



**Grant Agreement n. 215493**

**SMILING PROJECT**

“Self Mobility Improvement of eLderly by counteractING falls”

Information and Communication Technologies

Instrument: Collaborative Project

**WP 5**

**D5.5**

**SMILING PRO version presentation**

Due date of deliverable: 2009-03-31

Actual submission date: 2009-04-09

Start date of project: 2008-01-01

Duration: 30 months

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**Organization name of lead contractor for this deliverable: Ab.Acus srl**

<b>Project co-funded by the European Commission within the Seven Framework Programme (2007-2013)</b>		
<b>Dissemination Level</b>		
<b>PU</b>	Public	✓
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services).	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

<b>Document History</b>			
1.0	24.03.09	Draft version	ABACUS
1.1	28.03.09	Added images	IMEC/EPFL
1.2	29.03.09	Added images	STRATH/TUKE
1.3	31.03.09	Added images	UNIBO
1.4	02.04.09	Final editing	ABACUS

## **Executive Summary**

The Deliverable D5.5, SMILING PRO presentation is a layman language leaflet to present the prototype of the SMILING PRO system.

It is a two pages leaflet to be duplex printable in A4 format.

The target audience of the leaflet are clinicians, therapists, trainers but also the elderly themselves, interested to know about the general working principles of the system.



SMILING PRO is a complete system for the training of gait. It consists of 3 modules:

① a complete walking analysis system:

SMILING<sub>GAIT</sub>

② a motorised pair of training shoes:

SMILING<sub>SHOES</sub>

③ a user friendly portable control unit:

SMILING<sub>CU</sub>

## SMILING<sub>GAIT</sub>



Fig.1: S-Sense wearing

Before any training with the SMILING<sub>SHOES</sub>, it is necessary to assess the walking abilities. The user is asked to wear the SMILING S-Sense module on the rear of his/her shoes (fig.1) and walk for some minutes. The S-sense is a 6D IMU (Inertial Measurement Unit) wireless unit (fig.2) able to transmit data from a 3D accelerometer and 3D gyroscope.

The data acquired during walking are sent in real time to a PC for off line processing. Linear and non linear parameters of the gait are computed (fig.3).

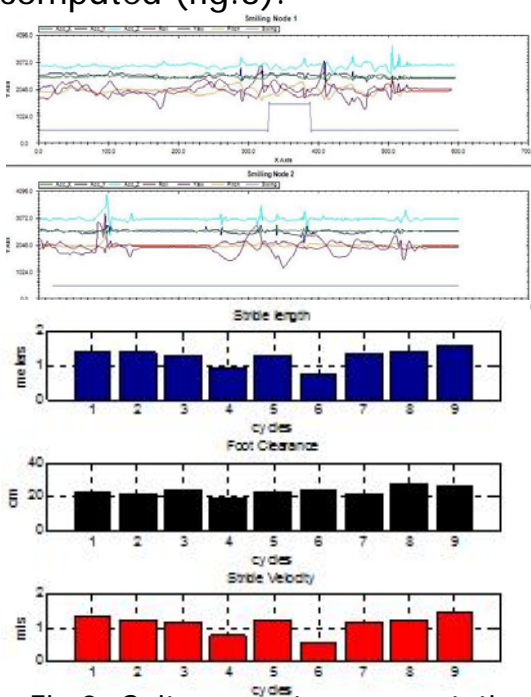


Fig.3: Gait parameters computation

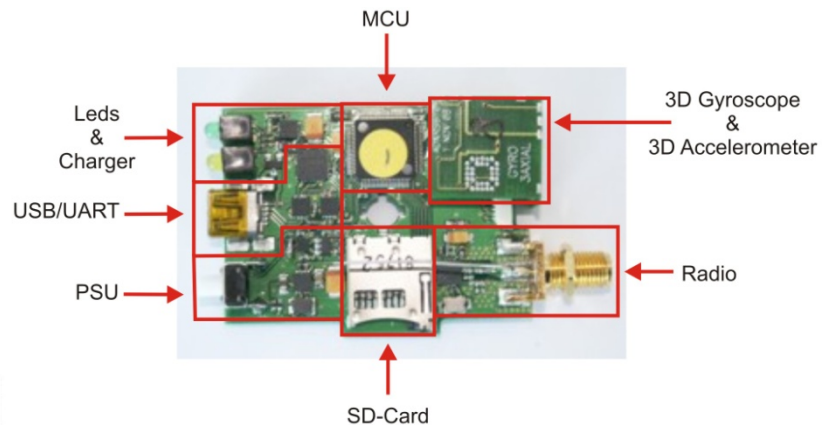


Fig.2: S-Sense electronics

The gait analysis results are then used to design the best training program for the SMILING user. The SMILING training consists in a series of sessions of work (once a day, three time a week, ...) composed by basic walking tasks (walk forward, backward, clapping your hands...) to be executed while wearing the special SMILING<sub>SHOES</sub>. The training program is saved on the SMILING<sub>CU</sub> for remote use.

# SMILING<sub>SHOES</sub>



Fig.4 Wearing the SMILING shoes

The SMILING<sub>SHOES</sub> are motorised shoes (fig.4) able to change their configuration during the swing phase of gait to propose a different "ground" when the foot will touch the floor. Each shoe is equipped with 4 independent actuators (fig.5). During training, the next position of the shoe is computed by means of algorithms based on the chaos theory to get challenging situations. The training sessions are managed by the user by means of a devoted control unit, the SMILING<sub>CU</sub>.

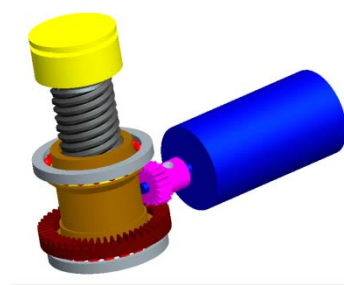
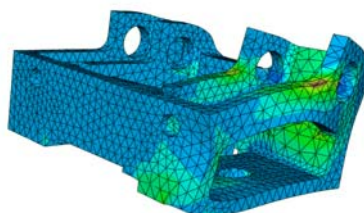
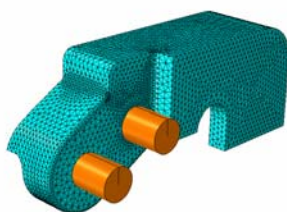


Fig. 5 : SMILING actuators

# SMILING<sub>CU</sub>

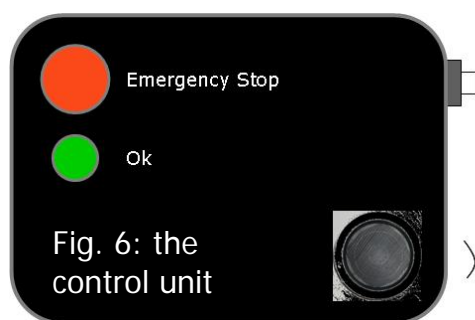


Fig. 6: the control unit

The SMILING<sub>CU</sub> is a portable device (fig.6) designed to supervise the SMILING training sessions. Before any exercise, the unit prompts the user with audio hints on the task to perform (e.g. "walk for 10 steps counting aloud"). While the user is walking, the unit collects in real time data about the gait performance, computes suitable

performance indexes to monitor the training quality and feedbacks the user (e.g. "Very good, you have completely accomplished your task. It's time to move to more difficult exercises...").

For information: [www.smilingproject.eu](http://www.smilingproject.eu) , [info@smilingproject.eu](mailto:info@smilingproject.eu)

The SMILING project is co-financed by the European Commission under the FP7 program (Grant Agreement n. 215493).

