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I. Introduction

Clinical or quantitative gait analysis is a topic of paramount importance in which concerns the detection of gait abnormalities and the support of decision-making relating to people that are under physiotherapeutic treatments. It is important to obtain quantitative data regarding the measurement of forces and walking kinematic parameters like position, velocity and acceleration. There exist a large number of techniques that can be used for gait assessment. Image based techniques are powerful to recognize and identify gait abnormalities and to evaluate patients' evolution over physiotherapy treatments. However, these techniques are affected by the subjectivity of the observers that judge the quality of gait and by their accumulated knowledge and experience in the area. By its turn, even if there exist videography based techniques to perform kinematic analysis, these techniques, usually based on the usage of reflective markers, are also prone to errors related with the image accuracy and resolution that depends on the type of markers that are used and on the contrast between them and the surroundings. Repeatability errors caused by variations in the positioning of the markers are also a great disadvantage of these methods. Another type sign in to Continue Reading of techniques that can be used for gait assessment are based on electromyography (EMG). In this case, EMG electrodes acquire voltage signals that give information about muscles' activations. However, these signals have a very low amplitude being required an adequate signal conditioning to obtain an acceptable signal-to-noise ratio of the signal before digitalization or recording. The electrodes pick up electrical noise and the electrodes' connecting wires behave like antennas that cause additional problems. Moreover, non-invasive surface electrodes only gives a gross estimation of muscle activity with low resolution. Even if it is true that every technique has its own advantages and disadvantages, in this paper quantitative techniques based on the usage of accelerometers [1]-[2], gyroscopes [3]-[4], inertial measurement units [5]-[7] and force sensing units [8] are considered. Transmission forces, body accelerations and direction, and other physical variables related with ground reaction forces are measured and processed, in a real-time mode, in order to extract gait related parameters. As a result of the present work, a low-cost, non-invasive and wireless system for gait monitoring was implemented and tested with successful results.

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