

PRESS RELEASE

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Saarbrücken, November 18, 2024 ||

Page 1 | 2

“SmartWire-Sensor” – Competence center develops solution for early detection of harmful water ingress in critical infrastructure

We know it from car journeys, among other things: Again and again, you see damage to the fabric of bridge structures. If damage such as spalling concrete is visible, the actual problem has probably existed for many years. One of the most urgent causes of damage is the corrosion of reinforcing steel caused by water penetrating the structure. The risk of this leading to a loss of substance and load-bearing capacity is greatly increased. In order to detect the cause of the often invisible damage as early as possible, the SmartWire-Sensor competence center, founded by the Fraunhofer Institute for Nondestructive Testing IZFP and Klaus Faber AG, is pursuing the goal of developing sensors for the early detection of water ingress. The aim is to significantly strengthen sustainability and safety in critical infrastructure.

Due to ageing infrastructure, determining the condition of structures is becoming increasingly important for public safety. Reliable and permanent monitoring of infrastructure structures is therefore of the utmost importance. The SmartWire-Sensor competence center is pursuing the idea of detecting water ingress in critical infrastructure such as bridge structures at an early stage to prevent possible consequences such as renovation, closure, or even new construction, thus avoiding costs in the billions and incidents such as the collapse of the German Carola Bridge in Dresden.

A flexible and self-sufficient monitoring system

However, the use of a flexibly adaptable, easy-to-use, self-sufficient, and intelligent monitoring system, which would contribute to solving the current infrastructural problems, has not yet been established. This is also due to the technological development status of the measuring devices. These are usually available as laboratory or mobile measuring systems, which require signal evaluation by a human operator. Autonomous recording and evaluation of

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SENSOR AND DATA SYSTEMS FOR SAFETY, SUSTAINABILITY, AND EFFICIENCY

sensor data is therefore currently not possible. The SmartWire-Sensor competence center is working on the scientific and technological development to make such a monitoring system for the early detection of moisture in buildings accessible to the market. Research focuses on sensor-related data processing and fusion with efficient and robust AI algorithms, self-sufficient energy supply and flexible and trustworthy data transmission using various communication interfaces (LoRaWAN, GSM, 5G, etc.).

PRESS RELEASE

Saarbrücken, November 18, 2024 ||
Page 2 | 2



Concrete spalling on a bridge; © AdobeStock / Kay Gebauer/Wirestock

The advantages of SmartWire-Sensor

The research and development work of the SmartWire-Sensor competence center is intended to enable early detection of damage – before the entire structure is soaked through – with the aim of efficiently extending the service life of a bridge structure. Only minor maintenance is required, with significantly lower costs and minimal traffic measures.

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