

Enhancing Disaster Resilience Through Immersive Tsunami Evacuation Training Using Virtual Reality

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1. INTRODUCTION

In recent years, natural disasters, particularly tsunamis, have posed significant threats to coastal regions worldwide. The importance of effective evacuation strategies is underscored by the devastating consequences of these catastrophic events. Traditional evacuation drills, while essential in areas with diverse populations, such as tourist attractions, often have limited frequency and scope, which may limit the number of participants. In particular, transient populations, such as visitors, may have limited opportunities to participate in these drills. This study explores the potential of virtual reality (VR) in conjunction with Google Street View as a virtual environment to enhance tsunami evacuation training and provide a more accessible platform for both residents and visitors.



Figure 1. Using Virtual Reality (VR) For Evacuation Drills

2. METHODOLOGY

Environment Setup: Utilizing Google Street View, we curated a virtual environment that mirrors real-world locales susceptible to tsunamis, which is Patong, Phuket province, Thailand. This realistic backdrop was enriched with crucial details such as evacuation route signages to aid participants during the drill.

Participant Orientation: Before immersing themselves into the VR-driven Google Street View environment, the middle school students were briefed about historical tsunami events, emphasizing inundation zones. They were acquainted with logical evacuation measures and strategies—e.g., determining the sea's direction and moving towards elevated terrains.

Simulation: Five middle school students, equipped with a VR headset, started from a predetermined point in the virtual world of Google Street View. Their task was to find their way around this environment and identify the safest evacuation route during the approaching tsunami threat.

Data Collection: As students traversed the virtual landscape, three primary metrics were observed: 1) The time duration to reach a predefined safe zone, and 2) The count of evacuation signages identified and heeded.

3. RESULTS

The average time taken by the students to cover a distance of 1 km was about 8 minutes, which is faster than in reality. Student B and E observed the maximum number of signages, three each, while Student C did not observe any. Student A and D observed two signages each during the drill.

Table 1. VR-based Tsunami Evacuation Drill Results

	Student				
	A	B	C	D	E
Duration for 1km Path (min)	7	9	8	8	8
Number of Signages Observed	2	3	0	2	3

4. CONCLUSIONS

Integrating virtual reality with Google Street View provides an innovative and more inclusive approach to disaster preparedness, particularly for tsunami evacuation training.



This combination allows for a more flexible and scalable training platform that can potentially accommodate a larger and more diverse group of participants than traditional drills. Given the limitations of traditional drills in accommodating large and diverse populations, the VR-Google Street View model offers a promising alternative that improves accessibility, particularly for transient populations. The results from Table 1 highlight the potential effectiveness and utility of this approach. Further research comparing this virtual approach to on-ground drills would be beneficial to understand its broad impact and potential for broader application.

5. REFERENCE

- [1] Sharma, S. (2020). Improving emergency response training and decision making using a collaborative virtual reality environment for building evacuation. In HCI International 2020–Late Breaking Papers: Virtual and Augmented Reality: 22nd HCI International Conference, HCII 2020, Copenhagen, Denmark, July 19–24, 2020, Proceedings 22 (pp. 213-224). Springer International Publishing.

6. AUTHOR BIOGRAPHIES



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Extended abstract

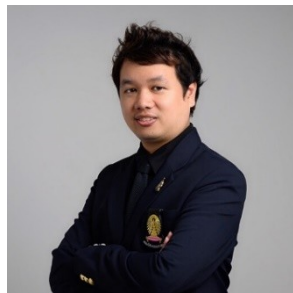
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