*Hsu Y-L. [**徐業良**]. Editorial: Special issue on 'research projects related to aged society'. Journal of Gerontechnology and Service Management 2014;2(3):179-182*; doi:10.6283/JOCSG.2014.2.3.179 Research related to aged society has received more attention in universities in Taiwan. Professors from various disciplines raise research issues from different perspectives. We use 'elderly', 'older adults', 'old age' as keywords to search in the titles of research projects approved by the Ministry of Science and Technology, Taiwan, and found 104 research projects approved in 2014. These projects are conducted in 52 different universities, with total budget of about NT$100,000,000. This special issue on 'research projects related to aged society' invites the principle investigators or the approved research projects to share the abstract and 'background and research purpose' of their proposals, and intends to provide more understanding and communications between research teams and facilitate further collaborations. There will be 3 issues devoting to this special topic. This issue publishes engineering related research proposals [in Chinese].
Keywords: aged society, research projects, interdisciplinary research

*Chou Y-C [**周瑛琪**], Lu C-H[**盧慶樺**], Yan S-Y [**顏炘怡**], Tang M-S [**唐明順**]. Constructing a preference-based demand-response home care service delivery system for the elderly: From the perspective of a health care delivery value chain. Journal of Gerontechnology and Service Management 2014;2(3):183-190*; doi:10.6283/JOCSG.2014.2.3.183 Given the advent of an aging society and the long-term care needs of the surging population, related welfare benefits for the elderly by government and private organizations place great importance on the Ministry of Interior to develop a long-term care plan, with the injection of NT$ 81.736 billion in funds to construct a long-term care system, so that the care industry can flourish, and long-term focus on home care services and community-based services are part of the most basic care model. However, the current home care services have not fully established the human resource planning model or the service delivery system, resulting in an excessive burden on human resources and inefficient service delivery. Therefore, this study uses the Multi-Objective Programming Model, to design a home care attendant scheduling model, particularly focusing on the service process and the demand side of the supply-side variability. For example: cases of health care clients and social worker preferences, characteristics, and various unexpected situations. On the other hand, due to social welfare organizations as platform donations, home care services are able to distribute aid to disadvantaged families. However, due to not having a current established social welfare agency materials management system, there are problems of over distribution and obsolescence. Additionally health care clients had other needs; such as, help to purchase materials and assistive devices for scheduling and material requirements in the first and second year. In view of this, the third year of the development of materials database management system has focused on the development of social welfare institutions for joint procurement of innovative services to make the health care value chain more complete, increase effectiveness and efficiency of home care services, and improve the quality of home care services [in Chinese].
Keywords: health care delivery value chain, social welfare system, service system design, home service for the elderly, scheduling, preference

*Lee C-H [**李昭賢**]. A wearable exercise tracking device using the geofence-based power efficient mechanism for elders with/without dementia. Journal of Gerontechnology and Service Management 2014;2(3):191-200*; doi:10.6283/JOCSG.2014.2.3.191 Due to the global trend of population ageing, 'active ageing' proposed by World Health Organization suggests people to realize their potential for physical, social and mental well-being throughout the life course. At the same time, by participating in society, people can accept adequate protection, security and care when they need. Based on the essence of active ageing, the goal of this project is to design and implement a wearable exercise tracking device to let elders with/without mild dementia keep exercise in a long term. In the 1st year of this project, we focus on how to track the exercise trajectory and the body activity. Different from previous work, we utilize flex sensors to detect the range of motion of joints and then recognize the corresponding body

activity. In the 2nd year of this project, we focus on how to record (i) the exercise intensity, which is measured based on the heart rate, and (ii) the body balance, which can be detected from the gait. Furthermore, we design a geofence-based power efficient mechanism to reduce unnecessary power consumption for positioning and then keep the required positioning accuracy [in Chinese].
Keywords: elderly, mild dementia, geofence, exercise tracking, power saving

