



Automotive Seat Occupancy Sensor based on e-Textile Technology

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Abstract

- A woven capacitive sensor is presented as a novel automotive seat occupancy sensor.
- The woven capacitive sensor is developed as a response to seat occupancy sensor false positives.
- The designed sensor demonstrates error-free sitting detection of a person by detecting the change of the permittivity around it providing distinction with an object with the same weight.



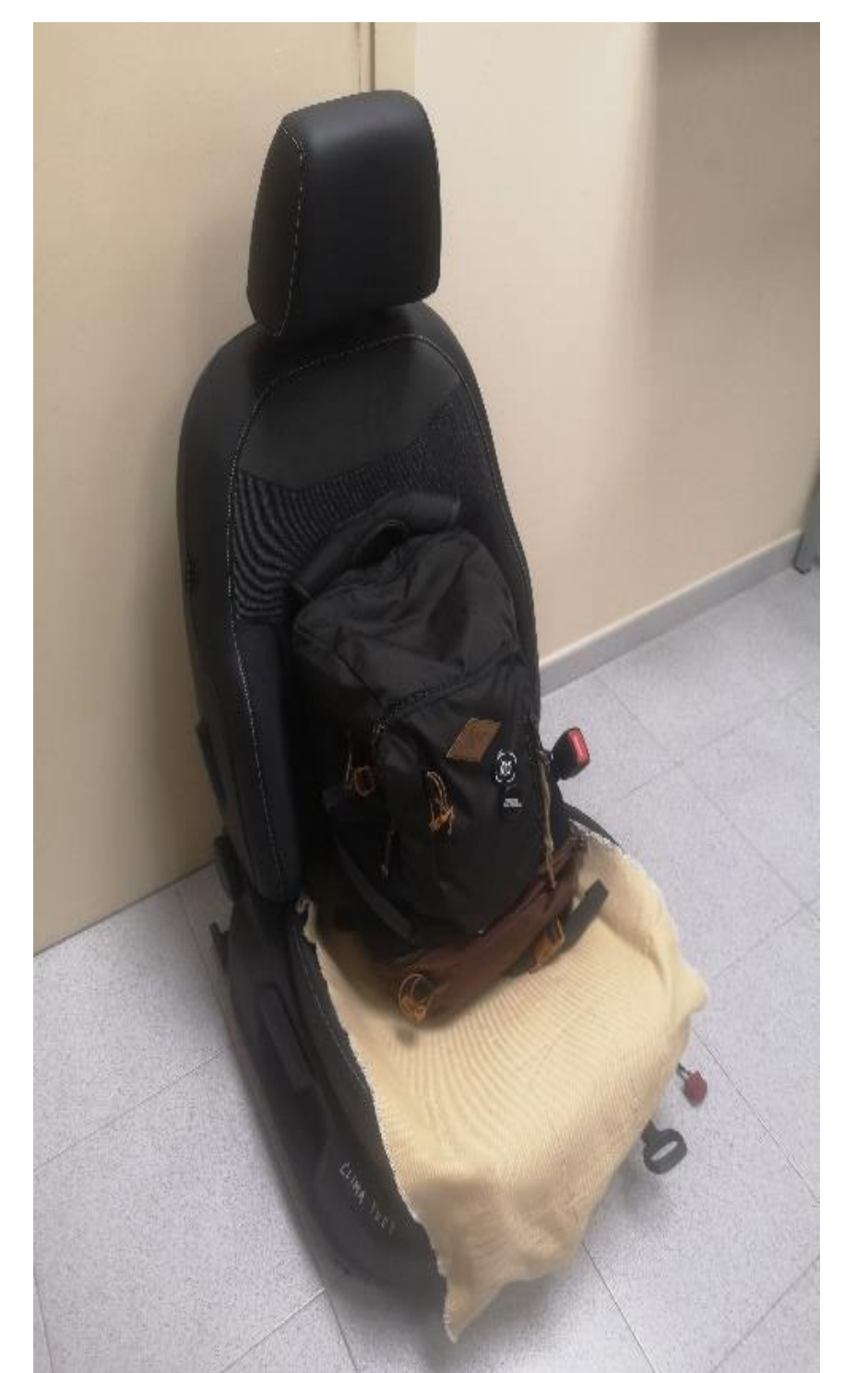
Materials

- Woven fabric substrate:
 - Warp --> 100% cotton spun yarn
 - Weft --> 35/65% polyester/cotton spun yarn
- Conductive yarns Bekaert 60% polyester 40% stainless steel.



