JAIST Repository
https://dspace.jaist.ac.jp/

Title	圧迫感提示に着目した可動式天井型ディスプレイの研究
Author(s)	粟津，実夢
Citation	
Issue Date	2023-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/18249
Rights	
Description	Supervisor: 佐藤 俊樹，先端科学技術研究科，修士(知識科学)

JAIST
JAPAN
ADVANCED INSTITUTE OF
SCIENCE AND TECHNOLOGY

Japan Advanced Institute of Science and Technology

Abstract

Various lighting and air-conditioning devices are installed on the ceilings of the spaces where we live. Most of these objects are located too far away for us to reach them, but we sometimes encounter opportunities to see and touch them up close, such as when we are on the top bunk of a bunk bed or in a loft. In such places we can feel the presence of the objects we usually see above our heads more strongly. We may also sometimes feel a "sense of pressure" as if we are being held down by them.

Another typical example of the thrill and excitement presented by pressure from the ceiling is the " descending ceiling trap," a device that appears in various movies and video game productions. In this trick, the ceiling gradually lowers and eventually crushes the person below to enjoy the thrill of being crushed. In the initial state of this descending ceiling trap, the ceiling is located at a distance that cannot be reached by reaching for it, and it starts out in a state where one does not feel much pressure. However, as the ceiling slowly approaches, the user begins to feel a stronger sense of visual pressure from overhead. As one's outstretched hand touches the ceiling, one will also begin to feel a sense of tactile pressure in addition to visual pressure. As the ceiling comes closer to us, we will be able to feel more detailed visual information about the ceiling, such as the unevenness of the ceiling, and we may even be able to feel the breeze from our breath bouncing off the ceiling.

Thus, the overhead pressure experience included in a suspended ceiling is a cross-modal entertainment experience that is felt not only through visual information but also through various of the five senses, such as touch, sight, hearing, and smell. In addition, we think that the change in posture of the person being squeezed by the ceiling is also a very interesting element of the experience. As the ceiling descends, we become unable to stand, and we may bend over at the waist, fold our knees, or even go to a kneeling posture. As we go through these processes, our posture gradually lowers, and eventually we are forced to lower and reduce our body to a lying position. This dynamic postural change from the standing posture to the lowest lying posture is one of the important components of the compression experience.

Therefore, this study proposes a movable ceiling display system that can present a feeling of pressure from the ceiling, focusing on such a "suspended ceiling" structure. This system can extend the experience of pressure from the ceiling described

above by using interactive display technology, and will enable natural and enjoyable cross-modal interactions using various body parts and mixing various senses in various ways, which is unprecedented. We think that we can propose an unprecedented interactive display platform that enables natural and enjoyable cross-modal interactions using various body parts and mixing various senses in various ways.

Based on the above, this paper first analyzes the experience of pressure from the ceiling from the perspective of the Human-Computer Interaction field, and then proposes a new interactive display platform that can realize a variety of natural and enjoyable cross-modal interactions with a mixture of various sensations. This paper will discuss the potential of the unique experience elements of the ceiling pressure experience. In addition, this paper proposes a ceiling-mounted display that can extend these experiences using display technology. We also propose a movable ceiling display that can extend these experiences using display technology, and describe its design guidelines. Furthermore, the prototype development of an experience-enabling prototype that was actually implemented is described in detail. The relationship between the height of the ceiling and the user's posture, which is based on this study, is also described. The relationship between the images displayed on the ceiling display and the sense of pressure felt by the user, and the effect of the user's active input movement to the ceiling on the feeling of pressure. The experiment to investigate the effect of the user's active input to the ceiling on the sense of pressure was also described in detail.

In addition, I proposed and implemented an application based on the above.