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A Method to Improve the Digital Window With Higher spaciousness

Zhen Zeng

School of Knowledge Science,
Japan Advanced Institute of Science and Technology
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In the past few decades, due to the problem of rapid population growth and aging, the need for more living spaces has been increasing gradually. The problem of overcrowding in the city centers is becoming more significant.

Creating underground living spaces is attracting attention as a possible countermeasure to solve this problem. However, the use of underground spaces present issues such as having no windows in the living spaces.

In addition to basic functions such as sunlight and ventilation, windows play the important role of an interface to acquire information of the outside world such as the weather and time. However, since the underground space is an isolated space blocked from the outside world, negative aspects such as psychological discomfort and anxiety are pointed out. Research has shown that people who are working in spaces without windows tend to have low work efficiency and job satisfaction. Due of lack of interaction with the natural view of the outside environment and sunlight, people tend to develop feelings of anxiety and being confined.

This research aims to support people who are working or living in windowless spaces to alleviate the negative psychological mood and the feelings of being confined to an isolated space.

We purpose the use of Surface Pro3 as a display device to show the panoramic-view of landscape movie. The users will find that the viewpoint of the movie can be changed when they move their faces. We hung curtains into the frame to provide a more natural feeling as it is with the real windows. The curtains are kept waving by the use of two fans located at both

the left and the right sides. The parts of the window frame that we proposed were printed using 3D printer.

We used Semantic Differential (SD) method to conduct an evaluation experiment and the data from two patterns (without and within frame) were analyzed by Paired-Samples T-test. The result showed that our method was effective in acquiring higher spaciousness by the use of digital windows. In conclusion, it is possible to reduce the negative psychological impacts of windowless spaces.

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