Abstract

A Novel Laser- and Video-Based Displacement Measurement System to Monitor Vertical Deflections in Bridges [†]

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Long-term monitoring of in-service bridges is useful for estimating the structural condition and its variation over time. The information obtained through a sensor network installed on the bridge is essential to aid in more inexpensive and effective maintenance strategies. Among the parameters typically measured, vertical deflection in some key points is the most useful and interesting one.

An ideal measurement system is accurate, reliable, robust and inexpensive. It also would be able to provide real-time information about the behaviour of the structure, in order to be integrated in a decision-making tool.

This presentation introduces a novel system to measure vertical deflections in bridges, based on laser and video technology. This solution successfully addresses the desirable features previously discussed. The key elements are a Full-HD video camera, laser pointers, and LED lights placed on a translucent panel.

The video camera records the relative position between the dots created by the laser pointers on the panel and the LED lights. Using specific software, it is able to determinate the vertical deflection of the bridge over time.

The proposed system is inexpensive, accurate, and can be applied remotely. A particular advantage is that the camera motion is automatically excluded.