1- Publishable summary

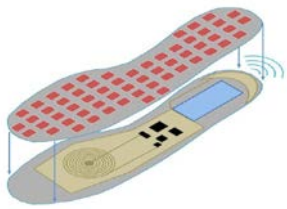
WIISEL: Wireless Insole for Independent and Safe Elderly Living

Co-funded by the European Commission (FP7 ICT – 2011-201; Contract no. 288878)
3 years of research and 3.9 million € budget

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**.

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 assessed 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.

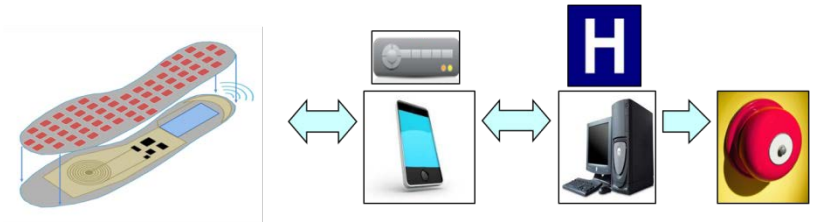
Coordinated by CETEMMSA, WIISEL is **co-funded by the European Commission** (FP7-ICT) for 3 years, with 3.9 M€ budget and 8 partners from 6 different countries.



The potential utility and impact of using the WIISEL system on the **research and clinical community** is the following:

- Allowing for **remote and quantitative assessment of a user's fall risk**
- **Measuring activity and mobility in daily living conditions**
- As a **clinical assessment tool,** allowing its use **as part of any research and assessment of gait parameters.**
- Enabling the **early identification of functional mobility decline in performance** (i.e. assessment of motor fluctuations and disease progression)
- Enabling **fall detection in the home setting**

Thanks to a **wireless system and several sensors embedded into the insole**, the data captured by the movement of the foot are **sent first to a mobile device and later to a server**, so that the evolution of a patient can be monitored remotely in terms of gait, fall risk, activity and mobility.



Towards more sustainable social and health systems.

According to the European Union, by 2050 the number of people in the EU aged 65 and above is expected to grow by 70% and the number of people aged over 80 by 170%. It is a fact the ageing of Europe's population is a challenge for the European social and health systems.
Age is a major risk factor for fall injury. 30% of people over 65 and 50% of those over 80 years fall each year, and older adults who fall once are two to three times as likely to fall again within a year[3].

A system like WIISEL, that in an unobtrusive way will allow to analyze movement, posture and activity of the elderly population by extracting a direct and continuous information from gait, is beyond any doubt of utmost importance in this context, by **assessing the risk of falls among the elders** and indirectly enabling the implementation of early and adapted interventions to lower this risk**.**

Innovative field of research and challenging outputs for a huge impact at European level

The WIISEL system integrates of all features and components into the insole, with wireless information sent to the server. The software receives the data from continuous gait monitoring, and through intelligent algorithms will recognize gait patterns and thus detect anomalies in gait which could lead to fall risk.

The WIISEL Project will **impact the research and clinical communities by developing an innovative tool for research and assessment on gait parameters**.

Moreover, the WIISEL system as a flexible tool **may lay the ground for a commercial pathway as a continuous and remotely monitoring platform**, contributing in the future to the improvement of the competitiveness of the European industry and to its positioning as a global leader in the field of Information and Communication technologies (ICT) related to the "Ageing well" concept.

Current research and technological developments.

First of all the project consortium has been defining the **specifications of the WIISEL system**. Focus Groups with patients and with clinicians have been carried out in the **three clinical partners sites**,

[3] Skelton D, Todd C. What are the main risk factors for falls amongst older people and what are the most effective interventions to prevent these falls? How should interventions to prevent falls be implemented? Copenhagen, World Health Organization, Europe, 2004 http://euro.who.dk/HEN/Syntheses/Fallrisk/20040318_1

which results have been translated into requirements and a use case for the system together with the technical partners. In parallel a scientific research has been done to define the **key parameters that the insole needs to measure to assess the risk of falls**. These physiological parameters have been directly translated into technical specifications like: type and number of sensors, resolution needed, data acquisition frequency, need of accelerometers, etc.

During this period, **first insoles prototypes** have been developed, which include 14 sensors in each insole, a combined 3-axis accelerometer and 3-axis gyroscope to monitor the chosen spatial and temporal parameters as fall risk indicators. As for the data analysis, the feasibility of the pattern recognition algorithm has been confirmed and a data analysis and prediction framework has been designed and developed. The development and implementation of the management and control application has also been completed.

The next step is to complete the functional trials before starting the pilots with elderly users in 3 sites (Ireland, Israel, Italy).

Several dissemination activities have been carried out (e.g. in congresses like ISPGR, ISFOE, ICOE...) and exploitation strategies are being prepared by the consortium.

Apart from CETEMMSA (Spain), as the leader of the project, the following entities are involved: National University of Ireland, Galway (Ireland), Spring Techno (Germany), The Tel Aviv Sourasky Medical Center (Israel), Istituto Nazionale di Riposo e Cura per Anziani INRCA (Italy), ACREO AB (Sweden), Universitat Autònoma de Barcelona - CAIAC (Spain) and Tejidos Indesmallables GEISA, S.L. (Spain).

WIISEL consortium

Be informed, get involved:

www.wiisel.eu

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