



SVR-1 (Beta Version): An Educational VR Experience for Earthquake Disaster Mitigation in Bhutan

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Abstract

SVR-1 is an educational VR experience for earthquake disaster mitigation in Bhutan, in which users can experience an earthquake and practice with earthquake mitigation measures. A user can experience a virtual earthquake in a room which is based on traditional Bhutanese home design and learn about earthquake disaster mitigation, with Oculus Quest. In this VR experience, first, the user experiences a devastating earthquake. After the earthquake, some glowing and floating indicators appear at the important points of interest for the earthquake disaster mitigation. Then, the user would touch the indicators to display text regarding knowledge about how to handle a devastating earthquake. After that, the earthquake prevention equipment kit on the table appears in the room. Then, the user would take the equipment, and the kit prompts the user to place the equipment in the correct position. The user would place the equipment with their own hands using the Oculus Touch Controllers which utilize six degrees of freedom (6DoF) tracking. After completing the task, a devastating earthquake occurs again, and the user would safely experience it.

Keywords: Earthquake, Education, Virtual Reality, VR, Oculus Quest, 6DoF



Figure 1: A user's point of view.

1 INTRODUCTION

We've been working on VR experience development for earthquake disaster mitigation in Bhutan. The activity has been carried out under the project, "Project for Evaluation and Mitigation of Seismic Risk for Composite Masonry Buildings in Bhutan (SATREPS BHUTAN) [1]." Under this project, we aim to develop an educational VR experience for earthquake disaster mitigation in Bhutan and work on dissemination using it. Until now, we've proposed two VR demonstrations, the one is an experiencing learning system for earthquake disaster mitigation

using VIVE Pro and VIVE Tracker units [2], and the other is a mobile VR museum of the SATREPS BHUTAN project in which a user can experience 360-degree videos, movies on a large screen, three-dimensional objects, etc., related to the project, with Oculus Go [3].

2 CONCEPT

In this paper, we propose an advantage of an educational VR experience for earthquake disaster mitigation using a mobile 6DoF head-mounted display (HMD) with 6DoF controllers by creating

our new educational VR experience for Bhutanese using Oculus Quest (Quest). Researchers or developers using VR say that an interaction using our own hands is crucial for producing an immersive experience in VR space [4]. Quest has Oculus Touch Controllers which utilize 6DoF tracking. Therefore, by using Quest, we can design an interaction using our own hands in a VR space. We believe that an educational VR experience using Quest has the potential to give us an immersive environment for earthquake disaster mitigation education.

3 IMPLEMENTATION

This VR experience consists of the following four parts:

- 1) a devastating earthquake experience in a room which is based on Bhutanese traditional home design (see Figure 2, left);
- 2) a user touching the indicators to display text regarding knowledge about how to handle a devastating earthquake (see Figure 3);
- 3) a user placing the equipment with their own hands using the Oculus Touch Controllers (see Figure 4); and
- 4) after completing the task, a devastating earthquake occurs again, and the user would safely experience it (see Figure 2, right).



Figure 2: The left shows a room without earthquake prevention kit after a devastating earthquake. The right shows a room with earthquake prevention kit after a devastating earthquake.



Figure 3: The user touching the indicators to display text regarding knowledge about how to handle a devastating earthquake.



Figure 4: The user placing the equipment with their own hands using the Oculus Touch Controllers.

3 OUTLOOK

We will demonstrate this VR experience at the end of this year in Bhutan for a third-party evaluation with the intent to implement this program in Bhutan. In preparation for that, we will update the following functions:

- 1) add a tutorial
- 2) include a third-person CG character who will experience an earthquake with a user in VR space; and
- 3) add other places user can experience an earthquake and have prevention practice.

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