

## V 140

### **Fall-management system for elderly by multisensory-analysis with integration in a social environment**

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Older people are prone to fall due to their reduced mobility, effects of medication and decreased brawn. Despite of the fact that not all falls lead to injuries, its percentage is high enough to be considered as a major public-health concern. This gains even more pertinence by taking into account that, based on the fear of falling, avoidance of movement reduces social interactions. Several approaches were made to detect falls focused on analysing body movements and identifying changes in acceleration. Unfortunately, these systems are compromised when the fall-speed is not high enough or the impact to the ground is smoothed in some manner. The developed system intends to solve these issues by monitoring not only the body movements but also the body position, obtaining a method to detect fast and slow falls. Position is calculated using high resolution barometric pressure sensors to compute the height difference between the chest and the feet. Motion sensors capture also the movements on these points, enabling to distinguish falls in contrast to daily life activities with similar body positions. Additionally, our system involves relatives and neighbours offering a new way of emergency response. Whenever a fall occurs, the system begins to communicate with the user in order to check how severe the injury is. Depending on the user reply, the system decides to call emergency medical assistance or to use a neighbour and family network to provide help for minor injuries. Therefore, we are capable of offering a fast aid attention, reducing unnecessary calls to emergency services and providing a self-determined life for older people with ongoing participation in their social environment. The presented contribution shows the developed system in detail and gives an overview about our first evaluation results.

## V 142

### **Consolidation of virtual coaching technologies for tele-rehabilitation**

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One out of six people in the European Union has a disability, usually caused by an acute episode or a chronic disease. Providing a suitable rehabilitation is the main issue for people as they age as it helps people to live independently and enhance their Quality of Life. However, as the rehabilitation period usually lasts some months, the continuity of care often is interrupted in the transition from the hospital to the home. Virtual Coaches can help these patients to proceed with a personalized rehabilitation that complies with age-related conditions. These are a key technology for empowering patients through the enhancement of the adherence to the care plan and the risk prevention.

The project *Virtual Coaching Activities for Rehabilitation in Elderly* addresses two major shortcomings of the status quo: a participatory design driven by the users' needs and the personalization of the care pathways enabled by technology. In fact, rehabilitation is an ideal setting for "users" (physicians and patients) interacting together for a longer period into the clinic. This allows to use the knowledge behind the clinical profiles and the clinical pathways that will drive the behaviour of the virtual coach at home.

The aim is to adapt existing AAL-services from former EU projects, such as eWall or Miraculus Life, to develop a holistic ICT-concept (information and communication technology) for an adaptive virtual coaching. Therefore, the ICT-concept will integrate a semantic layer (*universAAL*) including a reasoning engine that merges all patient-related and context information together. The research project consolidates the state-of-the-art on virtual coaching technologies and outlines a holistic concept for integrating these technologies. The findings shall be used to deploy these advanced services for virtual coaching on a telehealth platform (*FIWARE*-based).

## V 143

### **The potential of psychophysical and health related knowledge for building automation control**

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This work draws a comparison between psychophysical knowledge and normative values for building automation control concerning the regulation of indoor air parameters. Thereby, the considered environmental parameters, which are controllable and observable via building automation systems, are the air temperature, the relative humidity, the air movement, and the air change rate. Standards for building environment assessment and control give energy efficiency issues a top priority and possibly leave positive effects on the human's well-being out. Psychological experiments revealed recent knowledge about the effect of the environmental parameters towards the human's perception of the indoor air quality. Beside the air change rate, the temperature, the humidity, and the air movement have a major effect on the perceived air quality. However, these effects are unattended by the standards addressing the indoor air quality. The purpose of the comparison is the identification of differences in order to design a more adaptive and human-centered control method. Moreover, environmental factors with effects towards the human's well-being, like pollutant concentrations, are considered as well. Furthermore, knowledge gaps are identified and possible further investigations are presented. A general approach to enhance the control strategy of building automation systems, based on the comparison results and researched health related effects of environmental parameters, is discussed. Individual parameters like the origin or the metabolism, which are not observable via unobtrusive and retrofit sensors, may influence the human's comfort, but are too complex to include in the regulation process. In addition, the discussed strategy is focussed on the design of an initial building automation controller, which is nevertheless able to be adapted based on the user's preferences. In conclusion, the involvement of psychophysical and health related knowledge about environmental parameters is able to improve the control strategies of building automation systems and potentially reduces health risks and symptom appearances.