

# Intelligent Monitoring of the Elderly in Home Environment

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## Abstract

Demographic predictions of population aged 65 and over suggest the need for telemedicine applications in the eldercare domain. Current solutions are mainly focused on fall detection. We present a working prototype of a system that in addition to fall detection monitors a variety of users behavior characteristics that help raise awareness of health risks.

The presented system was developed primarily as a part of the EU-FP7 project Confidence, whose main objective is to build a care system for the elderly. An important advantage of the system is that it is based on localization hardware (that enables context-dependent reasoning resulting in a lower false-alarm rate). Localization enables a crucial advantage over accelerometer-based input because knowing that a person is in a bed enables avoiding annoying false alarms even when fast accelerations occur. Also, the localization system is especially suitable for people concerned with their privacy since it is less intrusive than video-based systems.

The system creates a profile of the user based on gait, turning, activity and spatial-activity characteristics. It monitors the state of users health, and more importantly, detects changes in behavior characteristics that potentially indicate a forthcoming or current disease, illness or some other disability. The system utilizes domain knowledge from medical literature on quantitative behavior analysis and combines it with an outlier-detection algorithm in order to identify anomalous behavior. The system can also provide information to relatives, caregivers or physician to help improve the life of elderly. Once behavior characteristics are computed, this opens a whole new set of possible applications. For example, the system can suggest to users actions that enhance their mental and physical health.

The preliminary results are encouraging, showing a potential for the early discovery of specific diseases, disabilities and even forthcoming health risks, all based on changes in behavior.