R-S. LEE. (Convener) ***Product development for the elderly by value-adding to creative scenario with cross-field knowledge.*** *Gerontechnology 2014; 13(2):90;* doi:10.4017/gt.2014.13.02.233.00 **Participants** S-H. Chen (Taiwan), Y-C. Wu (Taiwan), K-T. Tseng (Taiwan), H-H. Tang (Taiwan), K-H Chen (Taiwan) **Issue** The symposium will open a panel for the audience to discuss how cross-field knowledge can be integrated for the development of products for the elderly, from ideas to products. The innovation model[1] to accomplish the goal of 'innovation goes to business' and 'business becomes social welfare' will be presented and discussed. This work was supported in part by the National Science Council, Taiwan, under grant numbers NSC 101-3111-E-006-002 and NSC102-3111-E006-002. **Content** In view of the global aging society, issues derived from elderly health care have attracted increasing attention in Taiwan. In all aspects, it is necessary to re-think the design of products for the elderly. The Promotion Program of Value-adding to Creative Scenario with Cross-field Knowledge, sponsored by the National Science Council, Taiwan, facilitates the formation and cooperation of interdisciplinary teams in knowledge integration[2] and innovative R&D processes from 'creative idea' to 'feasibility assessment' to 'prototyping the product'. The R&D process has contributed to a new innovation model, which will also be introduced in the symposium. In addition, some gerontechnology products developed in this program will be introduced by the presenters, such as an interactive system, health management system, intelligent transport, and rehabilitation game for the elderly. The authors of the 6 presentations will presentare as follows: (i) S-H. Chen, R-S. Lee on a new gerontechnology innovation model, (ii) S-Y. Cho, Y-F. Cheng, H-R. Chen, H-H. Tang, W-C. Chu, M-Y. Chen, C-H. Chen on Memoir monopoly; (iii) Y-C. Wu on a multi-functional health management system; (iv) H-C. Chiang, Y-S. Su, N-S. Chou, S-F. Gao, Y-C. Wu on a sitting up detection method; (v) K-T. Tseng, T-S. Tsai, H-T. Chang on applying IPDD approach to the development of an interactive system; and (vi) K-H. Chen, C-Y. Pan on an intelligent transport for living in dignity. **Structure** There will be 6 oral presentations followed by a 15-minute panel discussion. **Conclusion** The symposium will discuss how to develop products that contribute to healthy and happy lifestyles for elderly people, while enhancing humanitarian care and, most important of all, that help the elderly to live in dignity and have a quality aging life.

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S-H. CHEN, R-S. LEE. ***A new gerontechnology innovation model: Interdisciplinary open innovation orange technology.*** *Gerontechnology 2014;13(2):90-91*; doi:10.4017/gt.2014.13.02.326.00 **Purpose** In the face of an increasingly aged population, Orange Technology development is looking forward to playing a crucial role in Gerontechnology innovation to bring increased happiness and mental wellness to the elderly and thereby enhance the well-being of all society. This paper presents the development of a new innovation model through interdisciplinary open innovation teamwork to commercialize orange technology innovation, supported by the Engineering Section of the National Science Council, to promote 'The Promotion Program of Value-adding to Creative Scenarios with Interdisciplinary Knowledge'. Through solution-call to team up for interdisciplinary cooperation, the team develops concepts from the 'creative ideas' stage to 'feasibility assessment', then to 'prototyping'. The interdisciplinary team of professors' can focus on developing Orange Design gerontechnology products from concept to commercialization. These creative ideas come from various domains such as humanism, management, engineering, bio-techs, etc. There have been 104 out of 181 designs adopted in Orange Technology and 30 Orange Designs have shown executable potential. Among the interdisciplinary teams, actual technological feasibility evaluations have been completed for 14 projects, and prototypes have been developed for nine projects. **Method** In

