

(54) Title of the invention : Real-Time Vibration Monitoring Sensor for Structural Health Assessment of Bridges

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(57) Abstract :
Real-time vibration monitoring sensors play a crucial role in the structural health assessment of bridges, providing essential data for evaluating their safety and integrity. These sensors utilize advanced technologies, such as accelerometers, strain gauges, and wireless communication systems, to continuously monitor vibrational responses induced by traffic, environmental factors, or structural changes. The collected data is analyzed to detect early signs of damage, degradation, or abnormal behaviors, enabling predictive maintenance and timely interventions. This system enhances the ability to assess the condition of bridges without the need for costly and disruptive physical inspections. Real-time monitoring offers significant advantages, such as immediate detection of issues like fatigue cracks, deformation, or structural instability, thus improving the overall safety and longevity of infrastructure. Furthermore, the integration of these sensors with cloud-based platforms allows for seamless data storage, analysis, and decision-making processes. The application of real-time vibration monitoring is particularly valuable in regions with high traffic loads, seismic activity, or challenging environmental conditions, where conventional inspection methods may be inadequate. With the advancement of sensor technologies and data analytics, the implementation of vibration monitoring systems is becoming increasingly cost-effective, offering a scalable solution to assess the health of bridges in diverse settings.