

PERSPECTIVES AND OPPORTUNITIES FOR VIBRATION ENERGY HARVESTING TECHNOLOGIES IN INDUSTRIAL APPLICATIONS

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The growing global demand for sustainable technologies increased the focus on developing SMART and Industrial 4.0 applications with embedded autonomous monitoring and diagnostic units. The development of such technologies saves significant maintenance, material, and energy costs. The operation of modern sustainable systems requires complex monitoring tasks that employ IoT sensing and monitoring units. Developed embedded IoT systems based on modern sensing materials and electronics could be used for long-time sensing to indicate wear, anomalies, or system degradation. Monitoring applications of modern engineering systems leads to an increase in the opportunity for the development of energy harvesting applications.

Energy harvesting technologies are characterized by converting waste and ambient energy into useful electricity, mainly in time and place. This contribution is focused on mechanical systems that operate under vibrations and a summary of potential physical principles of energy harvesting. The contribution addresses the critical challenges in mechanical energy harvesting technologies and provides an overview of the successful transfer of energy harvesting technology from laboratory specimens to industrial applications.