order to trigger the process of interdisciplinary collaboration[1], the multi-level innovation communities were planned for development by the project office as promoters[2] to support development of 'an integrated model of innovative knowledge chains', that provides mechanisms to link market knowledge into each stage of the process of innovation. Community networking[3] demonstrates how the cross-discipline value adding community evolved. Each interdisciplinary open team consists of sub-teams that have a professor along with a group of students from design, engineering and management disciplines. The sub-teams from different disciplines have to collaborate with each other to achieve the project goal. Substantial communication among these teams leads to the exploitation of new knowledge in the form of new system or product developments. **Results & Discussion** The R&D process has contributed to a new innovative model of development, in which a unique learning and knowledge integration model has been created. During the process, one variation from a sub-team might trigger a collective new direction that is different from the original design. While the established disciplinary systems may be good at promoting high quality research within existing boundaries, they are often less effective in supporting the exploitation of new knowledge that challenges those very boundaries[4]. This promotional promoting program has been supported to facilitate the interdisciplinary open collaboration designed to tackle the boundary and challenge current limits. The heuristic learning nature of such a cross- disciplinary knowledge integration process is different from traditional lab or project specific discipline mentor-advisors and calls for further discussions.

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S-Y. CHO, Y-F. CHENG, H-R.CHEN, H-H. TANG, W-C. CHU, M-Y. CHEN, C-H. CHEN. ***Memoir Monopoly: A rehabilitation game for elderly living with dementia****. Gerontechnology 2014; 13(2):91-92*; doi:10.4017/gt.2014.13.02.209.00 **Purpose** Tools are needed in Taiwan for rehabilitation of the elderly living with dementia, because the tools imported from overseas or initially designed for children are not age-appropriate. Most paper-made rehabilitation tools have the drawbacks of inflexible designs and limited ability to stimulate the user. This paper presents the development of a rehabilitation game app called Memoir Monopoly (MM) (*Figures 1 & 2*), which is designed to engage persons living with dementia in rehabilitation activities. Working with an occupational therapist, we designed a highly flexible reminiscing rehabilitation game app that allows elderly who are living with dementia to have interactive activities, including structured reminiscing, cognitive training, reality orientation, sensory stimulation, and social events. **Method** We adapted research through a user-experience design process to conduct the MM project. First, user-experience research (UXR) of the tools currently used in rehabilitation by elderly living with dementia revealed the need for a more interactive reminiscing game. Second, based on UXR findings, we designed a highly flexible 'reminiscing' and touchable rehabilitation game across four iPads with sharing screen sync and tokens that have user faces on the surface for physical indications and interactions. Each individual's iPad was used to collect personal photos and preferences at home. When placed together for a group reminiscence rehab session, the individual contents were pulled together by the hosting occupational therapist to responsively create a unique map for the participants with the proper level of difficulty to suit their personal experiences, increase their interests, and encourage their recall of the past. Various cognitive stimuli, including watching movie clips, listening to favorite songs, and touching interactive games, help participants to experience a sense of accomplishment and satisfaction in the rehab process. **Results & Discussion** For a field test, MM was

successfully brought once into one group rehab event at day care centers. Based on the observations and interview of the therapist and center caregivers, we found that elderly living with dementia who participated in the test were more actively willing to share their stories, using their own photos and movies, and were also interested in playing the reminiscence games, compared to their previous paper game events. This preliminary research result demonstrates that our design may resolve problems found in UXR. A game matching their life experiences and various interactions did encourage the elderly to participate in the reminiscence game. If reminiscence supports memory function, there is the potential that engaging in this type of group activity may improve the quality of life for elderly who are living with dementia.

Figure 1. Playing memoir monopoly

Figure 2. One leader and 4 seniors

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Y-C. WU, S-M. LIU, C-S. CHANG, C-C. HAN, W-C. YU, H-C. TIAN, J-W. LIU, Y-N. HU, N-S. CHOU, S-F. KAO. ***A multi-functional health management system.*** *Gerontechnology 2014; 13(2):92-93;* doi:10.4017/gt.2014.13.02.334.00 **Purpose** The aim of this paper is to develop a multi-functional health management system to help the elderly maintain good health before illness occurs and to provide a health management environment for the elderly. **Method** *Figures 3* and *4* show the main structures of the proposed system for indoor and outdoor applications, respectively. The instruments used to measure include a light ring-type pulse sensor, a pedometer, a scalar, a complexion inspector, and a Zig-Bee indoor localization system. The measured physiological signals (heartbeat, temperature, steps, and weight) are recorded by a smartphone for several apps such as 'BMI watch', 'walking ten thousand steps daily', and 'exercise 333' (exercise three times weekly, thirty minutes each time with a heartbeat above one hundred thirty beats per minute) to remind/encourage the elderly to keep working toward good health. The 'complexion inspector' can capture changes of complexion to determine the health conditions of the elderly based on traditional Chinese facial diagnosis theory[1]. The ZigBee localization system with physiological data can display an early warning to remind the elderly to exercise or let the caregiver assist them when the subject has stayed indoors for too long. A GPS system in a smartphone can work jointly with measured physiological signals to send text messages (the physical conditions and GPS coordinates) to first-aid personnel/friends and relatives if an emergency arises (e.g. pulse or temperature lower or higher than a threshold). The face image

