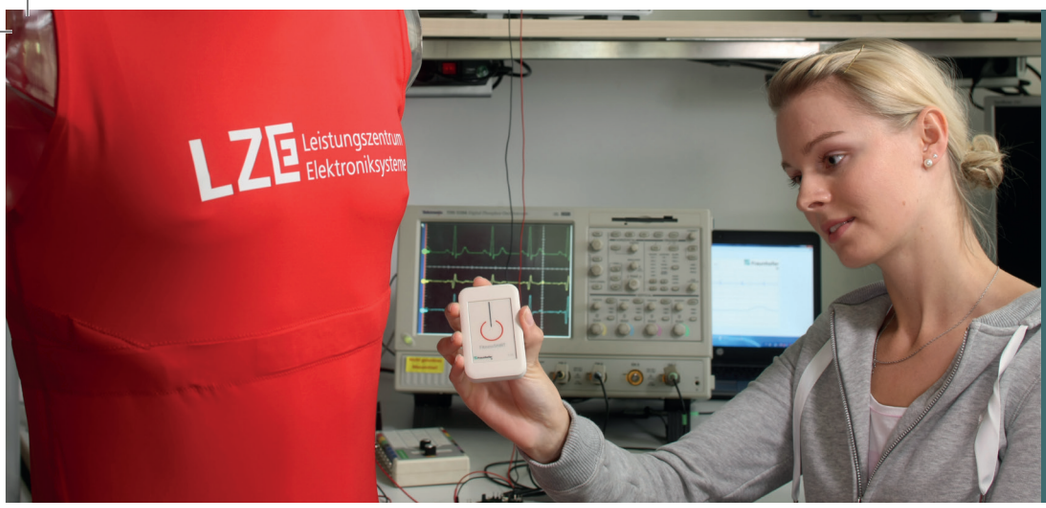
LZE Leistungszentrum Elektroniksysteme

A JOINT INITIATIVE OF FRAUNHOFER IIS, FRAUNHOFER IISB, AND FRIEDRICH-ALEXANDER UNIVERSITY ERLANGEN-NÜRNBERG (FAU)

Low-power electronics for sports and fitness applications



Smart wearables is a challenging research area where functional garments meet textile engineering, electronics and biosignal processing

DESCRIPTION

When it comes to grid independent systems, energy efficiency is one of the key challenges in the area of electronics, especially for daily electronic accessories (wearables) used in sports and fitness applications. The aim of this project is to combine energy efficient acquisition of physiological raw signals with reliable processing of biosignals and activity parameters from mobile systems. As a first step, a demonstrator was developed that combines the RedFIR® real-time localization and FitnessSHIRT technologies, allowing the system to simultaneously capture positioning and movement data as well as vital parameters such as heart rate and respiration. This information is subsequently used to create an optimized and individual training concept. Moreover we developed a sweat sensor, detecting physical overload from components of sweat and therefore further optimize your training.

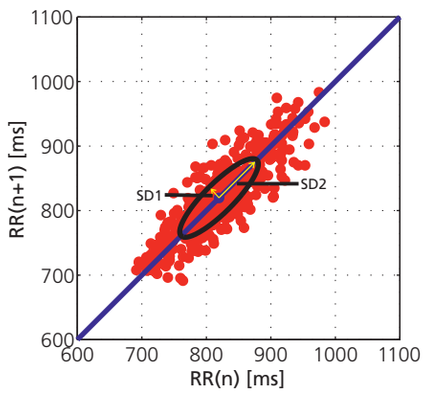
TECHNICAL DATA

- ARM processor
- 868 MHz channel for data transport
- Electrocardiogram
- Respiration effort
- flexible, electro-chemical sensor to detect physical overload or medical conditions
- Energy harvesting solutions via
  - Thermogenerators
  - Piezo Harvesters

FEATURES

- Heart rate
- Respiration rate
- Positioning of multiple player
- Analysis of heart rate variability
- Arrhythmia detection
- Fast data transfer
- Detection of ionic particles in sweat and interpretation of health and fitness relevant parameters

POINCARÉ PLOT OF THE HEART RATE VARIABILITY



One step beyond: In addition to traditional training analysis based on the heart rate (HR), the interpretation of the heart rate variability (HRV) gives a better understanding of the users current fitness, health and stress situation

PROJECT PARTNERS

This project is part of the „Leistungszentrum Elektroniksysteme (LZE)", a joint initiative of the Fraunhofer-Gesellschaft, Fraunhofer IIS, Fraunhofer IISB, and Friedrich-Alexander University Erlangen-Nuremberg (FAU), in addition to other non-university research institutes and various industry partners:

- Fraunhofer Institute for Integrated Circuits IIS
- Fraunhofer Institute for Integrated Systems and Device Technology IISB
- Institute for Sports and Sportsmedicine, FAU
- Chair of Computer Architecture, FAU
- Digital Sports Group, FAU
- Chair of Sensor Technology, FAU
- Chair of Information Technology (LIKE), FAU

ELECSA® - ELECTROLYTE SWEAT ANALYZER

More than just sweat: Our flexible, printable sweat sensor is selective for ammonia ions, which can be used to detect physical overload. However, other applications, e.g. in medicine are possible.

CONTACT US

We are developing miniaturized sensor systems that can be integrated into textiles. These devices gather physiological and activity data as well information about the localisation of the user. This data is of essential relevance for the optimization of the user's training as well as for healthy living applications. Advanced signal processing methods assure valid information even during intense activity.
Customer and use case specific adaptation is offered with the Research and Development services by Fraunhofer IIS in order to provide the best solution for our customers.

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