ConText

Contactless sensors for body monitoring integrated in textiles

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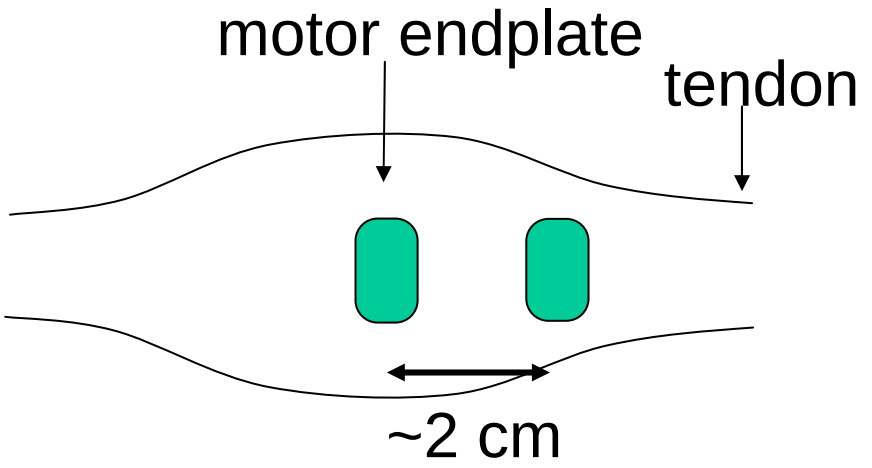
KATHOLIEKE UNIVERSITEIT LEUVEN titv berlin PHILIPS TNO CLOTHING+

Musculoskeletal disorders

- For example: back pain, RSI
- Among the biggest health and safety problems
  - 40 million workers in Europe are affected
  - 40-50% of all work-related ill-health
- Caused by physiological strain and psychological stress, e.g. high work load

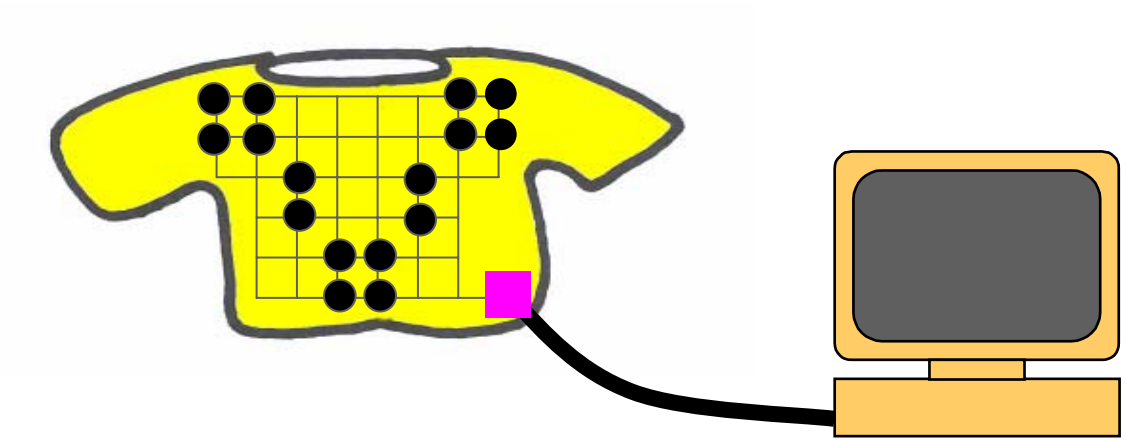
Electromyography (EMG)



Skin contact electrodes:
Potential difference
caused by charge flow from
motor endplate to tendon

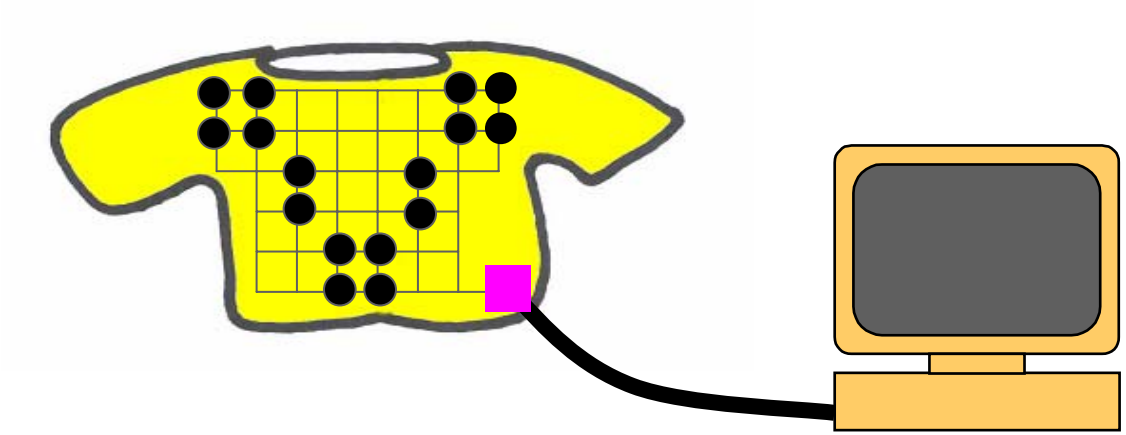
ConText objectives

- Incorporate **contactless sensors** into **textiles**
- To measure **muscle** and **heart electrical signals**
- For **continuous** monitoring
- To be used by **untrained individuals**
- Giving information on **muscle activity** and **stress state**



