

K-W. CHANG, Y-L. HSU, C-Y. HUANG, L-S. HSU, T-Y. WU, Y-H. LIN. **Development of a smart living platform based on a motion sensing carpet.** *Gerontechnology* 2016;15(suppl):8s; doi:10.4017/gt.2016.15.s.918.00 **Purpose** Changes in mobility level for older adults are highly related to the transition from relatively independent living to ill and declined functional health status. In addition, wandering behaviour is significantly more prevalent in patients with Alzheimer Dementia (AD), patients with dementia of longer duration, and patients with more severe dementia. It is important to provide objective and accurate approaches for localization, walking trajectory and long-term mobility level assessment in elderly care environment. Considering user acceptance, the technology has to be unobtrusive, easy to use, low cost, and be a natural part of the home environment. This paper presents the development of WhizCARPET, a motion sensing carpet for telemonitoring of mobility level, indoor locations, walking trajectory and fall events in an unobtrusive way for older adults in the care environment. **Method** The motion sensing carpet WhizCARPET is developed in the form of 50×50cm 'puzzle floor mat', which allows the users to assemble the units by themselves according to their desired shape and area. The auto mapping firmware identifies relative positions of all units after assembly. Instead of adding sensing components to the carpet, the puzzle floor mat unit itself is designed into a motion sensor. The working principle is similar to that of a membrane switch. Once a WhizCARPET unit is under pressure, the top and bottom layers make contact with each other. Different pressure will create different contact quality and therefore generates different resistance. I2C bus is used for data transmission between units, and built-in wi-fi and low-power bluetooth transmit sensing data to the cloud server and mobile devices. Programs built in the cloud server and mobile device app provide functions of localization, walking trajectory, mobility monitoring and fall detection. **Results & Discussion** Localization and mobility monitoring are fundamental technologies for constructing a smart living space. The smart living platform based on motion sensing WhizCARPET has been developed and implemented in a living lab (Figure 1). Based on this platform, several analysis models for elderly care are expanded, including detection and notification for real-time incidents, analysis of daily routine. This research also uses 'Fractal D' of the walking trajectory data collected by WhizCARPET as an index for wandering behaviour of dementia patient¹. Four basic walking trajectory patterns were observed: direct travel, lapping, random travel and pacing² (Figure 2). Fractal D of each walking trajectory can be calculated and recorded. WhizCARPET can be used in not only home telehealth applications but also multiple interactive applications, by developing different Apps.

References

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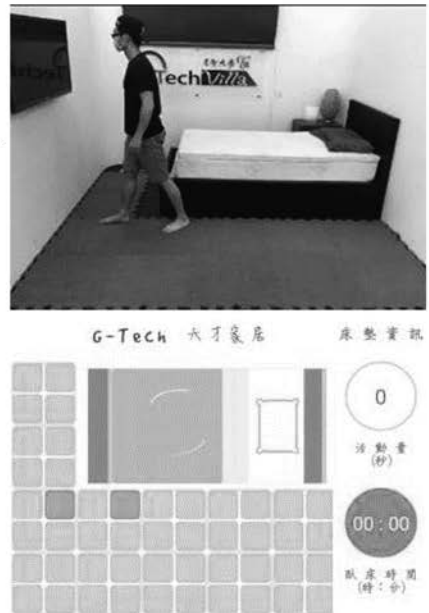


Figure 1. Localization and mobility monitoring are fundamental technologies for a smart living space

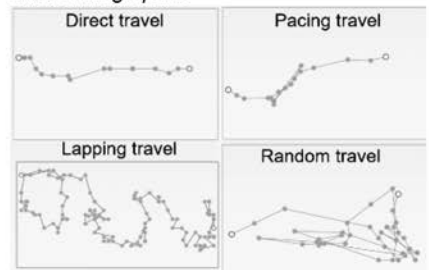


Figure 2. Four basic walking trajectory patterns were observed