

Active passengers' safety through intelligent textile

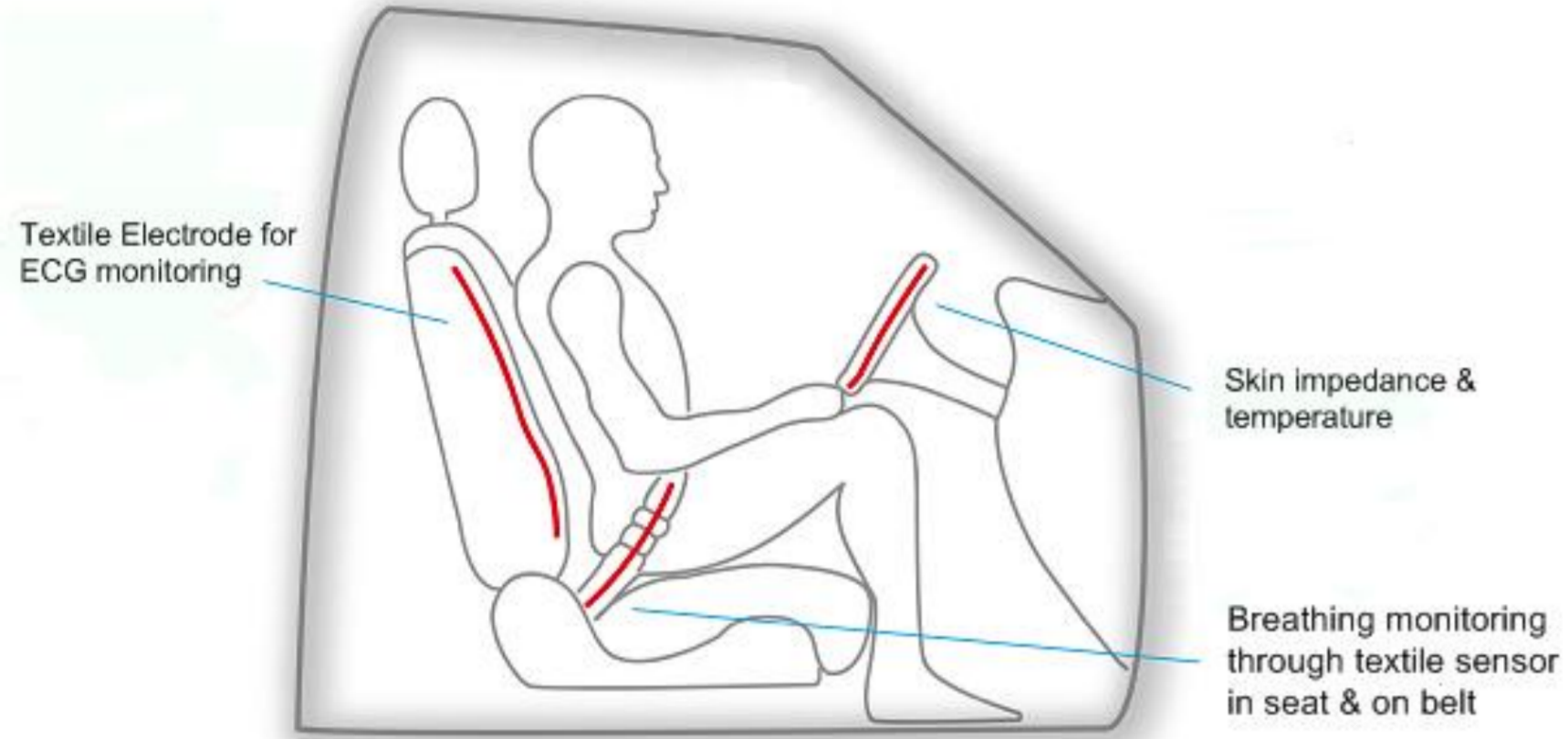
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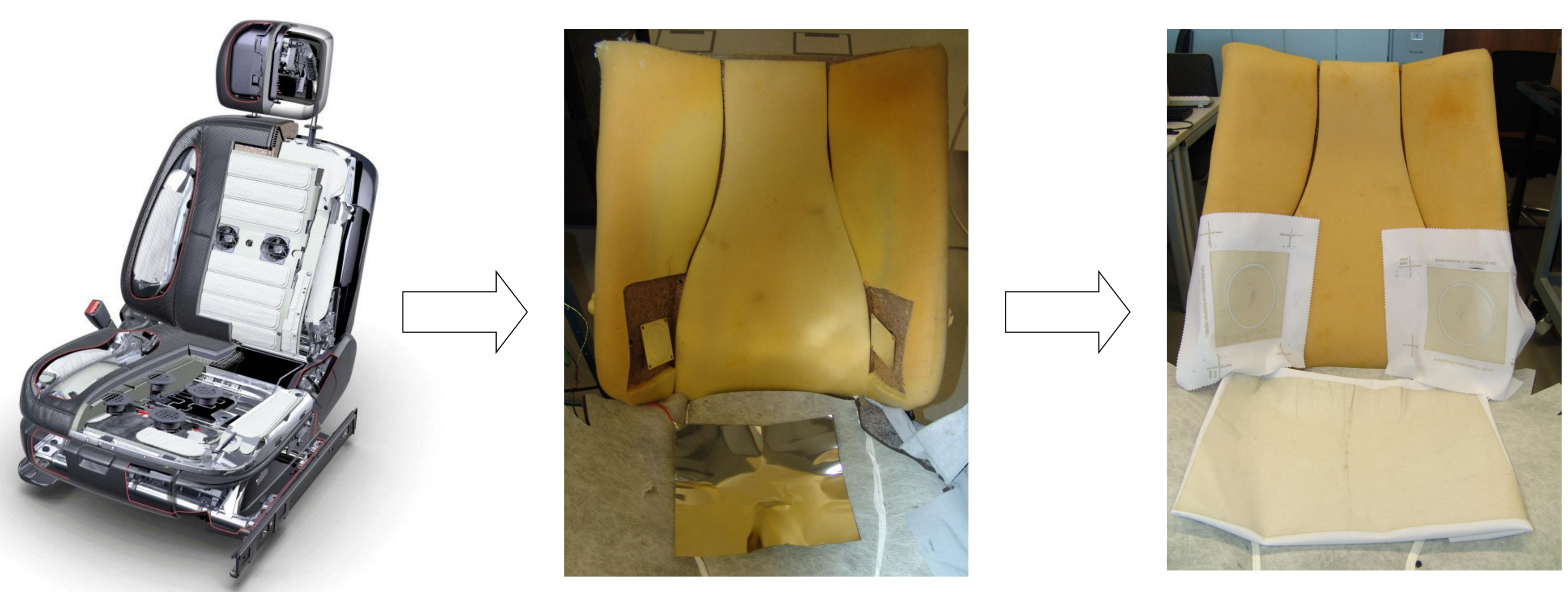
Objectives