Huang C-W [黃啟梧], Chen J-L [陳進隆]. An assistive design on drying towel for the elderly. Journal of Gerontechnology and Service Management 2014;2(3):201-204;
doi:10.6283/JOCSG.2014.2.3.201 Thanks to the booming economy, growing living standards and progress in medicine and hygiene, the lifespan of human being is significantly extended. However, more and more elderly people face deterioration physically and psychologically. For example, the function of hands is deteriorated by ages. The occurrence rate of deteriorative arthritis is 20-30% at 50 years old, but rises to 70% at above 70 years old. Therefore this kind of arthritis is also known as elderly arthritis. The prevalence rate of elderly arthritis in sequence is hand, knee and hip. Especially, the terminal finger joints are the most observed in the hand arthritis. Patients usually suffer from painful, deformed and swollen finger joints. The grasp strength of the elderly is also deteriorated when they are getting older. Consequently, this causes some difficulties in their daily lives. It was observed some elderly people have difficulties in twisting a towel dry when they are washing face and taking a bath in their daily routine. There is a need to explore this issue. This study aims to explore how the elderly twist a towel. What are the difficulties and problems? The study includes: (i) How the subjects twist a towel dry? What are their difficulties? (ii) To propose an assistive design for drying a towel for the elderly or handicapped. (iii) To test the design. (iv) To synthesize the findings into a design guidelines for an assistive tool for drying towels. This study plans to develop an assistive tool for the elderly to dry towel easily, through literature reviews, observations, interviews, design and test. The knowledge gained in the study should be able to apply into other products to help elderly people live in dignity and independently [in Chinese].
Keywords: towel, grasp strength, the elderly, assistive technology

Chang R-S [張瑞雄], Peng S-L [彭勝龍]. A study of implementing an intelligent healthcare cloud system. Journal of Gerontechnology and Service Management 2014;2(3):205-214;
doi:10.6283/JOCSG.2014.2.3.205 In a complete home care system, whether it is image recognition, cruise control, even environmental sensing requires immediate and large amounts of computation. This feature satisfies the three V's of big data, which are 'Velocity', 'Volume' and 'Variety'. Therefore, in order to allow a variety of systems and equipment running smoothly and reduce the system cost of reproduction effectively, using cloud computing technology is absolutely imperative. In addition, for home care system, the advantage of cloud connected is better than using local equipment, such as security and reliability of the historical data, flexible and easily scalable computing capacity, and analyzing the information of monitoring in order to evaluate the current status and predict the possibilities of development. However, difference from the general architecture of cloud computing is that information collection and calculation results of the various systems must be shared and synchronized. Consequently, how to establish a heterogeneous cloud computing system to regulate every sub-system will be a major challenge. This project is going to focus on data transmission and synchronization in heterogeneous cloud system to develop various API and computing model. Our works include the establishment of hardware, information retrieval platform, computing models and encryption technologies. Furthermore, we still continue to study the latest technical documents to improve our computing performance and scalability. [in Chinese]
Keywords: healthcare, big data, cloud computing

Jiang B-C [江行全], Li C-S [李家萱]. Progressive living environment design for the elderly. Journal of Gerontechnology and Service Management 2014;2(3):215-220;
doi:10.6283/JOCSG.2014.2.3.215 To realize the ideal of 'ageing in place', one has to remodel

the current house to fit the needs for the ageing process of the elderly. Based on the 'prevention' concept and the four phases of ageing: old, elderly, aged, and very old, this research project integrates human factors, green sustainability, somatosensory gaming, and gerontechnology to develop a graceful living environment as a foundation of the "ageing in place." Subproject 1 will study how to modify current house, without changing the structure, to have a graceful living space. Subproject 2 will design appropriate games to fit different stages of ageing in order to reduce the sense of deterioration with age. Subproject 3 will develop an intelligent living environment from social, psychological and physiological perspectives. The subprojects will be integrated and will be demonstrated through a computer animation model. The results of the project will provide a graceful living environment with the ingredients of sustainable living, intelligent somatosensory, delightful ageing. In subproject 1, in order to face the ageing society, the living environment must be designed to fulfill and accommodate the changing status of an old person. The basic idea of this proposed research is how to modify the house where an old person is current living to minimize the inconvenience and achieve the gracefulness of the residence, and to realize the 'ageing in place' concept. The research methods used in this research are human factors principles, charming quality criteria, and general design principles. The research will study the modification of a 'bathroom' to be hygienic and healthy, the 'kitchen' to provide comfortable functions, and the 'bedroom' to provide a peaceful and private resting space. Other three subprojects will provide inputs to the design guidelines, and the results will be presented as a computer animation model [in Chinese].

