



Textile Integration von Sensorik zur Kniewinkelmessung

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Interdisciplinary Product Development (M.Sc.)



Fig. 1: skier with bent legs

Problem statement

The knee is the joint most frequently affected by injuries when skiing. The Technical University of Munich is therefore developing an electromechanical ski binding that is designed to open in good time before the knee is injured. This requires, among other things, the measurement of the knee angle in real time.

Approach

The aim was to develop ski underpants that record the knee angle in real time and transmit the data wirelessly to an evaluation unit. This data can be used to control the ski binding.

Practical implementation

A sensor band is integrated in the knee area of the trousers, which measures the stretch to determine the knee angle. A microcontroller in a pocket at the top of the trousers performs the conversion and is powered by a rechargeable battery. The sensor data is sent via Bluetooth LE to the evaluation unit, which uses it for the ski binding.

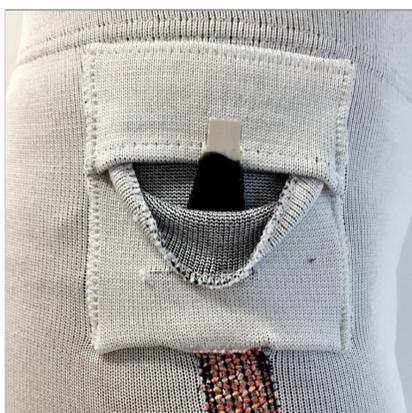


Fig. 2: Bag for microcontroller and battery



Fig. 6: Functional prototype of knee angle pants



Fig. 4: Bandage with conductor tracks and integrated sensor threads

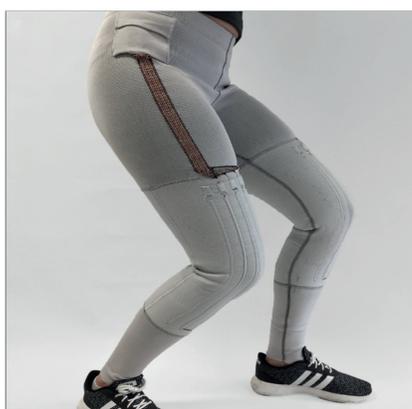


Fig. 3: integrated sensor threads react to stretching when the knee is bent

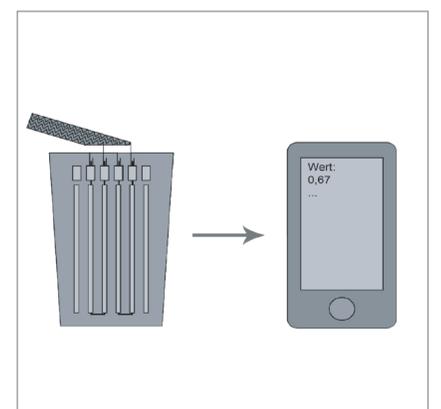


Fig. 5: Evaluation of the data using a smartphone app

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