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Peer Review

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

Abanah Shirley J.[1]

1. Independent researcher

The paper presents an innovative approach to gait analysis through the design and fabrication of flexible pressure sensors integrated into a shoe sole. Here are the key aspects of the study:

Material and Fabrication Techniques: The sensors are made using Eco flex/Graphene composites, which are known for their flexibility and sensitivity. The fabrication process involves molding and casting, allowing for the creation of conformable sensors that can accurately capture pressure changes during walking.

Sensor Design and Placement: The shoe sole incorporates five pressure sensors strategically placed: one at the forefoot, three at the midfoot, and one at the heel. This arrangement enables comprehensive monitoring of pressure distribution across the foot, which is essential for effective gait analysis.

Piezoresistive Behavior: The sensors exhibit negative piezoresistive behavior, meaning that their resistance decreases as pressure increases. This characteristic is crucial for accurately measuring the dynamic changes in pressure during gait, which can provide insights into foot health and gait abnormalities.

Integration with Technology: The pressure sensors are connected to an ESP32 microcontroller, which facilitates wireless data transmission to a graphical user interface (GUI). This integration allows for real-time monitoring and analysis of gait patterns, making it a valuable tool for both researchers and clinicians.

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Applications in Rehabilitation: The study emphasizes the potential applications of this technology in rehabilitation, particularly for patients with foot disorders or neuromotor diseases. By providing detailed insights into walking patterns, the system can aid in developing personalized rehabilitation strategies.

Comparison with Commercial Sensors: The paper compares the custom sensors with commercial Force Sensing Resistors (FSR), highlighting that while both exhibit similar characteristics, the custom sensors may offer advantages in terms of sensitivity and adaptability for specific applications in gait analysis.

Future Directions: The authors suggest that further research could explore the application of these sensors in various contexts, such as sports science and elderly care, to enhance mobility monitoring and rehabilitation efforts.

In conclusion, this paper contributes significantly to the fields of biomechanics and material science by presenting a novel solution for gait analysis. The integration of flexible pressure sensors into a comfortable shoe sole represents a promising advancement in monitoring human movement and improving rehabilitation outcomes.

Declarations

Potential competing interests: No potential competing interests to declare.