

PRESS RELEASE

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When buildings think for themselves – Intelligent monitoring with edge computing makes our infrastructure safer and more economical

Digital bridge guards: Fraunhofer IZFP presents results from “ImaB-Edge”

How can the condition of bridges, dams, or sewage treatment plants be monitored reliably and in real time? This question was the focus of the research project “ImaB-Edge – Intelligent, multimodal, and autonomous structural inspection using edge computing,” funded by the German Federal Ministry of Research, Technology, and Space (BMFTR). During the closing event on October 30, 2025, researchers from the Fraunhofer Institute for Nondestructive Testing IZFP, together with their project partners, presented the results of the joint project.

After a welcome address by Prof. Dr.-Ing. Hans-Georg Herrmann, member of the Institute Management Board of the Fraunhofer IZFP, Jürgen Barke, Minister for Economic Affairs, Innovation, Digital Affairs, and Energy of the Saarland, gave the keynote speech. He emphasized how important research projects such as ImaB-Edge are for the safety and sustainability of our infrastructure. Dirk Koster, Chief Scientist at Fraunhofer IZFP, then presented the results on behalf of the consortium. Afterwards, the various technologies were explained in more detail to the guests at presentation islands.



Participants and partner institutions of the ImaB-Edge project at the closing event; copyright: Fraunhofer IZFP

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Recognizing in time what will cause damage tomorrow

The collapse of the Carola Bridge in Dresden has made it clear to all of us how important it is to proactively assess the condition of buildings and critical infrastructure. Detecting damage at an early stage not only protects human lives but also saves considerable costs. In the ImaB-Edge joint project, materials research and testing facilities worked together with hardware and software developers, construction companies, and infrastructure operators to develop an electronic system for the permanent monitoring of building conditions. The aim was to continuously and precisely monitor bridges, sewage treatment plants, and dams to identify risks in good time and take targeted measures.

“Especially in the case of heavily trafficked bridges, closures can quickly cause millions in damage. With our modular on-site system, structures can be monitored continuously, allowing us to respond flexibly. This not only increases safety, but also helps to significantly reduce maintenance costs,” explains Dirk Koster, scientific project manager and Chief Scientist Sensor Intelligence and Microelectronics at Fraunhofer IZFP.

Technological basis: sensor technology, edge computing, and AI

The technical basis is provided by intelligent sensors that can be integrated into new or existing buildings. These continuously record measurement data, which is collected, pre-processed, and consolidated in an edge gateway via sensor edge units. Finally, artificial intelligence (AI) analyzes the data directly on site and automatically transmits the results to control centers or service personnel.

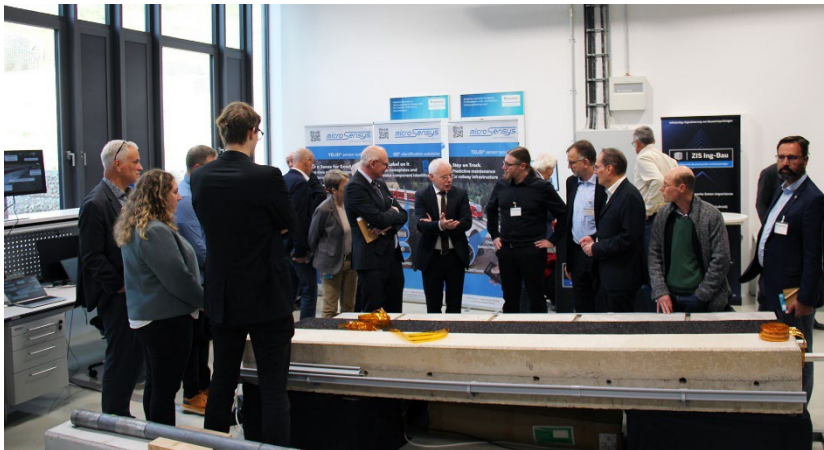
This type of decentralized data processing enables rapid status assessment while reducing the enormous volume of data that must be transferred to cloud systems – an essential contribution to data security, efficiency, and resource savings. In addition to bridges, railway facilities, tunnels, dams, and other critical structures are also set to benefit from these developments in the future.

The **Fraunhofer-Gesellschaft**, headquartered in Germany, is one of the world’s leading organizations for applied research. It plays a major role in innovation by prioritizing research on cutting-edge technologies and the transfer of results to industry to strengthen Germany’s industrial base and for the benefit of society as a whole. Since its founding as a nonprofit organization in 1949, Fraunhofer has held a unique position in the German research and innovation ecosystem. With nearly 32,000 employees across 75 institutes and independent research units in Germany, Fraunhofer operates with an annual budget of €3.6 billion, €3.1 billion of which is generated by contract research — Fraunhofer’s core business model. Unlike other public research organizations, base funding from the German federal and state governments is merely the foundation for the annual research budget. This serves as the basis for groundbreaking precompetitive research that will become important for the private sector and society in the years ahead. Fraunhofer’s distinctive feature is its large share of industry revenue, guaranteeing close collaboration with the private sector and industry, and the consistent focus of Fraunhofer’s research on the market. In 2024, industry revenue accounted for €867 million of its budget. Fraunhofer’s research portfolio is augmented by competitively acquired public-sector funding, pursuing the right balance between public-sector and industry revenue.

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*Minister Barke discusses the technological developments achieved in the ImaB-Edge project;
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Real-world laboratory demonstrates practical application

The real-world laboratory on the institute's premises in Saarbrücken demonstrates exactly how the system works: at a parking lot entrance, sensors record the loads caused by vehicles, supplemented by a weather station and camera. The data obtained is then analyzed and visualized by the project partners EUROKEY Software GmbH and WPM Ingenieure GmbH. This allows real-time and predictive analysis of how traffic and weather will affect the building fabric.

An important step for tomorrow's infrastructure

The ImaB-Edge project was funded by the BMFTR with around 5.6 million euros. The combination of sensor technology, edge computing, and AI has resulted in an application-oriented solution that combines safety, sustainability, and cost-effectiveness in infrastructure maintenance.

Further information on the project can be found at the following links:

[ImaB-Edge - Fraunhofer IZFP](#)

[ImaB-Edge - Intelligente, multimodale und autarke Bauwerksprüfung](#)

[ImaB-Edge — Elektronikforschung](#)

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