

# RESEARCH NEWS

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**Fraunhofer at the DMEA**

## Shaping the future of healthcare with AI

**Better patient care, more efficient processes and effective networking of stakeholders: The increasing digitalization of the healthcare sector is making all of this possible. To support these advances, Fraunhofer experts are developing systems based on artificial intelligence (AI) that can be used effectively and in compliance with data protection regulations. Nine Fraunhofer units will be presenting their research results at the DMEA 2024 trade show, held in Berlin from April 9 to 11, 2024. The researchers will be available for discussions and insights into the future of healthcare IT at Booth D-108 in Hall 2.2.**

Health research occupies a central position in the Fraunhofer research portfolio. It is geared towards the four major areas of drugs, diagnostics, devices and data (the 4Ds) and covers prevention, disease detection, therapy and rehabilitation. As a highly trans-disciplinary organization, the Fraunhofer-Gesellschaft offers ideal conditions for collaborations in health research. Together with partners, Fraunhofer researchers are developing pioneering innovations and solutions that create significant added value for health research and, above all, for patients.

### Tools and technologies support diagnostics and medical decisions

The Fraunhofer Institute for Digital Medicine MEVIS will be presenting no less than four AI-based applications at the DMEA 2024: The Data Steward tool harmonizes clinical data and makes it usable for multicenter studies. The SATORI training loop uses AI to reduce the time required to develop algorithms for segmenting medical image data. MINIMAKI supports surgical interventions for heart valve diseases using mixed reality projections. The MammoJourney app helps breast cancer patients with clear information, organizational help and an AI chat feature.

The Fraunhofer Institute for Telecommunications, Heinrich Hertz Institut, HHI will be presenting groundbreaking advances in light fidelity (LiFi) technology designed for medical use. LiFi enables mobile communication through optical wireless transmission, using light as the medium. Compared to radio transmission, light is more secure against unauthorized access and robust against interference from radio waves. LiFi is a valuable complement to radio communication, especially in high-density environments that require greater capacity, and enables new use cases, particularly in commercial applications. In addition, LiFi meets strict safety standards and electromagnetic compatibility criteria. Fraunhofer HHI is also working with commercial and university partners

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on various research projects focusing on medical applications, such as LINCNET, 5G-COMPASS and OWIMED.

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The Fraunhofer Center for Digital Diagnostics ZDD will be showcasing innovative concepts geared toward healthcare in rural areas. The projects cover the entire digital diagnostics value chain — from sampling and measurement to secure data management and data interpretation. Examples include an intelligent dressing for poorly healing wounds, which enables personalized wound management through decentralized monitoring. They are also working on a fully automated health center aimed at bringing professional diagnostic services to sparsely populated areas. Another focus of Fraunhofer ZDD lies on the analysis of digital ecosystems in patient care and the development of next-generation virus tests.

Cohort analysis forms the basis of personalized medicine: The Fraunhofer Institute for Computer Graphics Research IGD has developed a Parkinson's monitor that will benefit both medical staff and patients. The interactive web application, which will be presented at the DMEA, makes it easier to find relevant similarities in the respective courses of the disease, thereby helping to discover new correlations. By better understanding the course of the disease, the tool enables individual risk assessment.

### **AI models and planning algorithms improve processes and analyses**

The Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS will be presenting pioneering solutions in the field of clinical artificial intelligence for pharmacology and hospitals, including large language models (LLMs) and clinical support tools. At the DMEA, the researchers will be using innovative demonstration models to illustrate how AI can be used to generate text, extract information and analyze patient data from clinical studies. These technologies are expected to allow for more efficient and precise healthcare.

Surgery planning in hospitals is a complex task involving many different aspects and requiring constant adjustments due to incoming emergencies, delays or short-term absences. The SCEDAS software developed by the Fraunhofer Center for Maritime Logistics and Services CML calculates an efficient, up-to-date planning proposal at the touch of a button. This makes work easier for surgery planners and the entire medical staff. In addition, OR resources can be used more efficiently. Fraunhofer CML will be presenting this solution at the DMEA.

Under the motto of trustworthy digital health, the Fraunhofer Institute for Cognitive Systems IKS is focusing on trustworthy AI in the healthcare sector. One application scenario is the use of explainable AI in medical diagnostics, for example in the classification of vertebral fractures and blood cell classification. Another example is data-efficient AI that supports doctors in evaluating medical images for the early detection of cancer. Fraunhofer IKS will also be demonstrating how AI based on quantum computing can improve medical diagnoses.

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## **Patient applications allow for better healthcare delivery and successful telemedicine implementation**

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Detecting thromboses earlier and relieving the burden on nursing staff are the goal of the veinXam solution developed by Fraunhofer IGD. By continuously measuring the blood flow in the deep veins of the leg, the application is reducing the risk of thrombosis. If veinXam detects pathological changes, it will notify the user via an app or, in the case of inpatient stays, the nursing staff. The system is integrated into a compression stocking for everyday use.

Guardio — also developed by Fraunhofer IGD — enables users to take ECG measurements with a smartphone. It records heart movements without the need for electrodes and evaluates them with the help of artificial intelligence. Another one of the institute's telemedicine solutions is CareCam, a personal health assistant for the workplace. It continuously records a user's vital signs without the need for cabling and provides individual recommendations for improving well-being.

## **IT structures and software components support e-health providers**

The Fraunhofer Institute for Applied Information Technology FIT will be showcasing development tools aimed at deploying digital health solutions more quickly. The toolbox brings together applications and technologies from various research projects, thereby creating medical data spaces that connect clinics, practices and nursing staff across sectors. Examples include the FrühstArt app for parents of obese children and a patient chatbot provided as part of the AI-NET-PROTECT project.

The Fraunhofer Institute for Software and Systems Engineering ISST is researching and developing software technology for digital and data-driven healthcare delivery. Its researchers are creating concepts, architectures, prototypes and components for transparent, interoperable, federated and sovereign medical data spaces. At the DMEA, the institute will be presenting its data space projects on infrastructure, data usage and applications.

More information on Fraunhofer exhibits at the DMEA trade show can be found here: <https://www.fraunhofer.de/en/events/fraunhofer-at-trade-fairs/2024/dmea.html>

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**Fig. 1 Parkinson's monitor: The interactive web application developed by Fraunhofer IGD helps those affected better understand the symptoms and course of their disease.**

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