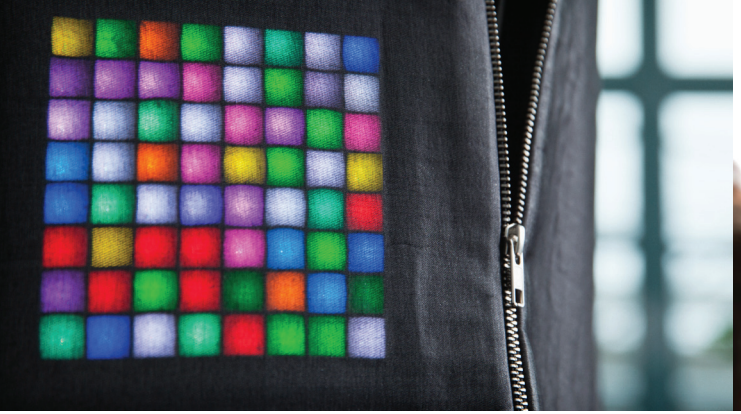

Smart pixel display bonded to a woven circuit substrate

Knee brace with textile stretch sensor for therapeutic monitoring

EXPERTISE AND SERVICES

Our clients can choose several forms of cooperation: from commissioning projects directly to cooperating as part of scientific-technological research projects supported by the European Union, federal or state funding.

- Development and production of textile-integrated sensors and electronic systems
- Mounting and interconnect technologies for textile microsystems
- Hardware and software development for textile-integrated applications
- Qualification and reliability tests and failure analytics
- Fast prototyping and small-series production
- Licensing and technology transfer
- Technical services, consulting, training, and studies
- Fundamental research

CONTACT

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Cover: Fabric-integrated multi-sensor system for posture monitoring

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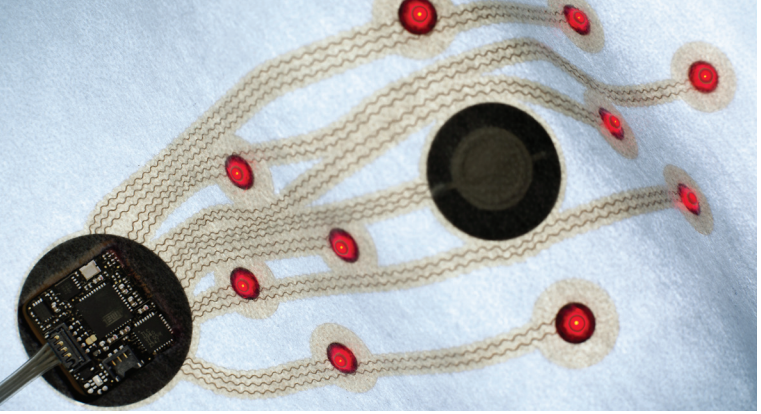
TEXTILE INTEGRATED ELECTRONIC SYSTEMS



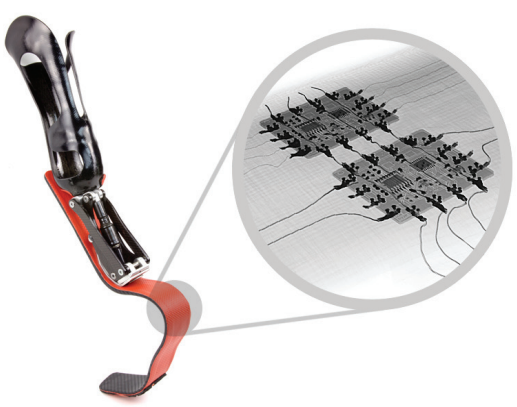
Interactive LED display with elastic circuit board technology laminated to a fabric substrate

ELEKTRONICS AND TEXTILES

Fabrics are an indispensable part of human life. They come in all shapes and sizes, from weaves, knitwear, or nonwovens for use in clothing to technical fabrics and composite materials. They need to withstand substantial stresses e.g. during washing. They provide a wide range of functions, while keeping the weight down and the flexibility high.

The integration of electronic components can substantially expand the functional range of textile products, such as sensors or lights. This creates entirely new applications for textiles in an innovative and strongly growing area of the market.
For more than fifteen years, Fraunhofer IZM has been developing, researching, and evaluating textile-integrated electronic systems.

Fraunhofer IZM is your reliable and competent partner with competences covering the entire value chain. On top of ideal conditions for research and development efforts, you benefit from access to our worldwide network of suppliers, experts, and users.

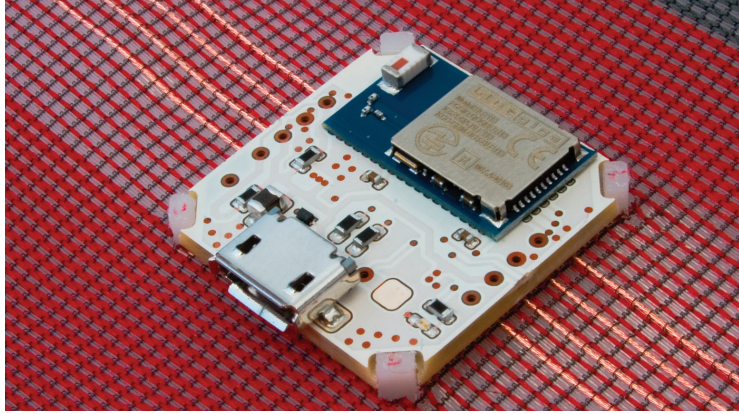


Carbon fiber prosthesis with embedded sensors for structural health monitoring

APPLICATIONS

The applications of textiles are at least as diverse and versatile as the materials themselves. E-textiles (electronic textiles) are used in wearable electronics, technical textiles, and fiber composite materials. The range of possible applications also implies considerable differences in the requirements. We draw on our long-standing experience to find custom solutions for every chosen application. The following case studies represent only a selection of our current research areas:

- Integrating highly elastic textile sensors in knee braces to monitor knee angles during therapy
- Monitoring posture with textile-integrated multi-sensor systems
- Reducing the weight and production costs while adding additional functionality and design possibilities in automotive and transport applications
- Highly reliable textile RFID tags designed to withstand industrial detergents
- Large-format, flexible alarm systems for detecting unauthorized access
- Innovative lighting designs with textile light solutions
- Integrated force and stretch sensors for carbon fiber prostheses



Embedding technology used for crimping miniaturized electronics systems to a textile communication bus

TECHNOLOGIES

Fraunhofer IZM can draw on a vast pool of reliable and fully tested materials, technologies, and systems. A range of permanently flexible, resilient, and conductive materials, including hybrid yarns, printing pastes, and metallized fabrics are available to match the application in question and are integrated through Soutache embroidery, printing, or galvanic and laser technology to form textile-integrated circuits. Alternatively, stretchable electronic systems can use thermoplastic elastomer substrates that can be easily laminated to almost any type of fabric.

Our expertise in electronics development is focused on the design of highly miniaturized and economical wearable systems with particular emphasis on reliability and security applications (EMC, fire safety). We use polymer ultrasound welding, (non-) conductive adhesives, crimping, or low-temperature soldering for electronic bonding and are actively developing 3D printing, injection molding, and liquid encapsulation technologies. All systems can be tested and analyzed at Fraunhofer IZM in accordance with relevant fabric and electronics standards.