

Kwansei Gakuin University

Report of Research Outcome

2021/03/30

To President

Department : Graduate School of Humanities
Position : Postdoctoral fellow
Name : Robin Orthey

I report the outcome of the research as follows.

Name of the Fund/Program	<input type="checkbox"/> Sabbatical leave with grant <input type="checkbox"/> Sabbatical leave with no grant <input type="checkbox"/> KGU Joint Research <input type="checkbox"/> Individual Special Research <input checked="" type="checkbox"/> Postdoctoral fellow ※Please report by designated form as for “International Research Collaboration”.
Research Theme	Development of effective image processing techniques for AVATAR application (アバター技術の画像処理に関する脳・心理への影響に関する研究開発)
Research Site/Venue	Center for Applied Psychological Science
Research period	2020/04/01 ~ 2021/03/31 (12 months)

◆ **Summary of the research outcome** (approx. 2,500 words)

Please write down the outcomes in detail regarding the research theme above.

In this project we evaluate the use of AVATAR applications for remote controlled tasks and experiences, in particular tourism related activities. AVATAR technology has to the potential to transform tourism in several ways. Firstly, in extreme events that severely limit travel opportunities, e.g. the COVID 19 pandemic, AVATAR tourism applications can serve as a substitute to limit the effects of the crisis. On the one hand, consumer would still be able to satisfy their need for exploration and engagement, and on the other hand AVATAR applications could reduce the economic impact on service providers. Tourist attractions with poor accessibility or limited space are another example that would benefit from AVATAR tourists, as the AVATAR would eliminate both problems. Similarly, AVATAR tourist applications can also attract new groups of people that are currently no part of the tourist population. For example, old or bed-ridden people may be unable to travel for health reasons and therefore never visit the attractions.

Another example are potential tourists with low social-economic backgrounds, who may refrain from visiting due to the excessive costs of travel itself. A remote controlled AVATAR could easily bypass these constraints. Finally, AVATAR applications can also be useful for tourists that are still unsure whether they want to visit the destination or not. By getting an immersive first impression through an AVATAR, these tourists can get a feel of the destination and allows for a more informed decision making process.

There are many advantages to AVATAR controlled experiences, but also challenges. Although the quality of cameras, remote controlled tools, and screens is gradually improving, difficulties remain in the interaction between the human operator and the machine. A particular problem is accurate depth perception from a camera video feed. In normal vision depth can be perceived due to binocular disparity. Additional cues for depth perception are overlapping of known objects, shadows, relative size of objects, or motion parallax. A problem with AVATAR controlled vision is that the operator receives a flat 2D representation captured by the AVATAR's camera. Consequently, there is no binocular disparity as the image is displayed on a flat screen. Second, the other cues rely on assumptions that are not necessarily met by camera-controlled vision. Similarly, due to the zoom of the camera it may be impossible/difficult for the professional to accurately estimate the size and position of reference objects to make inferences about the rest of the environment. Other potential challenges involved in AVATAR controlled performance include slower task reaction times, unfamiliarity with the controls, and lack of other sensory information such as smell of feelings of a breeze that are part of the real experience.

In this project we evaluate several image processing techniques to alleviate these problems and enhance user experience. Due to the ongoing pandemic, we were limited in our research activities, but we managed to run one lab-controlled experiment and conducted a field test of our equipment, stimuli, and procedure. However, due to a non-disclosure agreement I cannot go into detail on the exact experimental details, as we will continue this project in the following year.

Deadline : Within two months after finishing the research period.

Sabbatical leave with grant: Submit this report to President with confirmation by the dean of school you belong to.

※ Postdoctoral fellow is required to submit this report with confirmation by the dean of graduate school before the end of employment period.

Where to submit : Organization for Research and Development and Outreach (NUC)

◆ We put this report on the web of KGU. If there is any problem about it because of difficulties on your research, please let us know.