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A wearable piezo-resistive sensor for capturing cardiorespiratory signals

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Highlights

- A wearable piezo-resistive sensor capable of capturing cardiorespiratory signals is presented.
- It is fabricated by successive layers of piezo-resistive nonwoven fabric, adhesive webbings and silver knitted electrodes.
- The piezo-resistive nonwoven fabric is impregnated with nano silver particles using dip-coating technology.
- Electro-mechanical characterizations and cardiorespiratory signal testing are carried out in order to evaluate the performance of the developed piezo-resistive nonwoven sensor.

Abstract

This paper presents the performance of a new nonwoven piezo-resistive sensor for capturing cardiorespiratory signals. The novel piezo-resistive sensor is fabricated by sandwiching a nano silver electro-conductive ink impregnated nonwoven material between two layers of knitted silver fabric that function as sensor electrodes. The paper describes the technology for minimizing the signal noise due to motion artifacts in the sensor. The nonwoven piezo-resistive sensor is tested on volunteers by capturing their cardiorespiratory signals, where the signal noise is filtered using a bandpass filter. The paper further presents the analysis of the performance of the sensor together with a comparison against a commercially available, portable, cardiorespiratory signal monitoring device. The study shows that the wearable nonwoven piezo-resistive sensor system is highly sensitive, and it is an accurate and reliable sensor for capturing cardiorespiratory signals.

Keywords: Nano silver ink; piezo-resistive; smart textile; pressure sensor; nonwoven

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