

PRESS RELEASE

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“ImaB-Edge” – Distributed sensor electronics for energy-efficient and predictive maintenance of critical infrastructure such as bridge structures

The collapse of the Carola Bridge in Dresden clearly shows how important it is to assess the condition of buildings and critical infrastructure in advance using monitoring systems. This is not only essential for safety, early detection of damage can also mean cost savings. In the joint project “ImaB-Edge”, materials research and testing facilities are working together with hardware and software developers, construction companies and infrastructure operators to develop an electronic system for the permanent monitoring of the condition of infrastructure structures.

Civil engineering structures such as bridges, sewage treatment plants and dams are essential elements of technical infrastructure and are highly relevant from an economic perspective. For example, the closure of bridges on main traffic arteries can cause millions in damage every day. The ImaB-Edge project aims to develop a modular, configurable on-site system as an alternative to current cloud solutions by combining continuous monitoring with local non-destructive testing. The aim is to prevent potentially fatal accidents on the one hand and to ensure that cost-intensive construction measures are avoided by initiating the necessary repair measures at an early stage and taking preventive action on the other. The project thus contributes to the safety of infrastructure and to its cost-saving maintenance.

Continuous monitoring through edge computing

In new buildings, sensors can be implemented for permanent monitoring. The sensors integrated into a building continuously record measurement data, which is collected by sensor EDGE units in a node, the EDGE gateway, and analyzed and evaluated using artificial intelligence. The condition of the structure is then transmitted to a control center or to service personnel. In addition to freeway bridges, critical conditions or significant changes in railroad

Communication Manager:

Oliver Sandmeyer, M. A. | Fraunhofer Institute for Nondestructive Testing IZFP | Phone +49 681 9302-3944 | Campus E3 1 | 66123 Saarbrücken, Germany | www.izfp.fraunhofer.de | oliver.sandmeyer@izfp.fraunhofer.de

Scientific Contact:

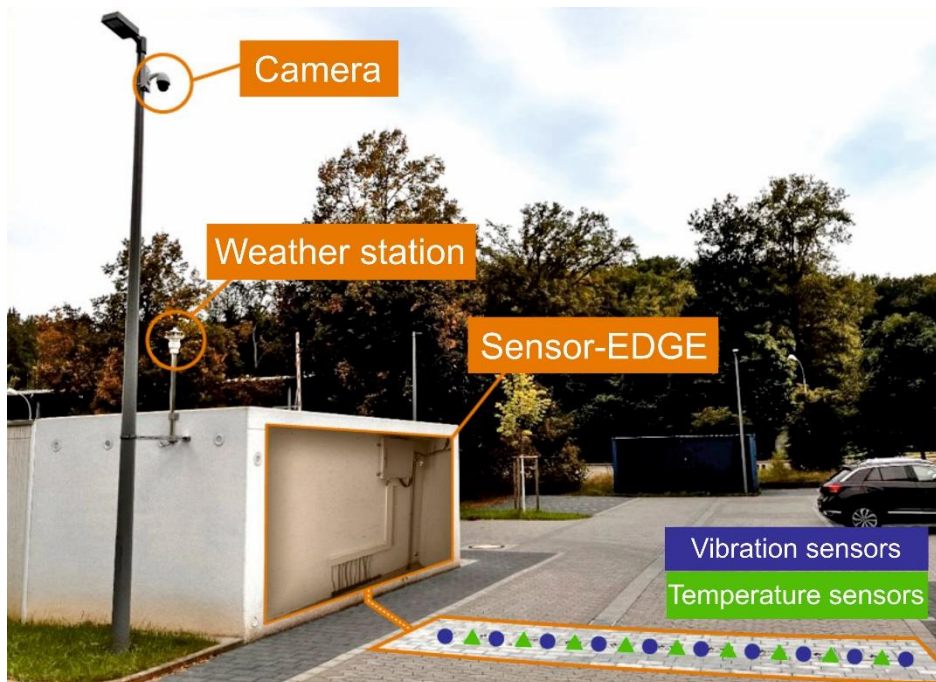
Dirk Koster, M. Sc. | Fraunhofer Institute for Nondestructive Testing IZFP | Phone +49 681 9302-3894 | Campus E3 1 | 66123 Saarbrücken, Germany | www.izfp.fraunhofer.de | dirk.koster@izfp.fraunhofer.de

systems, tunnels, dams, etc. are to be detected at an early stage so that appropriate measures can be initiated.

At the status meeting of the funding measure "Electronic systems for trustworthy and energy-efficient decentralized data processing in edge computing (OCTOPUS)" on 17.09.2024 at the Federal Ministry of Education and Research (BMBF) in Bonn, the interim results of the research results were presented and discussed. The collapse of the Carola Bridge and the solutions that ImaB-Edge can offer here were the subject of many technical discussions.

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Overview of the real laboratory; © ImaB-Edge

Establishment of a real laboratory

A real laboratory has currently been set up on the Fraunhofer IZFP premises. With its help, all relevant processes can be exemplarily mapped and validated, from structured data acquisition and pre-processing of the data in the sensor EDGE and EDGE gateway on site, to testing using the mobile NDT construction system and forwarding the data to the visualization of the results to the project partners EUROKEY Software GmbH and WPM - Ingenieure GmbH. For this purpose, temperature and vibration sensors were installed in the ground at a

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parking lot entrance. The recorded data is first transmitted via LAN or Bluetooth to the sensor EDGE on site, where it is pre-processed. In addition to the data from the sensors in the ground, the Sensor-EDGE also receives data from a weather station and a connected camera, which can be used in future to determine the real-time load on a road.

The ImaB-Edge project is being funded by the Federal Ministry of Education and Research (BMBF) with approximately 5.6 million euros.

You can find out about the latest news from the ImaB-Edge project on the [ImaB-Edge - Intelligent, multimodal and self-sufficient building inspection](#) website (in German).

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