Designing Motion Video Games for Cognitive Enhancement of the Elderly

Project Leader
REN Xiangshi, Dr. Eng.
Professor, Information Systems Engineering
Director and Professor, Center for Human-Engaged Computing, Japan

Faculty Member Involved in this Project
SALEHZADEH NIKSIRAT Kavous, Ph.D.
Visiting Researcher, Center for Human-Engaged Computing, Japan
Postdoctoral Fellow, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

1. Objective

As our population is aging, the number of elderly people with cognitive decline is increasing dramatically. Cognitive decline threatens older adults' quality of life in various forms, such as dementia or Alzheimer's. Researchers recommends elderlies to follow a healthy lifestyle such as exercise to slow down the cognitive decline. The project aims at designing novel motion video games to promote physical activity for cognitive enhancement. However, it is critical to systematically investigate the design space of motion video games and their effectiveness on cognitive enhancement. The project will carry out studies to design and develop novel video games. Equally important, using neuroimaging tools, the project will evaluate the effectiveness of different video game designs on cognitive enhancement.

Keywords for future research:
Video game; neuroplasticity; cognitive enhancement; elderly; game experience; virtual reality

Related article/paper/info:
1. Xiangshi Ren, Chaklam Silpasuwanchai, John Cahill. 2019. Human-Engaged Computing: the future of Human–Computer Interaction. *CCF Transactions on Pervasive Computing and Interaction*, Springer.
2. Kavous Salehzadeh Niksirat, Kaechang Park, Chaklam Silpasuwanchai, Zhenxin Wang, Xiangshi Ren. 2019. The relationship between flow proneness in everyday life and variations in the volume of gray matter in the dopaminergic system: A cross-sectional study. *Personality and Individual Differences*. Elsevier.
3. Kavous Salehzadeh Niksirat, Chaklam Silpasuwanchai, Xiangshi Ren, Zhenxin Wang. 2017. Towards cognitive enhancement of the elderly: A UX study of a multitasking motion video game. *In Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM.
4. Xiangshi Ren. 2016. Rethinking the Relationship between Humans and Computers. *Computer*. IEEE.

2. Project Outline
To that end, the project will consist of the following phases:
(a) Undertake systematic literature reviews
(b) Attend in research discussion together with the lab supervisor and other collaborators
(c) Design and develop video games
(d) Design experiments and conduct user experience and neuroscience evaluations
(e) Establish frameworks and design guidelines

3. Expected Performance
In this project, the successful candidate would be expected to:
(a) Publish at least 2 research papers in top-tier HCI conferences (*ACM CHI*, *ACM UIST*) and high impact factor multidisciplinary journals (*Nature, Science*)
(b) Assist the lab supervisor in research and management
(c) Assist in the supervision of Master & Bachelor students
(d) Report project progress in meetings and update progress to the laboratory's website

4. Required Skills and Knowledge
The successful candidate for this project will have the following knowledge and skills:
(a) Strong background in HCI, Computer Science, Design, Psychology or Cognitive Science
(b) Strong software development skills
(c) Strong communication ability and interpersonal skills
(d) Strong verbal and written English skills
(e) Ability to meet tight work deadlines
(f) Ability to work independently as well as in an international team

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http://www.kochi-tech.ac.jp/kut_E/graduate/admission.html

See our lab website:
http://xrenlab.com/
http://xiangshiren.com/
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Contact
E-mail: ren.xiangshi@kochi-tech.ac.jp