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Editorial: Applications of photonic sensors in smart cities

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Editorial on the Research Topic
Applications of photonic sensors in smart cities

This Research Topic on "Applications of Photonic Sensors in Smart Cities" belongs to the journals, Frontiers in Communications and Networks and Frontiers in Physics. For this Research Topic serves as lead guest editor and other guest editors include Saadi et al. Demostenes Z. Rodriguez, Lunchakorn Wuttisittikulkij, and Tien Khee Ng. The aim of this Research Topic is to highlight recent advancements in the field of Quantum Optics and Information, Photonic sensors, and optical wireless communication and how they can contribute to making smart cities. We received an overwhelming response to our call for papers and, after a rigorous peer review process, eight papers were selected for this Research Topic.

The managing editor, Saadi et al. and the guest editors would like to thank all authors who submitted their papers to this Research Topic. Thanks are also due to all anonymous reviewers, whose timely feedback ensured the high quality of the journal, and the Frontiers publication team for helping this issue to be a success. All the Guest Editors hope that this Research Topic can provide an in-depth insight into the field of optical wireless communication, photonic sensors, and optoelectronics that help realize the vision of smart cities.

The first paper title is "Calculation of the Coupling Coefficient in Step-Index Multimode Polymer Optical Fibers Based on the Far-Field Measurements", in which the authors use the power flow equation (PFE) to investigate mode coupling in step-index multimode polymer optical fiber.

The second accepted paper title is "Porous Silicon–Based Microring Resonator for Temperature and Cancer Cell Detection", in which a microring resonator sensor based on porous silicon is proposed for temperature and cancer cell detection, simultaneously. The results presented in this paper are promising, suggesting that the microring resonator sensor can be used in the fields of environment sensing, temperature sensing, chemical sensing, and biosensing.

The third accepted paper title is "Broadband Coherent Mid-Infrared Supercontinuum Generation in All-Chalcogenide Microstructured Fiber with All-Normal Dispersion", in which a numerical demonstration of the generation of broadband coherent supercontinuum (SC) spectra in the mid-infrared region using dispersion-engineered all-chalcogenide microstructured fibers (MOFs) is presented. Such sources can be applied in frequency metrology, optical coherence tomography, biomedical imaging, and few-cycle pulse compression.

The fourth paper belonging to this Research Topic is "Design of a High-Speed OFDM-SAC-OCDMA-Based FSO System Using EDW Codes for Supporting 5G Data Services and Smart City Applications", in which orthogonal frequency division multiplexing (OFDM) is used in conjunction with spectral amplitude coding optical code division multiple access (SAC-OCDMA). In this paper, the authors consider adverse weather conditions, such as clear, fog, haze, rain, and dust storms, and evaluate the performance of the proposed system using a log of the bit error rate and received power at different propagation distances. The simulation results show that the successful transmission of 3 × 15 Gbps with a propagation range of up to 3.45 km can be achieved.

The fifth paper of this Research Topic is "High Speed RGB-Based Duobinary-Encoded Visible Light Communication System Under the Impact of Turbulences", in which work is carried out to provide high data rate capacity using visible light communication. The reported results show the successful transmission of the data of six multiplexed channels, each carrying 10 Gbps data.

The sixth paper of this series is "Enhanced Performance of the 4 × 20 Gbit/s-40 GHz OFDM-Based RoFSO Transmission Link Incorporating WDM-MDM of Hermite Gaussian and Laguerre Gaussian Modes", in which the authors realize a 4 × 20 Gbit/s-40 GHz orthogonal frequency-division multiplexing-based radio-on-free-space optics information link. The presented results show a successful 80 Gbit/s-160 GHz transmission at 3,000 and 2,700 m under heavy rain and foggy weather, respectively.

The penultimate paper of this issue is "A robot-driven automatic scribing method *via* three-dimensional measurement sensor", in which an evaluation of the complex workpiece allowance and the scribing of the datum line, which is now heavily reliant on manual operation, is carried out. The results show that various problems of manual scribing can be solved effectively. The proposed RAS3DM can be widely applied in factories and laboratories.

The last paper of this Research Topic is "A structured-light 3D sensor-based shape measurement method for casting allowance evaluation". The structured-light, three-dimensional (3D), sensor-based 3D shape measurement technology is characterized by non-contact, high accuracy, and fast measuring speeds, which provide the complete 3D shape for accurate casting allowance evaluation. The experiment results show that the proposed method is accurate and efficient, and the casting allowance evaluation time is about ten times faster than that of manual operation.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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