

Graduate School of Science and Technology Master's Thesis Abstract

Laboratory name (Supervisor)	Cybernetics and Reality Engineering (Kiyoshi Kiyokawa (Professor))		
Student ID	1911410	Submission date	2021 / 7 / 29
Name	CHOTCHAICHARIN SETTHAWUT		
Thesis title	<u>Compelling AR Earthquake Simulation with AR Screen Shaking</u> 視界の揺れを再現可能なAR地震シミュレーション		
Abstract			
<p>Many countries around the world suffer losses from earthquake disasters. To reduce the injury of individuals, safety training is essential to raise people's preparedness. To conduct virtual training, previous work uses virtual reality (VR) to mimic the real world, without considering augmented reality (AR). Our goal is to simulate earthquakes in a familiar environment, for example in one's own office, helping users to take the simulation more seriously. With this approach, we make it possible to flexibly switch between different environments of different sizes, only requiring developers to adjust the furniture layout. We propose an AR earthquake simulation using a video see-through VR headset, then use real earthquake data and implement a novel AR screen shake technique, which simulates the forces applied to the user's head by shaking the entire view. We run a user study (n=25), where participants experienced an earthquake both in a VR scene and two AR scenes with and without the AR screen shake technique. Along with a questionnaire, we collected real-time heart rate and balance information from participants for analysis. Our results suggest that both AR scenes offer a more compelling experience compared to the VR scene, and the AR screen shake improved immediacy and was preferred by most participants. This showed us how virtual safety training can greatly benefit from an AR implementation, motivating us to further explore this approach for the case of earthquakes.</p>			