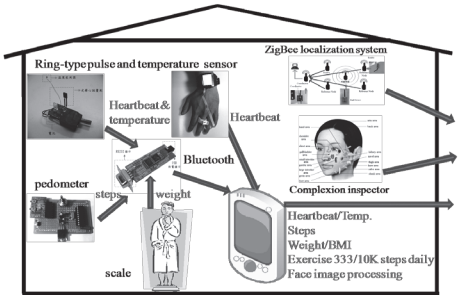

Figure 3. Indoor applications

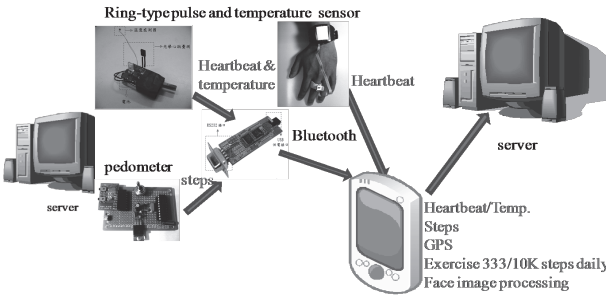

Figure 4.Outdoor applications

processing app developed on the smartphone can capture facial images, such as facial contours, face colours, smile lines, etc. Chinese medicine doctors can check the extracted visual features and give suggestions via the Internet. **Results & Discussion** Systems and graphical user interfaces such as 'exercise 333' that shows the elderly person's progress and status which reminds the user to exercise, ZigBee localization system that indicates the subject is moving, and the complexion detector etc. have been developed. Based on the user's feedback, the proposed system provides awareness of health management and is helpful for enabling the elderly to develop a healthy life style.

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H-C. CHIANG, Y-S. SU, N-S. CHOU, C-Y. LEE, S-F. KAO, Y-C. WU. ***A Method for the detection of sitting upright designed for elderly living assistance applications****. Gerontechnology 2014; 13(2):93-94;* doi:10.4017/gt.2014.13.02.316.00 **Purpose** Falling hazards and related injuries create a major problem for the elderly[1]. Elderly people living at home will need support to prevent and avoid injuries caused by falls when getting out of bed. Consequently, in the past decade, various researchers have worked on developing assistance equipment designed to prevent falls. Examples include grab bars, bedrails, folding walkers, etc. However, most equipment provides only passive fall protection. In this paper, we propose method for the detection of sitting upright designed to provide active fall prevention. When the elderly's position changes from laying down to sitting upright, the system sends a signal that turns on a light; furthermore, it notifies the staff of the facility that the elderly person requires help in getting up from bed to avoid an injury from a fall. **Method** In this study, we set up a night vision webcam at the end of a bed at a 45° angle to capture images for the detection of someone sitting up. *Figure 5* shows the detailed hardware settings. The detection method involves two steps: (i) Human detection -we subtract images frame by frame to determine if the elderly person climbed into bed. (ii) Upper body detection- we use a boosted cascade method[2] to classify image features for upper body detection. *Figure 6*presents the result of the upper body detection method. By using these two steps, we can automatically detect the posture of an elderly person in bed. We developed and implemented a testing environment to validate the sitting upright detection algorithm and used a hit ratio to accurately evaluate the performance of the experiment and also integrated a light switch into our system (*Figure 5*). The bedroom lights can be turned on automatically when the elderly person gets out of bed. **Results & Discussion** In this study, we proposed a reliable method for the detection of sitting upright; moreover, by integrating a light controller, the proposed method is suitable for fall prevention at nighttime. Based on the limited data available, the experimental results indicate that the algorithm can perform with 80% accuracy. The sum of true positive and true negative was 114 while the sum of false positive and false negative was 26. Privacy is a known issue in camera research. In this preliminary study, we designed a closed platform to process data without storing images for sitting upright detection in real-time. Actually, the closed platform is not a perfect solution for

