

Peer Review

Review of: "Fabrication of Soft and Comfortable Pressure-Sensing Shoe Sole for Intuitive Monitoring of Human Quality Gaits"

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This article presents the design and fabrication of flexible pressure sensors using EcoFlex/Graphene composites, with the primary application of intuitive human gait monitoring and consideration of their use in the rehabilitation of patients with foot disorders. While the concept of using pressure sensors in shoe insoles for gait analysis is not entirely new, the article seeks to contribute to the field by exploring specific materials and an integrated system for real-time monitoring. Contribution to the Body of Knowledge: The article's primary contribution to the body of knowledge lies in the specific application of EcoFlex/Graphene composites in the fabrication of pressure sensors for gait analysis. It highlights the combination of the high electrical conductivity and mechanical strain sensitivity of Graphene with the flexibility and elasticity of EcoFlex. This choice of materials is justified by their potential to create comfortable and conformable sensors suitable for long-term wearable applications. Furthermore, the article describes in detail the sensor manufacturing process using molding and casting, sandwiching the thin EcoFlex/Graphene film between copper electrodes. The integration of five sensors into a footwear insole, strategically placed in the forefoot, midfoot, and heel, aims to provide a comprehensive view of pressure distribution during gait. The implementation of an ESP32 microcontroller for wireless data transmission to a GUI and smartphones for real-time monitoring is also a relevant aspect of the proposed system. However, the novelty and impact of the contribution could have been strengthened by: • More comprehensively comparing the performance of the EcoFlex/Graphene sensors with other types of flexible sensors and materials previously used in similar applications. While a comparison with a commercial Force Sensitive Resistor (FSR) is presented, a more in-depth discussion of the specific advantages in terms of sensitivity (0.02 Pa/ohm), response time (120 ms), recovery time (100 ms),

hysteresis (6%), and durability compared to the state of the art would have been valuable. • More rigorously quantifying the comfort and acceptability of the insole to users. While the sole is mentioned as "soft and comfortable," no objective data are presented to support this claim. • More clearly articulating how this system advances existing gait analysis methodologies beyond simple real-time monitoring. The connection to personalized rehabilitation strategies and early diagnosis of disorders is mentioned but could have been elaborated upon in greater detail. • Exploring the limitations of the proposed system and suggesting possible improvements beyond general future recommendations.

Declarations

Potential competing interests: No potential competing interests to declare.