Project Summary for IAL Website

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Project Title:	Virtual And Augmented Reality Training Systems For The Elderly In Singapore
Project Number:	GA17-02
Year of Approval:	2018
Funding Source:	WDARF
Objectives and intended outcomes of the project:	The main objectives of this project are: (1) To understand barriers to independent living that the elderly are facing in an increasingly technological Singapore, via social science research utilizing focus groups, interviews, and surveys with seniors and relevant stakeholders; (2) To form an interdisciplinary team consisting of scholars from Communication, Computer Science, Education, Psychology, and Human Computer Interaction to develop VR/AR training programs for the elderly to assist them in handling the challenges identified in our preliminary research, using social science theories as a guiding principle; and (3) To examine the effectiveness of the developed VR/AR training programs in multiple senior centers in Singapore, and ultimately implement the project in real-life settings, in cooperation with government organizations and welfare organizations so as to benefit the elderly, pave the way towards active ageing. The proposed project will add to the existing body of scientific research by (1) focusing on developing customizable training programs for the elderly that utilize interactive digital platforms and adding a new dimension to the literature on VR training programs from the fields of Communication, Computer Science, Psychology, Education, and HumanComputer Interaction, utilizing social science concepts and interactive technology with a long-term vision; and (2) providing tangible evidence on the effectiveness of interactive technology in improving well-being of the elderly and promoting active ageing. We will measure several key outcome variables that reflect the acceptance of the elderly towards such VR/AR training programs, including their confidence in handling the automated machines or workplace tasks after training, likelihood of seeking employment, interest in picking up other skills or learning other forms of technology, as well as their self-esteem. Through interplay between the elderly and the new training tools using VR/AR interactive technology, a large quantity and wide variety of high quality data could be captured to serve as important information to assess the process of training. Such findings from the data can help policy makers, social workers and non-profit organizations to develop better training programs for the elderly in terms of daily tasks, basic job training as well as learning of technology, not to mention direct benefits for the elderly. This will be vital for helping Singapore address the challenges and opportunities brought about by an ageing population in a cost-effective way. Our short-term vision is to form an interdisciplinary research team and to explore the potential of interactive VR and AR technology as

	learning interventions by providing empirical evidence for the effectiveness of such new tools. Our long-term vision is to implement cost-effective and empirically proven learning methods for the elderly in practice, developed from theory-based research using rigorous experimental methods. We believe that simulated learning for the elderly through the VR/AR training system will be a way forward for active ageing in a smart nation. In addition, our proposed project also answers the call by the Ministerial Committee on Ageing for more research on factors that motivate seniors to stay in the workforce and engage in lifelong learning, by capitalizing on rapid developments in VR technology that is set to revolutionize many key aspects of our lives. Recent releases of affordable and accessible VR devices, such as the Samsung Gear and the Google Cardboard also demonstrate that the findings from this project will be extremely timely in helping us understand more about the practical applications of virtual reality in the lives of the elderly.
Project Team	
Principal Investigator:	Associate Professor Jung Younbo Wee Kim Wee School of Communication and Information (WKWSCI) Nanyang Technological University
Summary of Project (up to 300 words)	
In line with the government's Smart Nation initiative, Singapore is rapidly adopting technology in various aspects of daily life to improve the overall wellbeing of its people and efficiency of society. Concurrently, Singapore is also experiencing a shift in its population makeup. It is expected that by 2030, one in five people in Singapore will be aged 65 or older (National Population and Talent Division, 2016). These two trends combined make it more important to ensure that seniors are not left behind in the push towards a smart nation. One of the ways to achieve this is to help seniors stay updated with technology, so that they can live independently and confidently with dignity. To address it, this interdisciplinary project, funded by SkillsFuture Singapore develops and assesses VR and AR training programs for seniors in Singapore in two domains, daily tasks and vocational training. The research team consists of scholars from Communication, Education, Engineering, and Social Work utilizing various methods, such as focus-group interviews, surveys, and experiments. Based on exploratory research, the research team hasidentified two essential tasks that seniors in Singapore expressed trouble with – using an ATM machine and a self-checkout kiosk. A discussion with relevant stakeholders also revealed that health coach training was a potential type of vocational training which seniors could engage in safely and on their own. To assist seniors in their training on these tasks and be in line with the government's Smart Nation initiative, the research team has developed a VR/AR training system. The results show that the VR training is more enjoyable than the traditional training, and such enjoyment led to future-use intention of automated technology and job search. We suggest that the effectiveness of VR on training and learning outcomes is conditional, depending on pedagogical approaches such as scaffolding with guidance.	
Summary of Project Findings, Deliverables and Impacts (up to 500 words)	

This interdisciplinary project, funded by SkillsFuture Singapore, developed and evaluated Virtual Reality (VR) and Augmented Reality (AR) training programs to support seniors in adapting to automated services and exploring vocational opportunities. With Singapore's Smart Nation initiative and its aging population—where one in five residents will be 65 or older by 2030—the project aimed to ensure that seniors are not left behind in the digital transformation, promoting their independence and confidence in technology use.
The research team, comprising experts from Communication, Education, Engineering, and Social Work, employed focus-group interviews, surveys, and experiments to assess the effectiveness of VR/AR-based learning. Initial findings identified two daily tasks that seniors struggled with: using an ATM and a self-checkout kiosk. Additionally, discussions with stakeholders highlighted health coaching as a viable vocational opportunity for seniors.

To address these needs, the team developed a VR/AR training system, which proved highly effective. The results showed that seniors found VR training more engaging and beneficial than traditional methods. A majority (85% for ATM and 81% for self-checkout) reported that VR training made learning easier, and 88% (ATM) and 86% (self-checkout) believed they could apply the skills in real-world settings. The immersive and interactive nature of VR allowed seniors to practice without real-world consequences, helping them overcome fear and hesitation toward automated services.

Beyond technical skills, the project highlighted the importance of positive learning experiences in increasing seniors' receptivity to technology. Most participants (89%) found the training enjoyable, 95% felt good about participating, and 89% would recommend it to their peers. Findings also indicated that repeated exposure to VR training helped reduce psychological barriers such as anxiety, fostering a more positive attitude toward technology adoption.

The vocational training aspect explored peer-led learning, focusing on training seniors as health coaches. Findings suggested that seniors were more comfortable receiving guidance from peers than from younger trainers. This peer coaching approach not only enhanced seniors' confidence and autonomy but also contributed to the sustainability of training programs in senior activity centers. By empowering seniors to become trainers themselves, the project ensured continued learning and engagement even beyond its initial scope.

The project has had significant academic and societal impact. Its findings were published in leading conferences and journals, contributing to global research on technology-assisted learning for older adults. Additionally, the project was invited for keynote speeches at prestigious international conferences, including the *International Conference on Gerontechnology 2024* and the *International Conference on Educational Technology for Middle-aged and Older Adults*, showcasing its relevance on a global stage.
Beyond research, the training programs have continued to be used in senior centers, lifelong learning programs, and aging organizations such as Care Corner Singapore Ltd. Their sustained implementation demonstrates the long-term value of VR/AR training in bridging the digital divide and fostering an inclusive, technology-driven society for seniors.

This project underscores the potential of immersive technology to enhance seniors' learning experiences, improve their confidence in using digital tools, and promote active aging—aligning with national efforts to build a Smart Nation that includes all generation.