

A Cellular-Based Structural Health Monitoring Device (HMD) Based on Cost-Effective 1-Axis Accelerometers

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Abstract : This paper proposes a cellular-based structure health monitoring device (HMD) for temporary bridge monitoring without the requirement of power line and internet service. The proposed HMD includes sensor node, power module, cellular gateway, and rechargeable batteries. The purpose of HMD focuses on short-term collection of civil infrastructure information. It achieves the features of low cost by using three 1-axis accelerometers with data synchronization problem being solved. Furthermore, instead of using data acquisition system (DAQ) sensed data is transmitted to Host through cellular gateway. Compared with 3-axis accelerometer, our proposed 1-axis accelerometers based device achieves 50.5% cost saving with high sensitivity 2000mv/g. In addition to fit different monitoring environments, the proposed system can be easily replaced and/or extended with different PCB boards, such as communication interfaces and sensors, to adapt to various applications. Therefore, with using the proposed device, the real-time diagnosis system for civil infrastructure damage monitoring can be conducted effectively.

Keywords : cellular-based structural health monitoring, cost-effective 1-axis accelerometers, short-term monitoring, structural engineering

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