

Title	3D virtual window display to help spatial cognition for pedestrians
Sub Title	
Author	Tian, Ren(Haruyama, Shinichiro) 春山, 真一郎
Publisher	慶應義塾大学大学院システムデザイン・マネジメント研究科
Publication year	2022
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2022年度システムエンジニアリング学 第345号
Genre	Thesis or Dissertation
URL	<a href="https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40002001-00002022-0003">https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40002001-00002022-0003</a>

慶應義塾大学学術情報リポジトリ(KOARA)に掲載されているコンテンツの著作権は、それぞれの著作者、学会または出版社/発行者に帰属し、その権利は著作権法によって保護されています。引用にあたっては、著作権法を遵守してご利用ください。

The copyrights of content available on the KeiO Associated Repository of Academic resources (KOARA) belong to the respective authors, academic societies, or publishers/issuers, and these rights are protected by the Japanese Copyright Act. When quoting the content, please follow the Japanese copyright act.

# 3D Virtual Window Display to Help Spatial Cognition for Pedestrians

Tian Ren

(Student ID Number : 82034544)

Supervisor Shinichiro HARUYAMA

September 2022

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			
<p>Abstract</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>			
Key Word (5 words) Depth Camera, Intel NUC, 3D Virtual Window Display, Spatial Cognition, Human-Computer-Interaction			