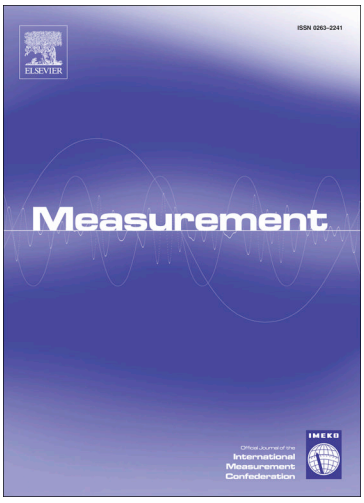

Non-Intrusive Fall Detection Monitoring for the Elderly Based on Fuzzy Logic

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Abstract

This paper presents a health condition monitoring solution that detects an elderly accidental fall occurrence. The fall detection algorithm implements both accelerometer-based and sound-based detections for the possible occurrence of a valid fall. The accelerometer-based fall detection is instrumental in the detection of a valid fall occurrence. However, it has been shown that by using accelerometer alone is insufficient to accurately detect a fall, as the accelerometer also misinterprets some daily motion activities and classified them as valid falls. The sound sensor can be used to detect the sound pressure generated from a resultant fall, but sound pressure cannot by itself be used as a reliable indicator of a fall. Thus, a fuzzy logic-based fall detection algorithm is developed to process the output signals from the accelerometer and sound sensor, where a valid fall activity detected by the accelerometer, coupled with a detected sound pressure from the resultant fall can infer an occurrence of a valid fall. This paper demonstrates the fuzzy logic algorithm to improve the accuracy of detecting a valid fall as compared to the accelerometer only fall detection algorithm and it can be demonstrated that the algorithm is capable of minimizing false fall detections per day from high of 1.37 to low of 0.06.

Keywords: Fall Detection; Accelerometer; Sound Sensor; Fuzzy Logic; Sensor Fusion