ConText feasibility prototype

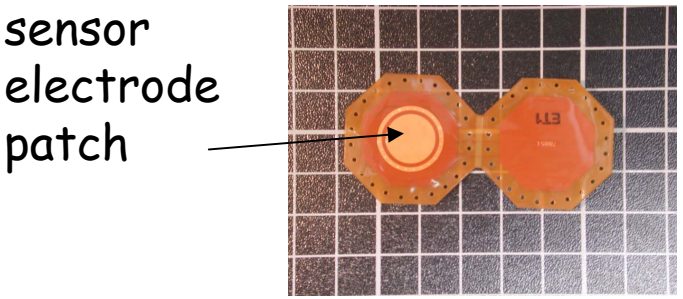
- Sensors measure electrical signals from muscles (electromyography)
- Sensors are incorporated in textile of shirt
- Combination with other signals from body and converted into muscle activity and stress state
- Feedback to person via PC

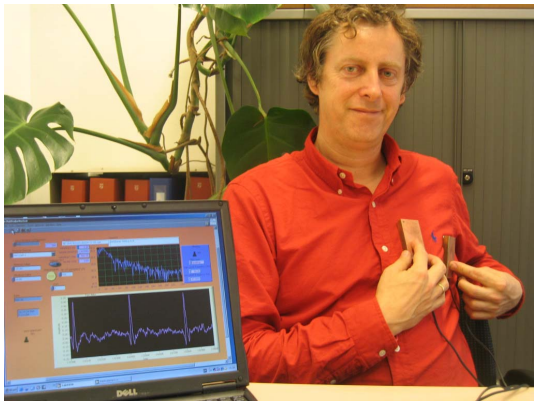


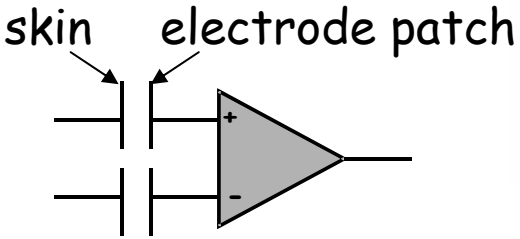
Contactless EMG/ECG sensors

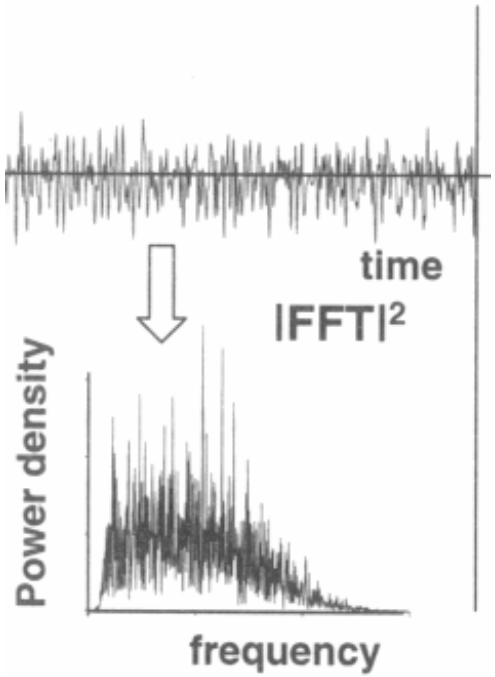
Monitor muscular activity and heart rate

- Capacitive EMG/ECG sensors
  (shape, size, signal pre-processing)
- EMG data evaluation/interpretation

