerging OWC subdisciplines.

Potential topics include but are not limited to the following:

- Advanced modulation, demodulation and coding for indoor and outdoor OWC
- Mobile computing and data signal processing within OWC
- LED-Internet of Things (IoT) communications
- High-rate and high-performance OCC
- Line-of-sight and non-line-of-sight OCC for short-to-long range applications
- Hybrid OCC and photodiode (PD)-based OWC
- Multiple-camera OCC
- Deep learning and neural networks for OWC
- Indoor/outdoor ultraviolet communications
- NIR-based OWC
- MIR-based OWC
- OWC for biomedical applications
- Infrastructure-oriented OWCs for smart city, smart factory, smart home, etc.
- Car-to-car and infrastructure-to-car OWC
- Improved accuracy of indoor localization/positioning within OWC
- Receiver design for OWC
- Hybrid radio frequency (RF) and OWC systems
- Uplinks in OWC
- Multiple-input and multiple-output (MIMO-) based OWC
- Underwater OWC

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Papers are published upon acceptance, regardless of the Special Issue publication date.