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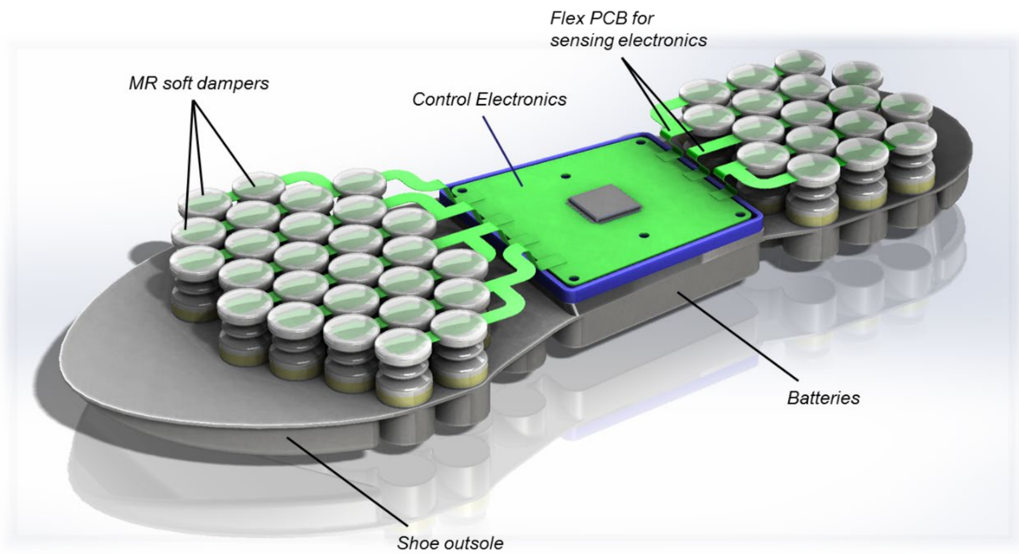
Pressure Limiter



System for adjusting pressure locally on the skin

Ref. Nr

6.1449

Keywords

Electromagnetic valve, cushion, pressure reduction, MRF

Intellectual Property

US 10,945,911 B2
EP3217831

Publications

Design and characterization of a soft magneto-rheological miniature shock absorber for a controllable variable stiffness sole, in Archives of Electrical Engineering, Vol. 64, No. 4, pp. 547-558, 2015.
10.1515/aee-2015-0040

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Description

Pressure sustaining and release capability based on a defined threshold limit is a key requirement in varieties of applications, especially in the context of automation and robotics or in the medical domain. For example, people suffering from diabetes mellitus and diabetic neuropathy may develop wounds and ulcers on the sole of the foot. One of the causes behind the formation of these plantar ulcers is connected to the presence of areas of excessive plantar pressure, which may be localized across the entire sole of the foot, in most cases in the region of the heads of the metatarsals. At present, the treatment of plantar ulcers in diabetic patients is limited mainly to passive systems, which simply ease the load on the region of the foot at risk. With these systems, the rate of recurrence of foot ulcers is very high.

Advantages

We propose a system for adjusting pressure locally acting on the skin including a set of adjacent modules composed of a cushion capable of changing shape and comprising a cavity, a valve, a tank, and a pressure sensor, wherein the cavity and the tank are in communication with each other by means of the valve. The vertical arrangement of the main parts of the module makes it possible to maximize the density of modules for a given surface area.
The proposed solution ensures greater flexibility, a high level of integration, while being controllable and simplicity in terms of the design of the overall system. Initially aimed application is for smart shoes, where the task would be to release and redistribute the excess pressure. Because of the simplicity, it is equally useful for other robotic and industrial application. The concept can also be enlarged to other medical domain where pressure should be regulated: mattress, chair, teeth…

Applications

- Shoes for diabetic patients
- Mattress
- Artificial teeth