- This work is part of project “INSITEX”, funded by German ministry for education and research (BMBF).
- The integration of textile capacitive Electrocardiography sensor in the car seat along with skin temperature and skin impedance (EDA) measurement at steering wheel will enable to monitor driver' mental status and possibly micro sleep for active prevention of car accidents.

Fig.1 Concept of project “INSITEX”.

Procedure & Implementation



- Fig.3 shows a 2 layer textile electrode (patent pending) connected with its electronics.
- The electrode is actively guarded to avoid any parasitic effects.

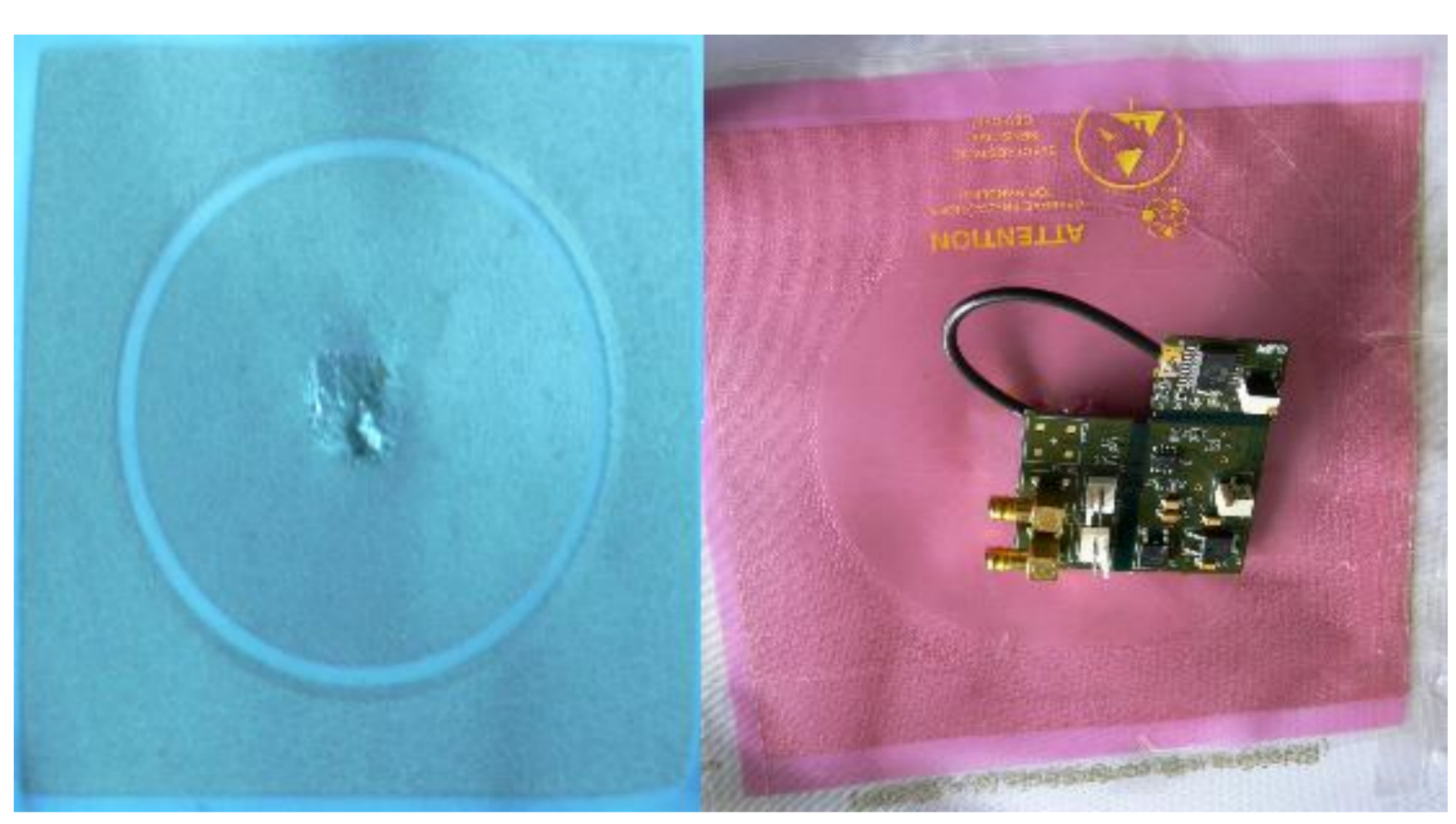


Fig.2 (LTR) (1) Seat of series W221, (2) Experimental seat with PCB electrodes and (3) Experimental seat with Textile electrode.

- ECG is measured without compromising any driving comfort as it is non-contact (capacitively coupled).
- Skin temperature and skin impedance along with the ECG signal will be measured to enhance accuracy of the result to estimate driver' mental condition and microsleep eventually.
