Wireless Insole for Independent and Safe Elderly Living

From 2011-11-01 to 2015-03-31, closed project | WIISEL Website

Description

WIISEL's main goal is to develop an unobtrusive, self-learning and wearable prevention and warning system to decrease the incidence of falls in the elderly population.

The idea is that elderly people put a specifically designed insole in their shoes, which monitors their walking pattern. This way the system may detect changes in gait and balance in the daily environment of the older person, which helps predict the likelihood of falling.

Thanks to a wireless system and chips built into the insole, data captured by the movements of the foot are sent to a mobile device or computer, so that the doctor, caregiver, nurse or administrator can follow the evolution of the patient, to assess if he correctly follows the rehabilitation programme or if he returns to bad habits that increase the risk of falling. If this occurs, an alert is sent immediately to the responsible caregiver. Thus the system provides security to the elderly and reduces their fear of falling, directly improving their quality of life.

Objective

The main goal of WIISEL is to develop a flexible research tool to collect and analyze gait data from real users and correlate parameters related with the risk of falls from the elderly population.

The global objective of the project is to provide a tool to continuous and remotely monitor gait and fall risk in the elderly and collect information on long term gait data for researchers in this field. This tool will consist of a combination of a flexible software platform together with wearable insole device collecting data related with gait. Risk of falls will be calculated as a new Fall Risk Index based on multiple gait parameters and gait pattern recognition. WIISEL will allow quantifying activity, assessing the quality of gait under real life conditions and will enable researchers to evaluate and monitor fall risk in elderly patients, in the home and community environment, mostly reflecting everyday life behavior. The system can be used as a research or rehabilitation tool and enable the recording of fall events to better recognize and correlate fall-associated gait patterns and increased fall risk.

The main output expected from the project is a flexible research tool that will impact in the scientific community with the following elements:1. A constant monitoring system for elderly people through a wearable and unobtrusive sensing insole connected to a data analysis system. The WIISEL system will continuously capture spatial–temporal data (eg, stride time, single support time, and swing time, double support time, cadence, nº steps per day, step length, stride length, gait speed, heel acceleration, postural sway, limits of stability, minimum foot clearance, maximum pressure values on heel and toe) related to human gait and balance.2. Intelligent algorithms which will utilize data analysis including pattern recognition to
quantify fall risk and provide useful information on fall risk assessment. With these results the project will contribute with a self learning analysis framework as a basis for further research in optimizing fall risk prediction and identifying fall risk factors. 3. A Fall Risk Index based on multiple gait parameters (e.g. stride time, gait speed, step length and double support time and their variability) and gait pattern recognition to assess and quantify the risk of fall of elderly population. 4. Real-life and long term human gait data useful for the scientific community to enrich existing databases. 5. A fall detection algorithm to feed gait pattern recognition. Moreover, the WISEL system as a flexible tool may lay the ground for a commercial pathway as a continuous and remotely monitoring platform.

Related information

| Documents and Publications | Submitted via NEF 2014_01_29 |

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