L. Chiari, E. Farella, L. Rocchi, L. Benini. A biofeedback-based portable device to support elderly mobility in the home environment. Gerontechnology 2008; 7(2):93. It has been demonstrated that physical activity based interventions can improve functioning in older people. In specific elderly populations, such as older fallers and patients with Parkinson's disease (PD), there is evidence that interventions may improve both cognitive and motor functions. Available results suggests more effect when interventions take place over longer time periods, are individually tailored, and include exercises in the home environment[1]. Due to recent technological advances, it is now possible to use body-fixed sensors in combination with advanced ICT solutions to effectively monitor older people in their home environment and to introduce biofeedback (BF)-like interventions that are tailored to individual needs. This new approach allows, e.g., telerehabilitation solutions where, from a distance, medical professionals monitor and assist older people. This is one of the scenarios of usage being developed within the EU-funded project SENSACTION-AAL (FP6-IST-2005-2.6.2-045622). **Methods** The portable and wireless BF system was designed to include: modular hardware (HW) architecture for diverse sensors integration and wireless communications, and modular software (SW) design to allow easy and optimized integration of different sensors, communication protocols and BF algorithms. The HW architecture was designed to potentially include a network of sensing nodes, and is capable to drive different actuators as BF generators (e.g. audio, tactile, and visual). In its simplest release, the body area network consists of an inertial sensor, a headset, a processing node, and a PDA. The SW architecture has been designed to best accomplish real-time data processing, I/O synchronization, trouble-free integration of further BF algorithms, independence from sensor node(s) characteristics and set-up. Such features have been combined with a friendly graphical interface for non-expert users. The interface offers the possibility to select the appropriate BF algorithm and user-specific options, and to perform a spot-check on the correct functioning of the sensing node. Furthermore, the software allows the detection of possible radio communication problems, notifying the user in case of misuse of the system. The processing node manages the data from the body sensor, in order to extract the user's posture and to provide adequate audio BF[2]. The functioning principles of the system and its architecture are illustrated in Figure 1. **Results and discussion** The system was preliminarily tested on a sample of 5 elderly patients with PD (Hoehn & Yahr, II-III), with severe stooped postures. Patients were in an early phase of the disease, when correction of trunk position was still reachable, with a firm intentional effort. Our results confirmed the acceptability and the potentials of the portable BF system in order to design rehabilitative exercises for correction of stooped posture and balance training. Results from a representative subject are shown in Figure 2. Current developments of the system include the integration with other scenarios of usage, including continuous motion monitoring and fall detection.

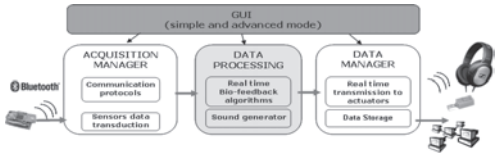

Figure 1 Overview of the system

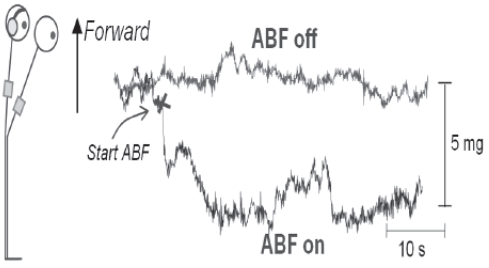

Figure 2 Trunk acceleration during an exercise session

References

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Address: Università di Bologna, Italy; E: lorenzo.chiari@unibo.it