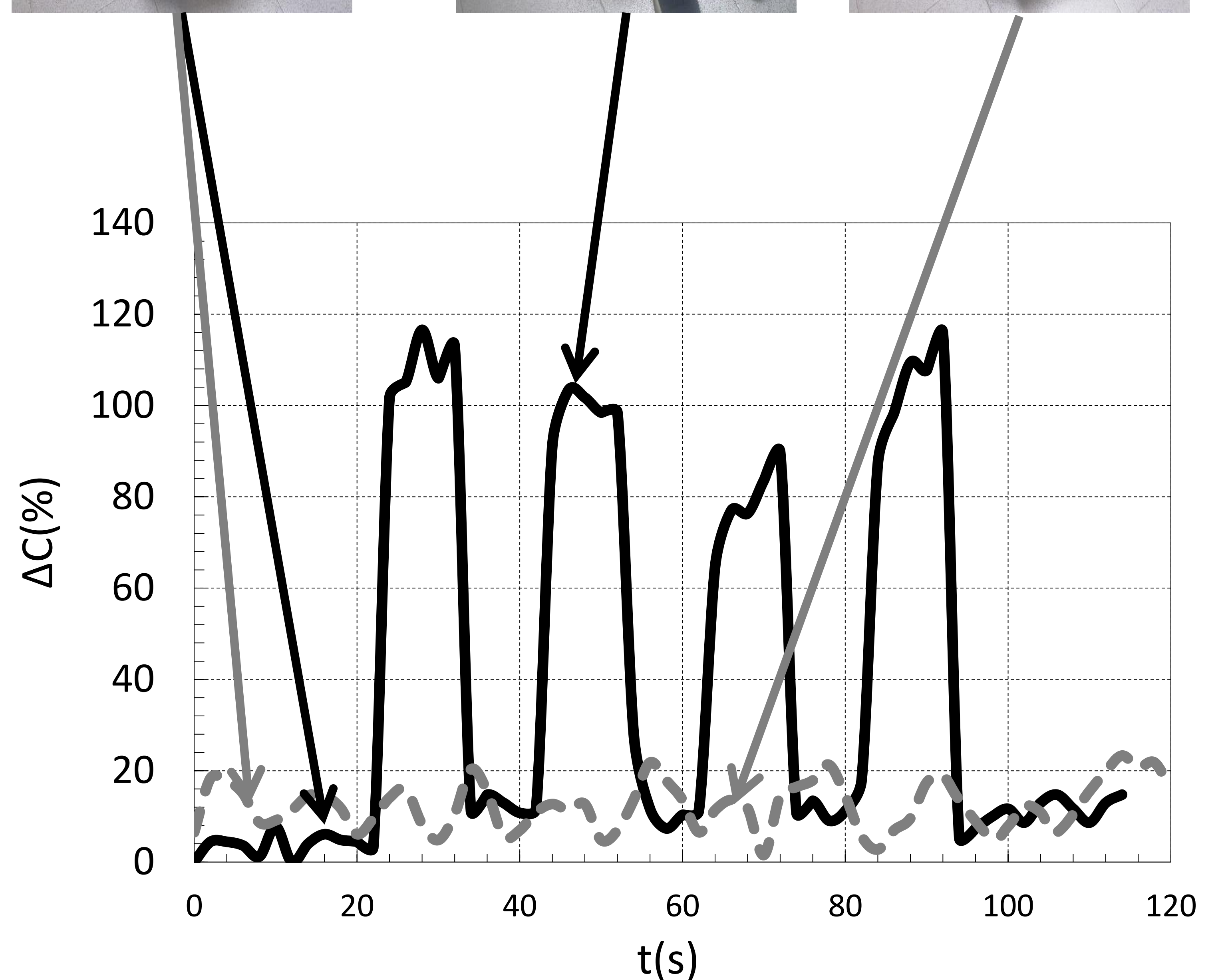
Methodology

- The sensor was embroidered in a Dornier LWV8/J 71 weaving machine moved by a Jacquard Stäubli LX1600B.
- The test consist in a person sitting over it during 10 seconds and getting up for 10 seconds, repeated 4 times.
- Second part of the test repeats the process with a bag containing 20 kg in weights.



Results

- The peaks over 80% of capacitance change indicates that the person is sitting.
- When the stand-up movement is performed the sensor recovers its initial capacitance value.
- When an object of 20 Kg is placed over the sensor, the maximum capacitance variance obtained is 20%.



Conclusions

- The sensor based on a woven capacitive sensor solve the problem suffer by the FSR sensors.
- The sensor is capable to difference a person from an object due to the permittivity differences between them.
- The sensor also could be integrated directly on the upholstery of the car seat saving the space where the FSR sensor were installed

Acknowledgment

