

Assessment of everyday physical activity: Development and evaluation of an accelerometry-based measuring system

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Abstract

By modifying an ergonomic motion analysis system, an accelerometry-based measuring system has been developed in the course of a feasibility study for quantitative and qualitative activity acquisition. To permit almost non-reactive long-term measurements in everyday situations, the scale of the original sensor equipment has been reduced by employing eight triaxial accelerometers. The existing evaluation software has been supplemented with appropriate functions. Movement intensity is determined and expressed in activity levels (*none, low, medium and high*), and a recognition algorithm has been implemented, which in its current version is capable of automatically identifying *walking* as well as different variants of *standing, sitting, lying, kneeling and crouching*. Activities were simultaneously videotaped to test classification accuracy. Tests yielded an agreement rate of 97.5% for measurements under controlled conditions. For measurements under everyday conditions, agreement rose to 99.0%. Preliminary testing by heart rate records confirmed the implemented intensity determination. In conclusion, the developed prototype is suitable for the objective recording and automatic identification of everyday activity behaviour. Using reliable hardware and enhanced, user-friendly software, the system has great potential for further development.

KEY WORDS: MEASURING PHYSICAL ACTIVITY, ACCELEROMETRY, ACTIVITY INTENSITY, ACTIVITY RECOGNITION