Keywords: progressive ageing, living environment design, ageing in place, human factors, charming quality criteria

Lin J-C [林久翔], Jeng L-Y [鄭來宇], Ho S-H [何穗華], Chen H-R [陳宏仁]. Developing an intelligent and interactive service system for progressive aging in house. Journal of Gerontechnology and Service Management 2014;2(3):221-228;
doi:10.6283/JOCSG.2014.2.3.221 According to the United Nations Principles for Older People report, respect and quality of life of the elderly must be emphasized when dealing with aging societies. Medical research has shown that staying in a familiar environment helps the elderly cope with memory decay and related illnesses. It is estimated that the aging population will reach at least 20% in 2031. Aging in place will be a major goal that will help to reduce the loading of social and medical care of the elderly in the social houses or hospitals. The present study aims to propose an elderly service model that focuses on aging in house where the elderly stay in a familiar place and continue to be cared and served as they become older in a goal to optimize the use of medical and service resources. The proposed study will look into the physiological, psychological, cognitive, social, medical, and environmental aspects of aging. It will also integrate the daily living needs including food, clothing, room, transportation, education, and entertainment into a service model that facilitates living activities, shopping, social, learning, and medical services. The proposed study will utilize User-central Service Experience Engineering methodology that integrates human factors, user experience, and service engineering in observing, obtaining, and modeling the behaviors and needs of the progressive elderly. A prototype of an interactive and intelligent television interface will be built and tested based on usability and user experience principles. Specifically, the objectives of the first year project are to investigate the user experience of the elderly while living in house and develop an aging in place model of service based on the needs of the elderly. In the second year, we will then develop and build an intelligent and interactive interface that can be used with the touch smart TV system based on the service model developed in the first year. In the third year, we will focus on the usability testing and validation and verification of the service model and the interactive TV interface that has been built for a successful and progressive aging life [in Chinese].

Keywords: progressive aging, aging in place, interactive and intelligent TV interface, service modeling, user experience

*Lin C-T [**林清同**]. Successful aging: Exploring gateball participating behavior and well-being in Taiwanese older adults with theory of planned behavior. Journal of Gerontechnology and Service Management 2014;2(3):229-236*; doi:10.6283/JOCSG.2014.2.3.229 Population aging is a common trend in the world. Successful aging is an expected goal for every older adult. It is also one of the main objectives of the government policy. Well-being has been considered an important indicator of successful aging. In the past there have been some researchers focused in elderly leisure activities on well-being. Gateball has increasingly become a popular leisure activity for the older adults in Taiwan. Although many studies have focused on identifying various factors influencing older adults acceptance behavior of playing gateball and their well-being, researchers are still developing evaluation techniques for playing gateball, using subjective approaches based on individual preferences, or simply to find the factors that influence participation gateball behavior. These approaches lack of well-constructed theoretical models for the connection between cause and accepted understanding of behavioral and psychological mechanisms. In addition, the findings only be answered 'What' questions, but cannot understand the behavior of the elderly to accept the reasoning of perception and feeling process, while there will be an unstable situation. As a result, although subjective researchers have made some contributions to overview concept of the development of gateball, they may not have adequately required direct evaluations through perceptive reasoning processes. So a deep understanding of the problem and treatment is not sufficient. Theory of Planned Behavior (TPB) is the use of a personal attitude, subjective norm and perceived behavioral control to predict the behavior of individuals to participate in a particular activities, TPB is widely accepted and has been successful used in various fields of study. Based on TPB, an integrated model was developed to explore the behavior of the elderly to participate in gateball and well-being. Also, through reviewing of gateball activities literature, author identified several antecedents contributing to playing gateball behavior and those affecting attitude, subjective norm, and perceived behavioral control. For example: the two exogenous factors 'easy to learn' and 'usefulness' to replace the original exogenous factors, behavior belief and outcome evaluation. And 'self-efficacy' and 'resource facilitating conditions' to replace the original TPB exogenous factors, control beliefs and perceived ease. In summary, this study focuses on: (i) Investigating whether elderly participants gateball activities impact on well-being; (ii) Investigating whether TPB core factor (attitude, subjective norm, perceived behavioral control) have a positive effect on the elderly playing gateball; (iii) Investigating whether the six exogenous factors (perceived usefulness, easy to learn, normative belief, normation to comply, self-efficacy and resource facilitating conditions) have a positive effect on the elderly's playing gateball; (iv) Investigating whether the integrated model can appropriately explain the exercise behavior of older adults and well-being. Results of this study not only extend the application of TPB in leisure activities, but also can provide the gateball associations and government with a theoretical study model and professionals with information for developing and promotion of the elderly gateball as well as help older adults to pursue successful aging [in Chinese].

