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Shoe insole with MWCNT-PDMS-composite sensors for pressure monitoring

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Rajarajan Ramalingame ; Zheng Hu ; Carina Gerlach ; Olfa Kanoun

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Abstract:

This contribution presents a flexible, thin shoe insole of less than 1 mm thickness, which can be used to monitor pressure at a human foot. On this insole, six single sensors based on a multi-walled carbon nanotube-polydimethylsiloxane composite are placed on distinct positions to measure the pressure at the forefoot, midfoot, hallux and heel. Within this work the fabrication of the composite as well as the functionalized insole and the data acquisition under pressure is shown. With such an insole foot ulceration can be prevented or gait analysis can be carried out by pressure monitoring.

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I. Introduction

Functionalized shoe insoles with pressure sensors are needed for pressure distribution measurement at human foot. This can be used to monitor pressure distribution to prevent ulceration which could lead to amputation [1] or to perform gait analysis studies, e.g. in sports for athletes to improve their movement profile or in rehabilitation after an operation at the lower extremities where less pressure on one foot or leg should be given, which needs to be controlled. Although, there are several shoe insole systems available at the market, they are less convenient for daily use as they are expensive, bad long-time stability, temperature dependency, less flexibility or high level of complexity in the data acquisition [2].

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