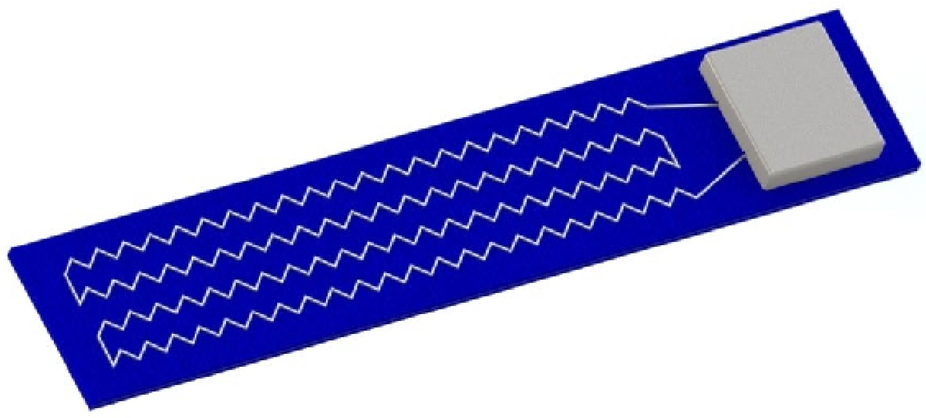
TECHNISCHE UNIVERSITÄT DRESDEN

ITM LEADING IN FIBRE & TEXTILE TECHNOLOGY
The Research Institute of University of Excellence

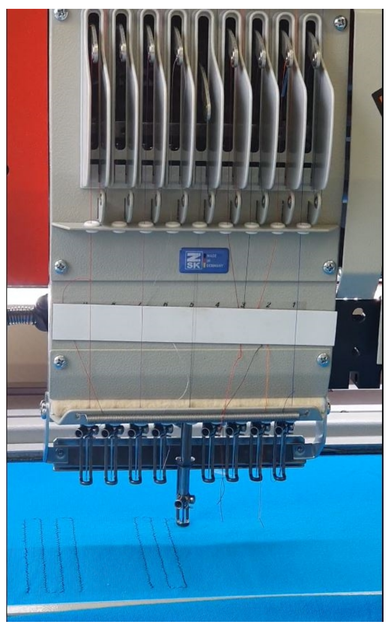
Faculty of Mechanical Science and Engineering Institute of Textile Machinery and High Performance Material Technology

Smart Kinesiotape

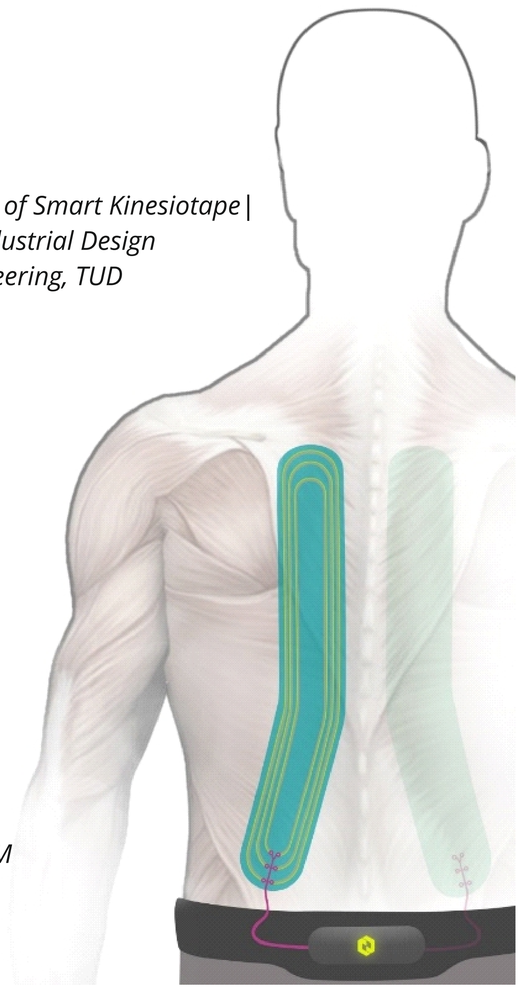
AS A TOOL FOR HUMAN MOTION CAPTURING



CAD model of Smart Kinesiotape with four-sensor-line deisgn | © ITM



Smart Kinesiotape produced by embroidery technique | © ITM



Vision of Smart Kinesiotape | © Industrial Design Engineering, TUD

Research Questions/Objectives

Which sensors and actuators are best suited for which task?
- Bending sensors for human motion capturing

