

FRAUNHOFER INSTITUTE FOR
INTEGRATED CIRCUITS IIS

**CARDIOTEXTIL
MEDICAL-GRADE WEARABLE FOR
LONG-TERM ECG MONITORING**





Cardiac arrhythmias such as atrial fibrillation are a growing health problem worldwide. Approx. 2.2% of the world's population are affected, and the trend is rising. If cardiac arrhythmias are suspected, there are several treatment options.

Currently, a long-term ECG (24 h) with adhesive electrodes is prescribed. Due to the limited observation period, some events cannot be detected. If no diagnosis can be confirmed, the 24 h ECG has to be repeated several times. The patient can also choose an implant that records the ECG over several years.

With CardioTEXTIL, we offer a comfortable solution for cardiological long-term monitoring in everyday life: Easy to use, non-invasive, observation period of several days to weeks.

Textile-integrated 3-channel ECG for your health

With its textile-based dry electrodes, CardioTEXTIL can easily measure electrical cardiac activity on the go. The comfortable textile carrier allows an extended monitoring period of several days or even weeks. Compared to conventional ECG systems, patients can easily put on and take off CardioTEXTIL themselves. Thus, the medical-grade wearable allows detailed diagnosis and monitoring of cardiac arrhythmia and other cardiovascular diseases in everyday life.



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Multichannel ECG diagnostics

With four integrated textile electrodes and plug-in electronics, CardioTEXTIL can record a 3-channel ECG. Signals are recorded according to standard medical leads. Raw data is used to calculate and store heart rate (HR) and heart rate variability (HRV) parameters. Signal interferences are compensated by the redundancy of several channels leading to higher quality of measurement results.

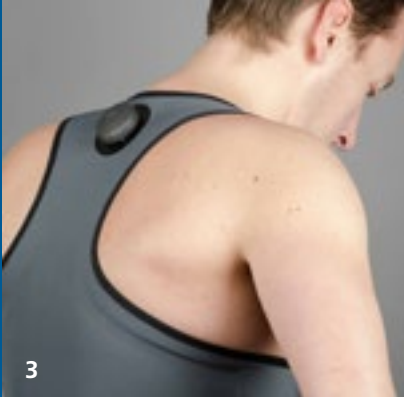
Live Data Transmission and Analysis

The removable electronics box processes the data and digitizes it. The ECG signals are stored on the sensor electronics or transmitted via Bluetooth and displayed as an ECG curve on the screen for the treating doctor. With our algorithms, we interpret the data and can pre-classify cardiological events.

All-in-one

CardioTEXTIL addresses long-term ECG diagnostics in medical quality. In addition, the electronics features an activity profile via integrated inertial sensors. Due to wireless data transfer, CardioTEXTIL supports continuous monitoring of cardiac functionality in telemedical application scenarios.

Further ECG channels and specific textile carriers can be offered within further RnD services.



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CardioTEXTIL for cardiologic long-term monitoring

- Comfortable long-term ECG
- Cardiologic monitoring for patients with rarely occurring arrhythmias or syncopes
- Peace of mind – patient monitoring in everyday life
- For patients who require constant monitoring during rehab – both in inpatient care or at home
- Telemedical cardiologic care, e.g. in difficult to reach regions

Further applications for long-term ECG monitoring with CardioTEXTIL

- Performance analysis
- Stress management
- Sleep analysis
- Platform for research studies in mobile application scenarios
- Risk patient monitoring
- Rehabilitation prevention

- 1 *3-channel-ECG recorded by CardioTEXTIL under resting conditions*
- 2 *Textile-integrated sensors of portable multichannel ECG*
- 3 *Plug-in electronics for evaluation, storage and transfer of measurement values*



Your benefits

- Comfortable sensor solution for mobile, long-term measurement without adhesive electrodes
- Medical grade signal acquisition
- Simple to use – especially for cardiac risk patients
- Storage and wireless transfer of medical-grade data
- Artifact compensation via redundancies
- Context evaluation of ECG and activity
- Washable textile with primary sensors

Technical details

- Signal acquisition according to standard medical leads: Einthoven I, II, III
- Optional further channels like Goldberger leads and Wilson chest deviation
- Inertial sensor measures acceleration in 3 axes
- Data transfer via generic Bluetooth technology or Bluetooth Smart

www.iis.fraunhofer.de/cardiotextil

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