



POSTER SUBMISSION FORM

NAME OF ORGANIZATION

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POSTER TITLE

Optimising position and pressure of wearable textile sensors to reduce motion artifacts

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ABSTRACT

Optimising position and pressure of wearable textile sensors to reduce motion artifacts

In the project wearITmed a wearable sensor system is developed aiming at long-term monitoring of symptoms of patients suffering from Parkinson's disease, epilepsy, and to assist in stroke rehabilitation. Such a system could offer a more objective measurement, compared to the subjective methods commonly used today where the patient is asked to describe their symptoms. For a wearable sensor system to be used in health care applications there are high requirements on accuracy, as well as comfort. Garment design in terms of fit and sensor placement will affect the measurements' accuracy and the user acceptance.

The wearable sensor system is to monitor movement of the wearer, blood pressure, oxygen saturation and heart rate. For heart rate monitoring textile electrodes are used to increase the comfort for the wearer and to facilitate laundry. One challenge related to heart rate electrodes is the motion artifacts due to the skin-electrode interaction. Such artifacts are in the same frequency range as the actual signals and therefore difficult to filter out. Tight fitted garments are needed to decrease the motion artifacts created between electrode and skin, but the tight fit can also make it difficult for people to put the garment on and can create discomfort.

Our proposed sensor garment combines integrated accelerometers and optical pulse sensors, with textile heart rate electrodes. The connecting wires are hidden in a seam carefully designed not to hinder the wearer's movements. The fit is loose, except in specific pressure areas or sensor zones. We also use padded textile electrodes to increase the pressure between the skin and electrode in the places where it is needed. Our measurements have confirmed that noise is reduced with increased pressure over the sensor area. This pressure can be exerted by the garment as a result of careful garment construction and a combination of textiles with different e-moduli.

Currently, we are evaluating 3D body scanning as a tool for individualised garment construction. Several focus groups including both health care personnel and patients representing the different neurologic disorders are consulted as a mean for verification of user acceptance.

In an ongoing interdisciplinary research project, wearITmed, partners from healthcare, electronics and textiles development (Sahlgrenska Academy, Acreo ICT, Swedish School of Textiles, Swerea IVF and Medtech West) collaborate to develop a novel wearable sensor system for use in healthcare.

The financial support from SSF (Swedish Foundation for Strategic Research) is gratefully acknowledged.

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