Keywords: successful aging, well-being, theory of planned behavior (TPB), gateball, exercise behavior

*Lin B-S [**林伯星**], Lee I-J [**李依蓉**]. A set-top box and hybrid cloud based homecare system for elders. Journal of Gerontechnology and Service Management 2014;2(3):237-242*; doi:10.6283/JOCSG.2014.2.3.237 As science and technology are getting advanced, telemedicine has become a prevalent topic in recent years and several telemedicine systems have been proposed; however, to the users, these systems exhibit disadvantages to not fit the daily requirements. Several homecare systems have been proposed on several platforms, such as a system hosted on personal computers (PCs) or smartphones. These telemedicine services are designed to provide a more convenient bridge that enables users to directly interact with medical staffs. Although such designs may seem friendly and helpful, senior citizens might be unfamiliar with and burdened by contemporary technology such as homecare products that constantly change. In addition, if a telemedicine system is designed for only individual use, the core goal of homecare may not be attained. Furthermore, the large amount of information

produced from increasing medical data from patients will be a big problem which will reduce the system efficiency and cause congestion when many users access the information at the same time. In this study, a set-top box integrated with the Android platform to provide a convenient and user-friendly interface was proposed. The set-top box was designed to receive vital data measured from medical devices through a Bluetooth interface. The received information is both displayed on a digital television (DTV) and immediately uploaded to a cloud. Furthermore, this platform can be used to manage the health situations of family members. The platform can also be used to provide telemedicine services and exchange information among hospitals. Thus, a novel, hybrid cloud architecture is proposed in this study. Updated information is stored in a public cloud, enabling medical staffs to rapidly access information so that they can facilitate diagnosing patients. Outdated information is stored in a private cloud, enabling users to efficiently access historical records by using a backend management system. The total data quantity is reduced in the long term, and the efficiency of the database is improved. The proposed design offers a robust architecture for storing data in an elder homecare system, resolving the overloading and congestion problems inherent to a centralized architecture because the data quantity increases and improves system efficiency [in Chinese].
Keywords: digital television, homecare, hybrid cloud, set-top box, telemedicine

*Lee C-F. [**李傳房**], Augmented reality on interactive navigation interface for older adults. Journal of Gerontechnology and Service Management 2014;2(3):243-258*;
doi:10.6283/JOCSG.2014.2.3.243 While new digital technology has ubiquitously embedded in the modern society, elderly faces tremendous challenge for adapting digital technology in daily life, especially the navigation system since most of digital technology is developed with younger generation in mind. An interactive traveling navigation system using augmented reality (AR) is developed in this research for addressing this issue. As the degeneration of elder's cognitive ability, their way-finding efficiency is also decreased. Hence, cognitive studies as well as service scenarios are conducted to unleash the digital gaps between elderly and younger adults in terms of navigation activities. The studies is divided into three phrases: (i) Cognitive studies specially on elderly on AR interface usages such as depth cue; (ii) The usability test on interaction behaviors as well as interviews on the presentation of AR interface for elderly; (iii) Workshops are applied for exploring the usages of developing service scenarios of AR navigation system based on the usability test and interviews above. Several prototypes are implemented in the process to evaluate the scenarios and interfaces as well as usability test [in Chinese].
Keywords: older adult, interactive navigation, augmented reality, service design