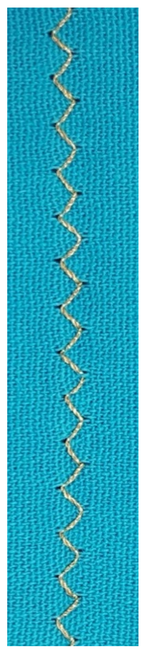
How can these be optimally attached to the user?
- Stable in position
- Comfortable/without movement restriction

How can energy be supplied and data processed?
- Printed Circuit board (PCB) for data gathering
- Bluetooth connection for data transfer

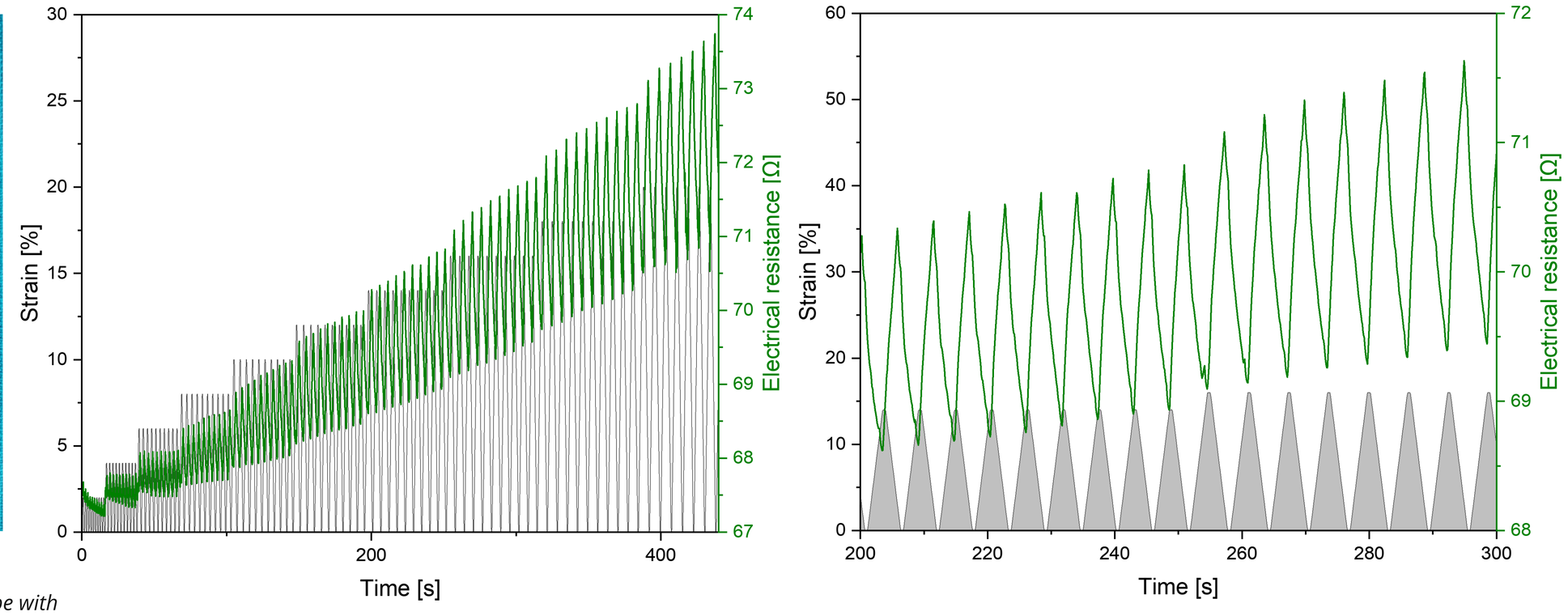
Methods

Materials and design
- Plain weave: cotton weft yarns, core-sheath elasthane/cotton warp yarns
- Electrically conductive silver-plated polyamide yarn (290 dtex, 300 Ω/m)
- Zig-zag shaped senor design, four parallel lines

Sensor analysis
- Machine electro-mechanical characterization
- Evaluation of sensing signal and transmission signal
- Cyclic elongation up to 20% in 2% steps



Smart Kinesiotape with zig-zag shaped sensor design | © ITM



Electro-mechanical test with zig-zag shaped sensor design from 0 to 450 s and detailed sequence from 200 to 300 s testing time | © ITM

Results

Kinesiotapes can be equipped with textile-based strain sensors using textile manufacturing process such as sewing and embroidery technique. Moreover, the stretch and measurement capability of up to 20% has been proven. The properties of the kinesiotape, especially the stretchability, can be retained to a large extent. The material selection, sensor geometry and stitch geomtry are decisive for sensor properties.
The results from the electro-mechanical charcterization show a relative resistance change of baout 2 Ω. However, a high elongation of more than 20% of the Smart Kinesiotape is possible and a clear sensing signal can be obtained.

CeTI Centre for Tactile Internet with Human-in-the-Loop

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DFG Deutsche Forschungsgemeinschaft

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