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Development of a Flexible Lora-Based Wireless Sensory System for Long-Time Health Monitoring of Civil Structures

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Abstract : In this study, a highly flexible LoRa-Based wireless sensing system was used to assess the strain state performance of building structures. The system was developed to address the local damage limitation of structural health monitoring (SHM) systems. The system is part of an intelligent SHM system designed to monitor, collect and transmit strain changes in key structural components. The main purpose of the wireless sensor system is to reduce the development and installation costs, and reduce the power consumption of the system, so as to achieve long-time monitoring. The highly stretchable flexible strain gauge is mounted on the surface of the structure and is waterproof, heat resistant, and low temperature resistant, greatly reducing the installation and maintenance costs of the sensor. The system was also developed with the aim of using LoRa wireless communication technology to achieve both low power consumption and long-distance transmission, therefore solving the problem of large-scale deployment of sensors to cover more areas in large structures. In the long-term monitoring of the building structure, the system shows very high performance, very low actual power consumption, and wireless transmission stability. The results show that the developed system has a high resolution, sensitivity, and high possibility of long-term monitoring.

Keywords : LoRa, SHM system, strain measurement, civil structures, flexible sensing system
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