*Tsai W-C [**蔡旺晉**]. A study on the product interface training for older adults. Journal of Gerontechnology and Service Management 2014;2(3):259-264*;
doi:10.6283/JOCSG.2014.2.3.259 The present research proposal is already in process and will investigate and explore the advantages of age-specific electronic product training programs for older adults based on different behavior mode. With a rapid increase of an ageing population in Taiwan, the number of active older adults willing to interact with new electronic products is also growing. The ultimate goal is to develop a set of systematic and iterative training programs that could be used in the development of electronic product interfaces for older adults. The researcher will conduct phase II of the whole research process and explore approaches in the dimensions of motor, sensory, and cognitive ability relevant to electronic product interactions and described how these could be used to apply to a given training design. The first part research will complete the phase I for a well understanding on the needs and demands under the four targets about the interface knowledge and skill components when considering older adults' interaction with product interface: (i) the older adults, (ii) the product, (iii) the environment or context, and (iv) the activities and tasks over time that constitute the interaction. The main concern is to evaluate the match between older adults and the electronic product by utilizing various measures of compatibility. The assessment of older adults' compatibility with electronic devices can be conducted with a number of human

functioning levels, including the sensory, motor, and cognitive levels, and finally will develop a capability-demand framework and assessment tool. Based on the predicted outcome, the capability-demand framework and assessment tool provides a useful starting point for training consideration, that is, to start from focusing on ways to relate product demands to the range of older adults' capabilities. The second part follows the first part's research result to examine the phase II on the effects of electronic product interface trainings under a wide range of product training situation including tutorial, type of feedback, amount of practice, training of schedule, and training media contents, that have not been well-explored for older adults [in Chinese].
Keywords: older adults, product interface, interface knowledge, skill, training

Chang G-C [張國清], Hwang I-S [▪英修]. Integration of stochastic resonance stimulation and dedicated interactive motion sensing games to enhance the postural control abilities of the elderly. Journal of Gerontechnology and Service Management 2014;2(3):265-280;
doi:10.6283/JOCSG.2014.2.3.265 Postural instability in elderly people is a major contributor to falls. Stochastic resonance stimulation is a novel intervention which provides potential benefits for enhancing postural control ability of the elderly. Besides, motion sensing games make the elderly have higher willingness and motivation to perform rehabilitation training. However, commercial motion sensing games are not necessarily suitable for the elderly because the type of athletic activity makes older people feel nervous and frustrated. Dedicated motion sensing games used for rehabilitation need to cooperatively develop with physiotherapy scholar according to the requirements of the elderly. The aim of this two-year project is to integrate stochastic resonance electrical stimulation and dedicated interactive motion sensing games with entertaining rehabilitation programs to promote postural control ability of the elderly. In the first year, we will construct a 2-channle head mounded stochastic resonance visual stimulator. The subthreshold white noise LED photic stimulus will be applied to the eyes of the subject. The relationship between perceptive mutual information of the subject and light stimulus intensity will be quantized by measuring the visual evoked potential in the primary visual cortex. The visual perception has close relationship with eye movement. For evaluating the improvement of visual perception due to stochastic resonance visual stimulation, the eye movement signals will be recorded by an eye tracking system when the subject looks at the objects with different resolutions, different profiles, or different velocities. In the second year, the kinect-based motion sensing training games will be developed including maze game, batting ball game, dodge ball game, and soccer game to increase older persons' incentive to exercise sensorimotor integration training and postural-suprapostrual dual task training. The eye movement signals, such as fixation point, fixation duration, number of fixations, fixation sequence, and area of interest will also be measured to assess the visual attention function and visuomotor coordinative ability when the subject plays a motion sensing training game [in Chinese].
Keywords: postural control, stochastic resonance, motion sensing games

Hung C-W [洪崇文], Zhang T-W [張登文], Tu, Y-M [▪毅銘]. Development and design of the family bond intelligence wireless sensor network for the independent senior who lives alone. Journal of Gerontechnology and Service Management 2014;2(3):273-280;
doi:10.6283/JOCSG.2014.2.3.273 According to the Ministry of Interior Survey in Taiwan, nearly 23% of elderly parent does not live with family. Those elderly are mostly self-caring. Under realistic conditions of separation, issues concerned to elderly living alone are related domestic caring, elderly's health, safety of life, and their mood state. As the Taiwan culture, children are usually the primary caregiver to their elderly, and these care, including economic, health, and the level of emotional support. In this study, we focus on the seniors who live alone and their distance families, hoping to establish an intimately family bond through intelligent technology. An intelligent wireless sensor network structure is proposed in this project. Unlike the hard-installation of the normally intelligent house, the high power consumptions of the ZigBee and WiFi, and the low penetration of the Bluetooth, the Sub1G communication is selected, due to its low power consumption and penetration. The different sensor nodes are connected to the Cloud server via Ethernet by the bridge. And then, the elderly's living record will be provided to