- Textile electrode has been implemented after verifying the ECG principle with PCB electrodes. Fig.2 shows various stages of the work.

Fig.3 A Capacitive ECG Electrode

Results & Outlook

- A promising result from the Capacitively coupled ECG is shown in fig.4. Heart rate (HR) and heart rate variability (HRV) can be derived from it as shown in fig.5.
- Values of HR and HRV are related to physiological condition of the mind (e.g. stress), hence can be helpful to estimate mental status of the subject along with skin temperature and skin impedance.
- Further work comprises aspects to convert the system into a practical set-up, e.g. tests with various textile technology approaches, integration into the real car seat, influence of the environment on the technical textile. Reproducibility and robustness has to be verified in order to use the system flawlessly.




Fig.4 Capacitively coupled ECG with the textile electrodes

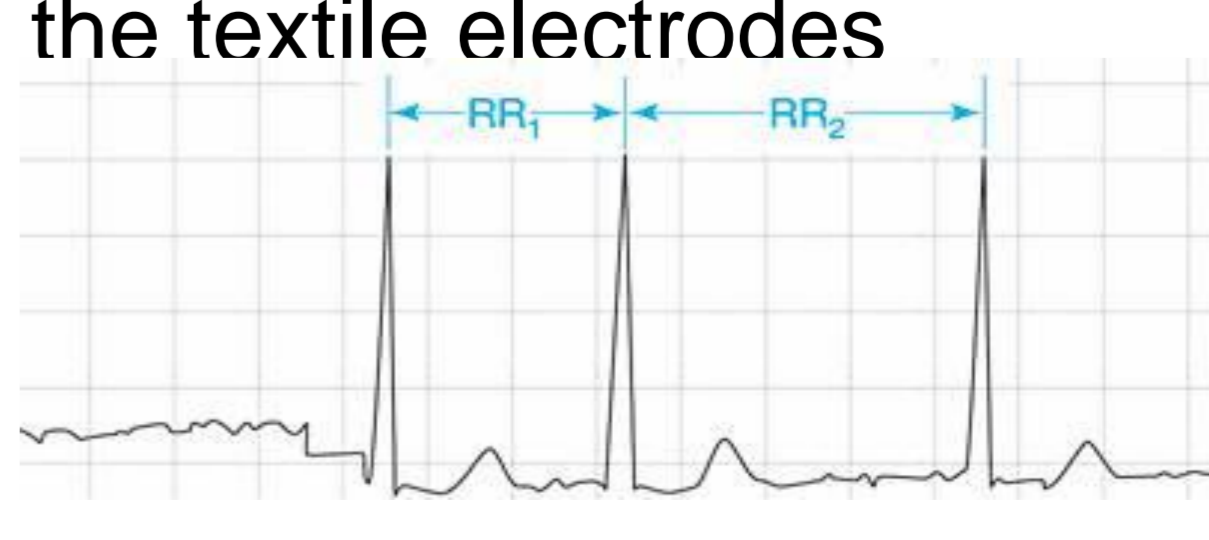


Fig.5 HR & HRV with conventional ECG

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