Accelerometer Based Structural Health Monitoring System on the Go: Developing Monitoring Systems with NI LabVIEW

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Abstract

Structural Health Monitoring (SHM) is a very crucial part of maintenance and management of buildings and structures. The use of SHM in recent years has been increasing due to the advancement in technology and the availability of nanodevices and nanosensors which can detect damaged part or crack in a structure. In this paper, PSpice simulation was carried out to show the response of the integrated electronic piezoelectric (IEPE) with a VPWL-source. Then, practical experiment was done using Arduino Mega with the ADXL335 accelerometer in a laboratory setup. LabVIEW software was used along with Arduino IDE software to make graphical visualization of accelerometer reading to be captured. Furthermore, a web service was deployed which enabled LabVIEW data transmission to a smartphone running Data Dashboard application for real-time monitoring anywhere. Therefore, making the system an ecosystem of Internet of Things enabling the user to access monitoring system while on the move. The result of the vibration test on the accelerometer showed that the accelerometer response to small changes in the x, y and z axis of the accelerometer which can be used to detect micro-movements in a structure.

Keywords

Author Keywords: Structural Health Monitoring (SHM); Accelerometer; ADXL335; LabVIEW; LabView Interface for Arduino (LIFA); Virtual Instruments (VI); Internet of Things (IoT)

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