

Abstract Bachelor Thesis „Possibilities And Limits Of Smart Insoles For The Application In The Area Of Sports And Healthcare

Subject: gait analysis, smart gadgets

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Topic: **Possibilities And Limits Of Smart Insoles For The Application In The Area Of Sports & Healthcare Engineering**

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Topic and Purpose. The present bachelor thesis gives a general overview of the current market of smart insoles regarding the aspects of applications, usability, technical realization, possibilities and limits for use in mobile gait analysis in the field of rehabilitation, prevention and performance increase in competitive sports.

Method of Research. First of all, the human gait, typical foot deformities their dependency are illustrated. Furthermore the classical gait measurement methods such as kinematic, kinetic and myoelectronic methods as well as the used measurement systems and sensors are explained in detail. Based on these information, an extensive market analysis of all actual available smart insoles is performed. In a next step, two smart insole products, the "Science Insoles" by Moticon and on the "Run Profiler" by Digitsole, are described in detail as well as tested and evaluated subsequently.

Results. The investigation gives a revealing understanding of the tested products. Significant differences could be shown by built-in sensors complexity and functionality. Concerning accuracy and comfort, the "Science Insoles" by Moticon have shown the best results. The examinations show the difficulty of comparing these both products because of the different application areas and sales markets they are built for. As it turned out that the mobile examination methods are less precise and less informative compared to stationary camera and pressure plate measurement systems. On the other hand mobile examination methods with smart insoles offer the previously not available option of continuous, real-time feedback of the measurements accessible for the user, the patient or athlete, as well as the physiotherapist or doctor.

Conclusion. Smart insoles offer a great advantage for individual and flexible ambulant usage in the form of continuous control for postoperative patients during their rehabilitation process. Smart insoles are characterized by very good handling and high comfort. Their performance is limited by the sole's thickness, the external influences such as e.g. water, humidity, sweat or change in temperature which have been considered by the use of compensation techniques to guarantee accurate measurements independent from the mentioned influences. But, due to continuous technological improvements in the field of sensor materials and dimensions, the number and area of applications of smart sensor soles will increase in the future and offer the opportunity to cover new branches and innovative markets.

Key Words. gait analysis. smart insoles. moticon. digitsole. mobile examination methods. rehabilitation. sports science.

