Zürcher Hochschule
für Angewandte Wissenschaften

**Gesundheit**

Institut für Pflege

# Emergency Recognition through Energy Data Analysis (ERED)

We all leave tracks of energy usage in our daily lives. In the mornings we operate the coffee maker and open the refrigerator, in the evenings we watch television. A comparison of such regularly recurring everyday activities gives us an idea if people are changing their routine. Ninety percent of accidents among older adults occur at home (e.g., falls). The Institute of Nursing and the School of Engineering would like to offer professional support that utilizes energy usage to provide an early intervention service in the event of an accident or illness. Especially in the population of older adults with cognitive deficits, such methods could help support an individual's health and wellbeing and provide enhanced personal safety, all with minimal technical effort.

*Everyday activities can be mapped out through their energy usage. Changes in the daily patterns help in the early recognition of emergency situations among older adults who live alone.*

**Current situation and driving factors**

Among older adults, 90% of accidents occur at home. Such events or other rapid changes in health can be recognized by variations in the use of household energy of the affected individual. That is why the Institute for Nursing and the School of Engineering at the Zurich University of Applied Sciences wants to analyze and use these results to offer professional support as needed. This method could be especially helpful among older adults with cognitive deficits, to meaningfully support their health and wellbeing in the home with minimal technical intervention..

**Background**

In Switzerland, between 2001 and 2005, approximately 405,900 people injured themselves in their homes. Of those, 54,101 were over the age of 65 (c*itation*). Studies show that there is a risk to safety in the home environment, especially among those with hearing and visual impairments, as well as with dementia-related illness.

**Aging Demographic**

There are an estimated 110,000 people living in Switzerland with dementia-related illness, and the prevalence increases with age. Due to the increased life expectancy, the number of persons with dementia is expected to rise to over 190,000 by the year 2030 and to nearly 300,000 by 2060 (c*itation*). A loss of hearing frequently correlates with cognitive deficits. According to information of the World Health Organization, there are currently 360 million people globally affected by hearing loss. In Switzerland, estimates suggest that there are well over 1 million. Especially in people older than 80 years of age, hearing and visual impairments often co-exist.

**Rapid technological development**
Parallel to the increase in individuals with cognitive deficits, the field of health care has seen an enormous growth in technology. The rapid technological development will have a significant influence on the delivery of health care. From simple technical aids to complex systems with intelligent design, there have been various applications developed and tested for household use. As several studies have shown, we are able to capture alterations in daily routines and detect health-related changes at a distance. However, for so-called intelligent homes (Smart Homes) complex and expensive technical devices are necessary, which measure the activities of the residents by means of numerous sensors.

**Intelligent applications provide safety**
Even though the clinical use of intelligent systems has not yet been scientifically proven, studies have shown positive impacts. For example, older individuals and their family members feel more secure. At the same time, it is clear that such intelligent systems are useful, but only as a complement to family caretaking and professional nursing services, not as a substitute to them. In addition, these technologies raise concerns about personal privacy. This issue can be addressed, when the technology utilized to determine the daily patterns (and especially the recognition of the deviations from the norm) are based on existing infrastructure, e.g., the electrical grid. The sharply escalating need for nursing and medical services among older adults living alone raises the question of how technological innovations can be utilized in a meaningful way.

**Implementing simple technology solutions**
The goal is to develop low tech applications, through a lasting partnership between nursing and technology that supports home nursing care and older people in their daily lives. As a first step, through a cooperative effort between the professions of nursing and technology, a system will be developed and tested that measures daily patterns of energy usage in the households of older adults and thus serves as a basis for nursing care.

**Goal**
This goal of this project is to work together with adults over 80 years of age to develop and test a system that leads to the recognition of daily routines as measured by energy usage.

**Approach**
In an early pilot phase of the project, we will develop with a single individual a system to measure the energy usage of daily activities. Subsequently this new system will be fine-tuned in 12 further households. In addition, clinical data and information on the older adult's perspectives will be collected, in order to match the data captured on energy usage with the health and life situation of the affected individuals.

**Expected gain in knowledge**
The research is expected to show that daily activities can be depicted by their energy usage. By means of a mathematical algorithm, deviations from a daily pattern may be captured. From this, there can be early recognition and corresponding support provided, when suddenly occurring changes and emergency situations are experienced by older adults living alone, especially those with cognitive, hearing or visual impairments. Through such means, the safety of this growing demographic can be reasonably ensured.