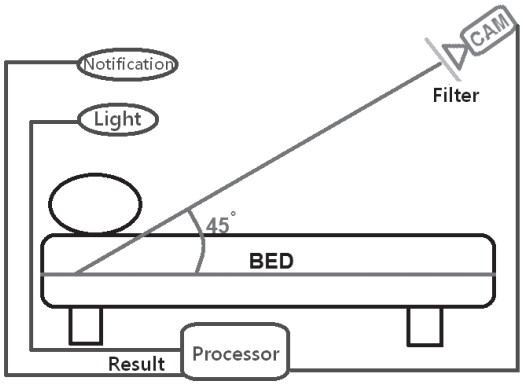

Figure 5. The hardware architecture

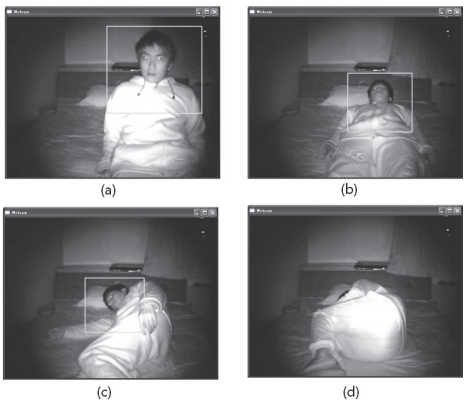

Figure 6. Upper body detection

solving privacy issues. In future research, we plan to mount a filter lens in front of the camera, such as a mosaic lens, to obtain a fuzzy image. In this way, the obtained data cannot reconstruct a recognizable human image.

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K-C. TSENG, T-S. TSAI, H-T. CHANG. ***Applying IPDD approach to the development of an interactive system for older people***. *Gerontechnology 2014; 13(2):94-95;* doi:10.4017/gt.2014.13.02.300.00 **Purpose** Much of the research related to aging focuses on the elders' increased need for assistance and the tendency for people to neglect elders' psychological and social needs. It is vital to understand that mental and cognitive aging also plays an important role in physical aging. If the elderly are more physically and psychological cared for as they get older, then the burden they often place on society will be reduced[1]. Therefore, an interactive system has been proposed in order to encourage older people to engage in more leisure activities and take care of their physical and mental health. Observation in the Chang Gung Health and Culture Village was conducted and steps of the innovative product design and de-

