

Monitoring bridge safety with wireless sensors

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The Akashi-Kaikyo Bridge in Japan, the world's longest suspension span. Credit: Wikipedia

Tens of thousands of bridges across the country are deteriorating, creating potentially dangerous conditions. Particularly after a natural disaster, being able to assess a bridge's structural integrity can be critical.

Researchers from Washington University in St. Louis and Michigan State University (MSU) are teaming up to help solve this problem. They are testing innovative sensors on Michigan's Mackinac Bridge that are powered by traffic vibrations and could detect bridge failures before they happen. This will make the Mackinac Bridge the first fully instrumented bridge in the country using advanced wireless and self-powered monitoring technology.

"Not only can this technology be used to issue early warnings prior to a catastrophic structural failure, it can also be used to quickly diagnose the effects of rare, high-impact events like earthquakes and hurricanes on a large infrastructure like a bridge," said Shantanu Chakrabarty, the Clifford Murphy Professor in the Preston M. Green Department of Electrical & Systems Engineering at

the McKelvey School of Engineering.

Chakrabarty worked with Nizar Lajnef, associate professor of civil and [environmental engineering](#) at MSU to develop the sensors, which are powered by the kinetic energy of the bridge's movements and wirelessly transmit structural data.

The first 20 prototype sensors were installed on the Mackinac Bridge in 2016. After the [sensors](#) proved their durability and performed as intended, researchers started the next phase of testing with the installation of up to 2,000 of the tiny devices. This will allow them to explore the logistics of an even larger deployment and provide useful monitoring data to the Mackinac Bridge Authority.

The successful large-scale deployment of this low-cost sensing technology could dramatically transform the economics of [bridge](#) preservation and management and improve the serviceability and safety of bridges.

Provided by Washington University in St. Louis

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