

TOP TEN

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Category: Road

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Research Area 1: Safe & Inclusive Transport

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Monitoring of typically overlooked non-landscape bridges utilising cost-efficient SHM alternatives

Over 50% of bridges worldwide are older than 50 years, and many exhibit structural deficiencies. In the last 20 years, the collapses of bridges in the EU caused nearly 120 fatalities. At the same time, passenger and freight traffic in OECD countries may double between 2019 and 2050. Therefore, it is of utmost importance to develop and implement innovative methods and technologies that will facilitate infrastructure managers to effectively monitor their assets' condition.

Nowadays, most landscape bridges have installed Structural Health Monitoring (SHM) systems; this is only exceptionally true for short- and medium-span bridges. Contrary to SHM systems, the main criterion for equipping a bridge with a weigh-in-motion system (B-WIM) is acquiring traffic loading data at a specific location. This research aims to utilise B-WIM systems beyond their primary weighing function by reusing measurement results, most often strains, to update the bridges' Finite Element (FE) models. The performed analyses utilising data from actual bridges demonstrate the possibility of updating FE models with B-WIM systems, providing results comparable to those from much more expensive SHM systems. Successful implementation of the proposed approach will extend the applicability of B-WIM systems and allow using cost-efficient SHM systems on typically overlooked non-landscape bridges.

