

A Reliable Transfer Protocol for Multi-Parameter Data Collecting in Wireless Sensor Networks

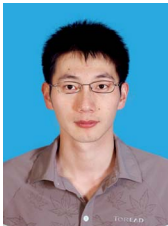
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Abstract—A reliable data collection protocol for structural health monitoring (SHM) is presented. This application is deployed on Ronghu Bridge in the city of Wuxi, Jiangsu Province, China. The system monitors seven types of sensor (vibration, strain, tension, temperature, bridge deck settlement, bridge tower tilt, wind speed and direction) in real time. Since radio transmission consume most part of the node battery power, this system improves the battery life by optimizing the radio duty cycle. Time synchronization is adopted for time slice control, where each slice consists two parts, working and sleeping. Every working period is able to handle different sensor data and each time slice is adjustable according to different data type. For reliable data collection, the gateway node send nack request at the end of the time slice for retransmission. This application has been developed on TinyOS environment, and tested first on our test bed in the lab then on Ronghu Bridge with estimated operation time over one year without battery replacement. The result of this protocol shows better performance over CTP (TinyOS supported) protocol.

Keyword—Wireless Sensor Networks, Structural Health Monitoring, transfer, Reliable collection



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