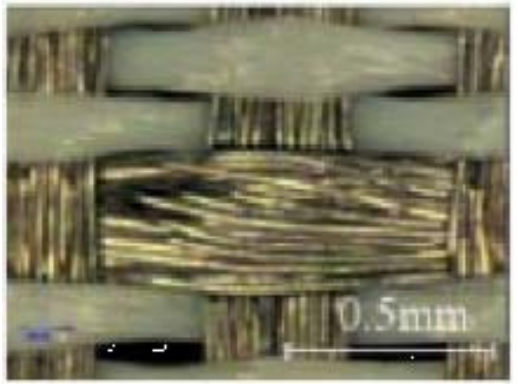


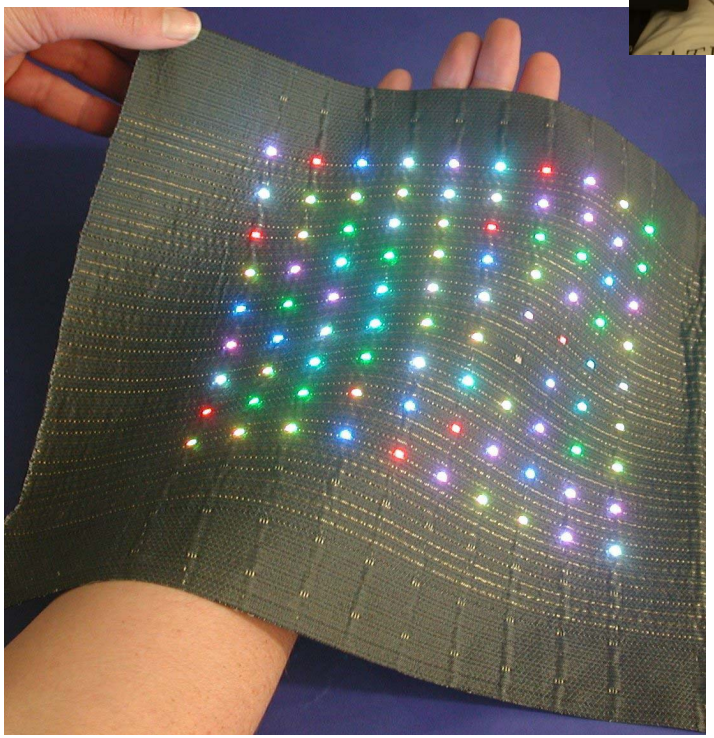






Textile and electronics: state of the art

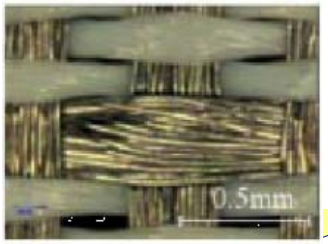


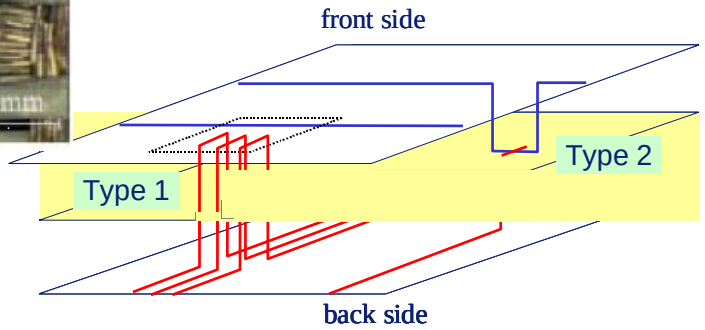


Technical challenges for textile integration

Conductive textile substrate

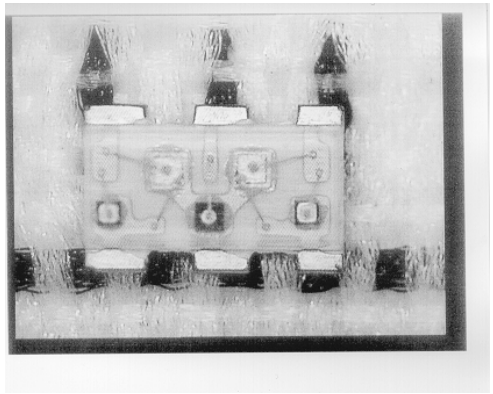
- Data and power trans-mission through textile





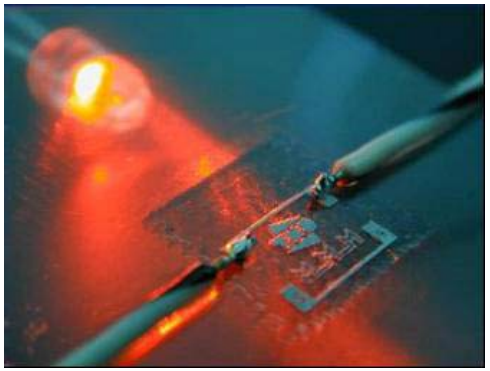
Textile interconnects

- Connecting micro-electronics to conductive textile substrate



Textile electrode patches

- Embroidery, weaving and printing



Consortium

6 partners, 1 SME (TITV)

• Philips	NL	sensors, electronics HW and SW
• TNO	NL	printing conductive ink, confection
• TU Berlin	D	fabric-electronics interconnection
• TITV	D	thread galvanising, weaving conductive yarns
• KU Leuven	B	electromyography measurements
• Clothing+	FIN	application development