

# **Smart Structures: Technology Changing the Opportunities and Responsibilities of the Modern Engineer**

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## **ABSTRACT:**

The fields of material science, signal processing, signal acquisition, and structural health monitoring have experienced explosive growth in the past two or three decades. Indeed the latter, structural health monitoring, is a field generally regarded as new with worldwide conferences on the subject area currently running on their 7<sup>th</sup> or 8<sup>th</sup> year. Despite exponential technological growth and progress in these areas, use of these new technologies is still extremely limited.

This paper starts by defining a “Smart Structure” and quickly traces the development of Structural Health Monitoring to highlight why topic areas presented in this paper are timely now. The paper then presents research conducted by the authors in the areas of power harvesting for wireless sensor networks, the usage of Shape Memory Alloys as passive control devices, and the development of a Statistical Based Damage Detection Method for structural systems. The paper concludes with a look at potential military applications in two topic areas: 1) Improving vehicle operation and maintenance through real time data acquisition and 2) Presenting a solution for assessing critical structures and establishing a basecamp in a deployment scenario.

KEY WORDS:

SMART structure, Modal Analysis, Shape Memory Alloys, Damage Detection, Response Surface Approximation

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