other subproject I, the APP provide from subproject V will show elderly's living status to Caregiver, and the safe and interactivity with family will be supported in subproject II and III. The advantages of the proposed structure are easily-installation and easy-extension. In this project, we explore ways to help older with distant family members to maintain family cohesion, as well as how to accomplish the moderate intervention and application for intelligence technology in domestic life [in Chinese].
Keywords: family bond, wireless sensor network, Sub1G wireless communication

Tsai T-H [蔡采璇]. Design and development of an online platform and innovative social networking services for older people. Journal of Gerontechnology and Service Management 2014;2(3):281-296; doi:10.6283/JOCSG.2014.2.3.281 The research project aims to investigate the key factors of social connection and interactions between older people and their friends/family. The study is also related to developing a new social platform - Sharetouch plus, which is designed to fit perfectly into the formation of social network and relationship in Taiwan, so that elderly can communicate and interact harmoniously together in an online social platform without difficulties and strengthen their social bond. This research necessitates enhancing the understanding of special needs of elderly users and investigating the principles of social network theory/tie strength theory as design solutions for making a social platform more accessible. Moreover, the area of study is also concerned with validating the newly development platform enable elderly users to engage the benefits of social media and communication technologies, via both user-issue and scientific-based evaluations. The various stages of the project are: (i) to conduct a comprehensive literature survey of relevant research article, current trends and social changes, users' characteristics and requirements when accessing a social network site; to investigate latest information on social technologies, existing development of online SNSs and relevant mobile applications; moreover, to analyze different properties of top social applications, mainly focusing on the formation and evolution of the networks as well as the social interaction over the networks. (ii) to measure social relationship among the older people, including network size, extent of social interaction, specific type of relationships, as well as instrumental and emotional support; to generate survey to explore how older generations use social applications; and in particular, to investigate older people in SNSs and consider how properties unique to such mediate environments (e.g., persistence, searchability, replicability, and invisible audiences) affect the ways in which the elderly interact with one another; and therefore, to identify influential factors in association with socialization and web accessibility and provide design principles for a social-based interactive platform. (iii) to develop an online social platform for senior users based on the theory-driven principles and practical experiences; to validate and measure appropriateness and usability of the newly developed social platform on both user-issue consideration and scientific-data demonstration; to identify further research that is required.
Keywords: elderly social interaction, social networking site, social network theory, tie strength theory, mobile application, cloud computing [in Chinese]

Chang C-S [張志昇]. A study and design on falling risk warning mechanism for the elderly. Journal of Gerontechnology and Service Management 2014;2(3):297-300; doi:10.6283/JOCSG.2014.2.3.297 For the elderly, diseases, injuries or the deterioration of general physical functions could cause instability in their daily lives. The imbalance could lead to them falling down, getting hurt or even getting killed. Such accidents not only put great pressure, both physically and mentally, on the elderly and their families and friends, but also cause individuals, families and society to bear immense medical expenses. Currently, clinics and medical professions use the Berg Balance Scale (BBS) for fall risk evaluation. However, this method is subjective, and liable to lead to a range of differing opinions of the subjects' general well-being. The purpose of this study is to establish an early warning mechanism for the risk of the elderly falling down. The elderly who show signs of imbalance or are unaware of it may be warned by the early warning mechanism, and go through physical therapy or use suitable aids to prevent injuries from falling down. This project continues current research that is already in progress. The results of the pilot study have provided the basis of this research

project and will establish the early warning system by the experiments of 3D force platform design, integrated absolute error (IAE) research, pattern research, factors of falling risk research and the research of falling risk important factors using Mahalanobis-Taguchi System (MTS). By establishing and using the early warning system, injuries caused by changing postures can be reduced or even prevented among the elderly, allowing the elderly to extend the time that they are capable of living independently, and enhancing their general quality and value of their lives [in Chinese]
Keywords: integrated absolute error, pattern, Mahalanobis-Taguchi System

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