

Integrated Free Space Optical Communication and Optical Sensor Network System with Artificial Intelligence Techniques

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Abstract : 5G and 6G technology offers enhanced quality of service with high data transmission rates, which necessitates the implementation of the Internet of Things (IoT) in 5G/6G architecture. In this paper, we proposed the integration of free space optical communication (FSO) with fiber sensor networks for IoT applications. Recently, free-space optical communications (FSO) are gaining popularity as an effective alternative technology to the limited availability of radio frequency (RF) spectrum. FSO is gaining popularity due to flexibility, high achievable optical bandwidth, and low power consumption in several applications of communications, such as disaster recovery, last-mile connectivity, drones, surveillance, backhaul, and satellite communications. Hence, high-speed FSO is an optimal choice for wireless networks to satisfy the full potential of 5G/6G technology, offering 100 Gbit/s or more speed in IoT applications. Moreover, machine learning must be integrated into the design, planning, and optimization of future optical wireless communication networks in order to actualize this vision of intelligent processing and operation. In addition, fiber sensors are important to achieve real-time, accurate, and smart monitoring in IoT applications. Moreover, we proposed deep learning techniques to estimate the strain changes and peak wavelength of multiple Fiber Bragg grating (FBG) sensors using only the spectrum of FBGs obtained from the real experiment.

Keywords : optical sensor, artificial Intelligence, Internet of Things, free-space optics

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