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Author	Tian, Ren(Haruyama, Shinichiro) 春山, 真一郎
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3D Virtual Window Display to Help Spatial Cognition for Pedestrians

Tian Ren

(Student ID Number : 82034544)

Supervisor Shinichiro HARUYAMA

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Graduate School of System Design and Management,
Keio University
Major in System Design and Management

SUMMARY OF MASTER'S DISSERTATION

Student Identification Number	82034544	Name	Tian Ren
Title 3D Virtual Window Display to Help Spatial Cognition for Pedestrians			
Abstract Even if there are many guidance methods, people still get lost in buildings, especially when the building structure is complex, like Shibuya Station, which is a problem. Current methods like maps, information boards, and navigation maps have disadvantages that could not help pedestrians gain spatial cognition easily. To solve the problem, this paper introduces a 3D virtual window display system to help pedestrians get spatial cognition by simulating the experience of seeing through a window. In the 3D virtual window display system, we use monitors to simulate the real experience of seeing far away big buildings through the window. The view on the monitor will change according to the pedestrians' position. When we are walking, far away buildings remain in our field of view, and nearby buildings move fast, which is caused by motion parallax. We use motion parallax to help pedestrians gain spatial cognition. 3D virtual window display consists of a hardware system and software system. For the hardware system, we made two virtual window display prototypes, consisting of the depth camera, intel NUC and monitor. For the software system, it has two parts—one is face detection and depth calculation, and another part is the virtual view. The system is verified to work well in face detection and depth calculation within the distance of 0.7m to 6.5m. Through user testing, the effectiveness of helping pedestrians to gain spatial cognition is validated. As a method of internal building guidance, the virtual window display is possible in the future.			
Key Word (5 words) Depth Camera, Intel NUC, 3D Virtual Window Display, Spatial Cognition, Human-Computer-Interaction			