

## **Falls Prevention through Quantitative Tremor Assessment and Monitoring**

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A large number of foreign and Canadian studies show that falls represent one of the most frequent causes of serious injuries in the general population, particularly among older adults. Our analysis of the 2005 Canadian Community Health Survey (CCHS) based on a large representative national sample shows that the almost 40% of most serious injuries among all Canadians are caused by falls. The CCHS also shows that 34.0% of employed Canadians suffer from falls, and among them, almost one quarter (22.7%) of most serious injuries are caused by falls.

Among numerous factors correlated with falls including age, muscle strength, some acute and chronic diseases, and medication and alcohol use, tremor is a significant factor and/or symptom which indicates increased risk of falls. A comprehensive report on risk of falls among the elderly (Fuller, 2000) indicates that tremor assessment represents significant diagnostic information for fall assessment and prevention.

This study is based on the assumption that regardless of its etiology, tremor represents a significant objective indicator of the increased risk of falls among people of all ages, particularly people more prone or more exposed to risk from falls or accidents and proposes an objective, reliable and economically feasible method for tremor assessment based on 3D accelometric measurements. In order to avoid gravitational artifact in accelerometric measurements of tremors, as Elble (2005) suggests, the developed instrument uses filtered sensor signals and parallel placement of accelerometers on different parts of the arm.

The study presents results obtained through the development of a quantitative method for tremor assessment and monitoring. The assessment technique is based on three tri-axial accelerometers, positioned on the palm and the wrists. The results show correlations among vibration signals obtained from different accelerometers. This suggests that such processed vibration signals can provide valuable information for risk assessment, monitoring, and falls prevention.

**KEYWORDS:** Falls; Tremor; Falls prevention; Assessment; Diagnostic techniques; Accelerometry; Signal filtering, Data acquisition.