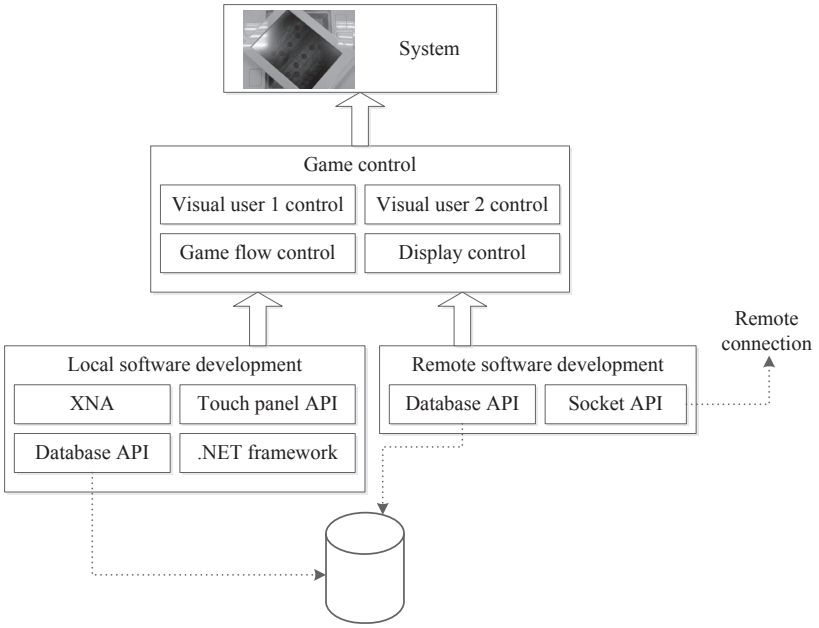

Figure 7. The software design of the developed system

velopment (IPDD) approach were taken to design the proposed system. **Method** The IPDD approach[2] systematically helps professionals from different fields collaborate ideas. The system is based on a 13-inch electric capacity type touch panel and a portable computer like ASUS ePC. The portable computer was hidden in the bottom of the touch panels. The software was developed within XNA and NET framework. *Figure 7* demonstrates the overview of our software architecture. **Results & Discussion** Many articles have found that playing chess is an effective way to activate the brain[3,4]. In this research, the system provides a platform to increase social engagement and mental exercise for the elderly, and has been validated by a survey. The results show that the elderly could use the system to improve the likelihood of successful aging.

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K-H. CHEN, C-Y. PAN. ***An intelligent transport for living in dignity.*** *Gerontechnology 2014; 13(2):95-96;* doi:10.4017/gt.2014.13.02.303.00 **Purpose** The wheelchair is currently the most commonly used device to increase users' mobility, but it cannot assist them to stand or to transfer to another device. Although stand-up wheelchairs can help users to stand, they do not provide the function of transfer. While most of the standing frames provide a standing function, few provide the function of transfer and movement. On the other hand, a patient lift device may provide a transfer function, but not movement or standing. In short, there is no device currently on the market that can assist in standing, transfer, and movement. In other words, there is a huge demand to design such a device in order to improve the daily living quality of people who cannot stand and walk and to aid their caregivers. This paper presents the development of an intelligent transporter, i-Transport, for the disabled to live a freer daily life with dignity. Working closely with end users, this research aims to design an intelligent, lightweight, and inexpensive wheelchair with standing and transferring features. **Method** After observation and in-depth interviews with patients at their own homes, we designed the i-Transport after a patent titled “assistance mechanism for assisting patients to stand up"[1]. The i-Transport is a lightweight,

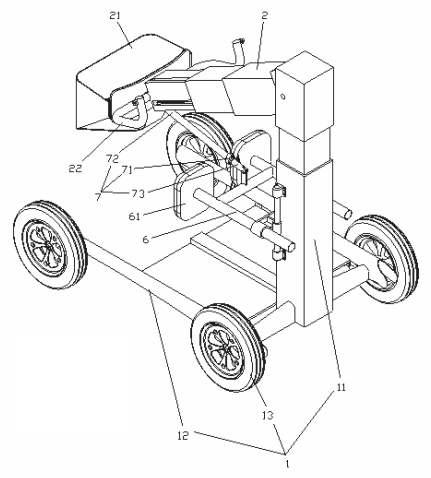

Figure 8.Assistance mechanism for helping patients to stand up

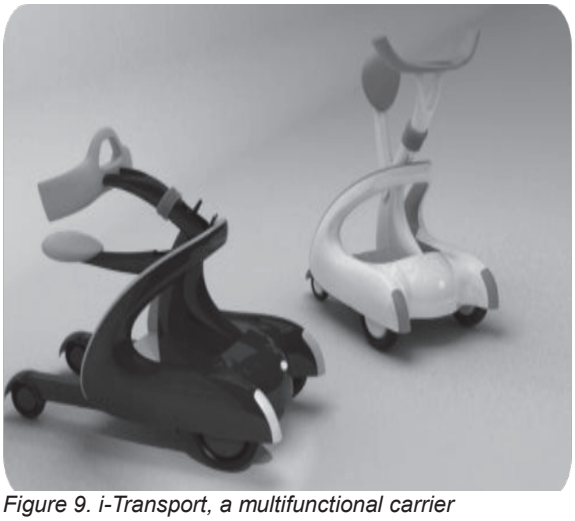

Figure 9. i-Transport, a multifunctional carrier

electric wheelchair with a moving seat and handles for sitting and stand-up positions. It is equipped with a remote control for controlling back and forth movement at the user's convenience (*Figure 8*). **Results & Discussion** The i-Transport was designed with an embedded health-monitoring system for tracking blood pressure and breathing conditions, allowing the disabled to stand, move around, and meet their demand for independence. The i-Transport is a multi-functional carrier (*Figure 9*) with features for lifting, shifting, standing, and moving, while also serving as a physiological monitor, thus assisting the disabled to undertake daily chores and have a freer and safer daily life without the need for body contact from caregivers, and hence, to live in dignity.

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