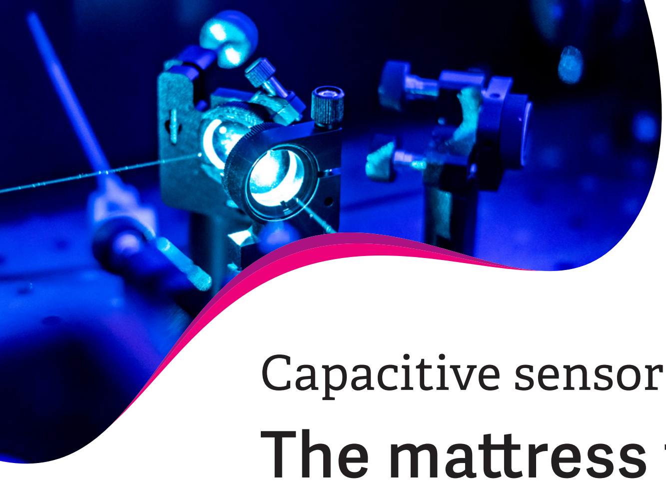

IMES | Institute for Microelectronics, Embedded Systems and Sensors

OST Eastern Switzerland University of Applied Sciences

Capacitive sensors

The mattress that measures your pulse

The idea was to use conductive and insulating foam in a mattress as capacitive pressure sensors to detect presence, movement, breathing and even pulse. Applications are conceivable in the healthcare sector or for sleep analysis.

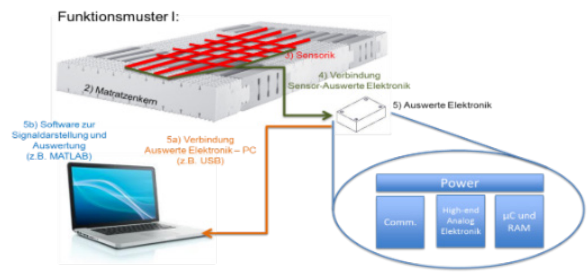

Image 1: Mattress with sensors

The project

In a project co-financed by the Commission for Technology and Innovation (CTI, now Innosuisse), a functional model was developed in which a capacitance array was formed using insulating and conductive foam sheets and integrated into mattresses. With the support of bachelor theses, the system was further developed into a demonstrator that shows the possibilities of capacitive sensor technology.

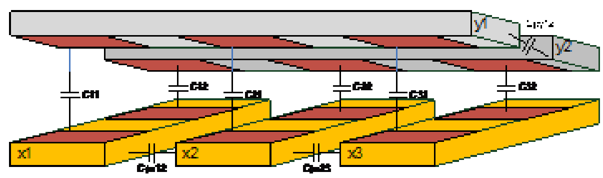

Figure 2: Capacitive sensors in the mattress

Project status

These electronics allow the detection of capacitance differences of a few femto-farads (1 femto-farad = 10^{-15}F= 0.000'000'000'000'001F). Pressure and movements on the mattress are therefore easy to measure. Figure 3 shows the pressure distribution of a person lying on their back.

Depending on the lying position, the pulse can also be detected. Figure 4 shows the heartbeat after the measurement data has been filtered with a bandpass filter.

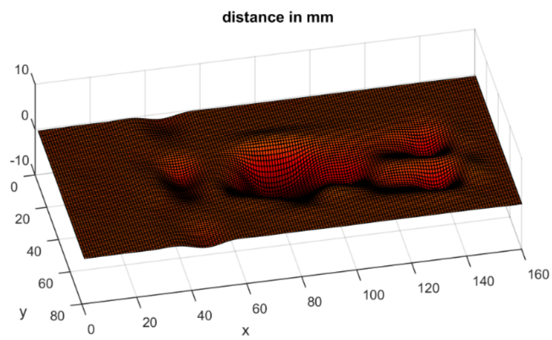

Figure 3: Depth of impression on test subjects

Prospects

The concept has been verified and has potential. Unfortunately, a negative market analysis brought the CTI project to a stop. It is waiting for a new project partner.

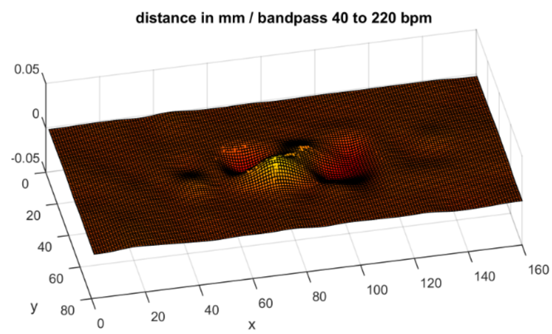

Fig. 4: Pulse failure detection with filter

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