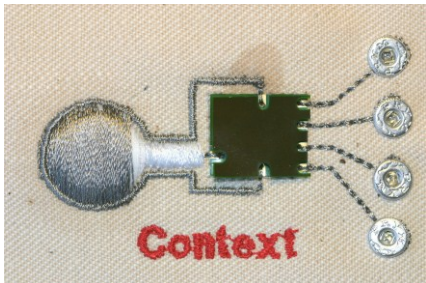


+++ Sensing Body Signals +++

ConText: Contactless sensors for body monitoring incorporated in textiles



Laminated textile-integrated capacitive EMG sensor for measuring muscle activity in an unobtrusive way



Embroidered capacitive EMG sensor with embroidered interconnections to electronics module

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Background

ConText is an EU STREP project that ran for three years and finished in December 2008. The project partners were: PHILIPS Research (the Netherlands), Technische Universität Berlin (Germany), Clothing+ (Finland), Katholieke Universiteit Leuven (Belgium), TITV Greiz (Germany), TNO (the Netherlands)

The Project

In ConText a vest has been developed with integrated sensors and electronics for constant monitoring of muscle activity. The vest measures muscle activity in order to derive the psychological stress level of a person. To make the system most unobtrusive, a sensor technology has been developed which requires no direct contact with the body. It capacitively senses the EMG signals of the muscles even through other garments worn under the vest. Beyond this, technologies have been developed to integrate the sensors and electronics into textile to achieve a high level of comfort for the wearer. A number of different approaches have been investigated and developed by different partners. Conductive ink has been printed onto textiles, conductive and non conductive fabrics have been

laminated, conductive threads have been woven and embroidered to build multilayered textiles structures. The different technologies have been compared and benchmarked for different technological applications. Furthermore new technologies have been developed for interconnecting electronic modules like amplifiers with textile sensors and wiring. On the basis of these developments a feasibility prototype vest has been developed with textile integrated contactless EMG sensors, integrated amplifier modules and integrated conductive wiring for data transmission and power supply.



Final prototype vest with EMG sensor placed on the outside for better visibility of the technology

The Partners

The ConText consortium contains 6 partners and is a combination of industrial companies and institutes with world-class knowledge of sensors, electronics, textiles and musculoskeletal disorders. The contribution of Philips (the Netherlands) was in sensor development and data processing, as well as project management. The Katholieke Universiteit Leuven (Belgium) developed algorithms that can link the muscle activity measurements to the psychological stress state. Technische Universität Berlin (Germany) developed interconnection and encapsulation technologies for reliably integrating electronics into textiles. TNO (the Netherlands) developed an inkjet process for depositing metal on textile base materials. Furthermore they designed garments that minimize body to garment movements for optimal EMG sensing. TITV (Germany) developed woven sensor structures and stretchable wiring ribbons. Clothing+ (Finland) carried out market analysis and is now developing an application on basis of the ConText results. Furthermore they built textile sensors using lamination technologies. All together the ConText partners have built a number of feasibility prototype vests, one of which is shown hear.

Acknowledgement

We thank the European Commission for funding part of this work under contract IST-027291 (ConText).

Links

- [1] [T. Linz, L. Gourmelon, G. Langereis, "Contactless EMG sensors embroidered onto textile", IEEE International Workshop on Wearable and Implantable Body Sensor Networks, Aachen, March 2007](#)
- [2] [T. Linz et al., "Embroidered Interconnections and Encapsulation for Electronics in Textiles for Wearable Electronics Applications", Advances in Science and Technology Vol. 60 \(2008\) pp 85-94, Trans Tech Publications, Switzerland, September 2008](#)
- [3] [D. Güngör, "Ben Loves Anna", Berliner Zeitung, December 2006](#)
- [4] [Britta Danger, "Weste meldet Stress", Fraunhofer-Magazin 4.2008](#)