Design, Multimodal Combination and Evaluation of a Virtual Coach for Older Adults' Wellbeing

Mira El Kamali

The global population is aging rapidly due to increased life expectancy and declining birth rates, especially in industrialized nations. Healthy aging, a process of maintaining and improving one's well-being, independence, and quality of life, is crucial. The World Health Organization suggests that companionship, living in familiar environments, and participating in outdoor activities can contribute to healthy aging. Technology, particularly Information and Communication Technology (ICT) and mobile technologies, can play a significant role in promoting healthy aging. However, the adoption of digital health technology among the elderly is challenging due to complex factors such as trust, stigmatizing product aesthetics, relevance of technology in daily life, ease of use, and integration into everyday routines.

This thesis, part of the NESTORE project, aims to overcome these challenges by developing integrated digital solutions for the elderly's well-being. The project's goal is to create a virtual coach that can assist the elderly in four domains of well-being.

Firstly, the research explores the dimensions and properties to design a virtual coach through a co-design study with older adults. A conversational agent with vocal and tangible capabilities was designed offering a more natural interaction. Design recommendations are also generated from this work. Secondly, the research also explored different output modes for the virtual coach, comparing single-interface and multi-interface designs. The single-interface provides one interface for the user, while the multi-interface combines two interfaces in an assigned or redundant-complementary manner. The research found that older adults prefer a combined interface, indicating a need for multimodal output modes that can foster deeper user engagement. Lastly, the thesis examined various evaluation modes for the virtual coach, such as online surveys and face-to-face experiments. The comparative study between these modes revealed differences in overall results and data quality, providing valuable insights for future research in human-computer interaction studies. This research highlights the potential for hybrid experiments that combine different evaluation modes.

The thesis concludes with a discussion of the findings, an acknowledgment of the research limitations, and a projection of future work in the field of digital health technology for older adults.

Jury:
Prof. Denis Lalanne (thesis supervisor)
Prof. Elena Mugellini (thesis co-supervisor)
Prof. Dr. Bruno Dumas (co-examiner)
Prof. Dr. Jacques Pasquier (president of the jury)