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PIEZOELECTRIC-BASED INSOLE FOR GAIT ANALYSIS

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Summary: The activity of walking is one of the main movements performed by human beings, since this movement is indispensable for both mobility and personal independence. Thus, the act of walking becomes essential for the execution of most daily activities. In the last decades, two strands research lines have become the focus of attention by researches, resulting in an expressive number of works on the subject. The first with the development of techniques, studies and protocols that allow to understand, analyze, evaluate and characterize the gait behavior, and the second with the development of systems to obtain parameters related to gait, in order to facilitate its analysis and characterization, assisting researchers in the field of physical therapy in the study of gait. The identification of gait behavior, specifically the distribution of plantar pressure of the foot, both static and dynamic, allows applicability in areas such as: sports, health and assistive technology. In sports applications, for example, to analyze the gait behavior of high-performance athletes to apply protocols to improve training and prevent injuries. In healthcare applications, such as diagnoses of pathogens that have gait as one of the parameters for diagnosis and/or progression, such as Parkinson's disease or some dementias such as Alzheimer's. In assistive technology applications, to assess the gait of patients with spinal cord injury or patients with diabetes, specifically the pressure/force distribution of the plantar surface of the foot, can help measure the efforts exerted by the lower limbs of these patients, and it also becomes essential to provide subsidies for the adoption of effective strategies for rehabilitation. Thus, the present work presents the prototype of an insole made of polymeric material, easy to manufacture and low cost, instrumented with 4 commercial piezoelectric sensors (*MEAS 35005*) in pre-established positions that allow to obtain a mapping of the planar pressure of the foot and which can identify the 3 main types of steps (neutral, pronated and supine). Preliminary tests were carried out with this insole, under two different conditions: walking and foot dragging. The results obtained with these preliminary tests showed that it is possible to differentiate the behavior of the signal in the two conditions tested. Therefore, it is intended to improve this insole to use it as an instrument for obtaining parameters and gait characterization.