Biomechanics laboratory as a source of real life human movement data

Vladimir Medved, Faculty of Kinesiology, University of Zagreb

Abstract

Being both a theoretical and an experimental field, human locomotion biomechanics resides significantly on the possibility to collect - reliably, accurately and non-invasively experimental data. Todays's state-of-the-art in data measurement and processing is characterised by efficient use of automatized measurement systems collecting 3D kinematic, kinetic and multichannel electromyographic (EMG) data of the movement performed, the process which is followed by data/signal processing and analysis, resulting ultimately either with scientific or with clinical interpretation. Classical methodological paradigm dating back to the time of Braune and Fischer is based on an inverse dynamic approach combining kinematic measurements with human body biomechanical modelling, and characterised with standardised ways and formats of results' presentation. The procedure practicised in the Biomechanics Laboratory at the Zagreb Faculty of Kinesiology is described concisely and illustrated with some examples of healthy and pathological locomotion evaluation, such as skeletal muscle fatigue evaluation and gait analysis. However, appreciating rather complex mechanisms underlying human movement - which have yet to be fully understood - methods emerge that enable handling complex data in novel and more efficacious ways. They surpass classical inverse dynamic approach and aim to even offer superior explanations of empirical findings. We are at the beginning of the development of these kinds of approaches and strive to find new mathematical/statistical methods and techniques suitable to efficiently handle and explain our data (being rather rich and abundant in quantity). The field of signal processing is particularly promising in this respect.