

ABSTRACT

This paper presents a newly designed wireless transmission system for structural monitoring applications. Its main features include the capability of real-time and multi-channel data transmission, a high compatibility to different types of sensors, a highly efficient power-supply, and low cost. Instead of adopting the most commonly used commercial wireless modems, the wireless communication is pursued by implementing an optimized and customized solution based on a recent System on Chip (SoC) wireless transceiver. The Frequency Division Multiplexing method is applied in order to ensure the real-time feature of the multi-channel data transmission. A simple and practical point-to-point topology is pursued. The Cyclic Redundancy Check (CRC) and the retries-acknowledgement mechanism are employed to achieve a reliable wireless communication. The usage of switching regulators, which feature a low quiescent current, a highly efficient power conversion, an adjustable output voltage, and a high output power, makes this platform suitable for both low-power and non low-power structural monitoring applications involving different types of sensors. Furthermore, a four channels, fifth-order Bessel filter is implemented to perform the anti-aliasing before the analog to digital conversion. Lastly, a laboratory test is carried out to validate the proposed wireless sensing system.

INTRODUCTION

Structural monitoring technologies utilize various sensors installed on a structure to monitor its response during forced vibration and/or static excitation. In the last decade, many research studies were dedicated to develop damage detection algorithms (whose advantage depends on the case-specific application) with the common goal of identifying a change in naturally and/or artificially induced structural modal properties, and locate the onset of structural damage from the use of structural measurements. The related scientific area is referred to as Structural Health Monitoring

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A Real-Time Multi-Channel Wireless Sensing System for Analog Cable Replacement Application

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Ключевые слова:

Содержание.

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