

Survey On: Disaster Survival Training using Virtual Reality

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Abstract— Natural disasters creates unpredicted and major risk with destructive impacts on people all around the globe. Public awareness and survival training is important for understanding and learning different disaster management techniques. Disaster survival training includes various preparedness and response activities happening before and after the disaster. Virtual reality-based disaster survival training provides simulated environment that can be much like to or totally different from real world which will be more effective in disaster management types of applications. This training includes all kinds of natural disaster survival training which assists the people to make ready at the time of real-time disaster.

Keywords: Virtual Reality, Serious Game, Disaster management, Kolb's learning method, Risk management

I. INTRODUCTION

Natural disaster constitutes unpredicted and severe threats with destructive impacts on the community's worldwide. It can occur because of different reasons and maximum of them are not possible to forecast. Floods, hurricanes, earthquakes, volcanic eruptions, wildfire, landslides, tsunami are number of the several natural disasters that can happen [1]. The most important and highly efficient way to survive in a disaster is public alertness and training of various disaster preparedness and response activities. The real-time simulation of disaster helps to educate the people in disaster-prone areas.

Virtual reality helps to develop a simulated environment of real-world events in low-cost devices. Using virtual reality, a virtual world created for peoples to engage themselves into a virtual environment to experience a different kind of disastrous situations. Virtual reality simulates various scenarios that provide a consistent, on-demand, real, and secure platform that permits correct analysis and recursion while reducing the challenges of real-life training [2].

The main goal of serious games is training and education. Serious games are the best chance to experience, learn, and practice different disaster situations. Also, it provides praiseworthy engagement and motivation. Serious games make the simulation of complicated situations simple and easy.

The serious game is a useful method to decrease the effect of natural calamities. Virtual reality techniques make the training more effective. Serious games are a powerful technique, for training people, as they can increase the learner's interest by involving within the game. So this virtual reality serious games increased public awareness about disasters and provide a training platform for peoples to survive in different disaster situations and used it as a decision-making tool to take correct decisions at the time of real-time disaster.

II. LITERATURE SURVEY

Rohith R Krishnan et.al [1] mentioned a virtual reality serious game for disaster relief management. This game contains two stages such as shifting and rescuing. Both stages consist of some risk management tasks. At the beginning of the game, the automatic player guides the player about the risk situation. At last, the player's understanding level is checked by giving the same risk situation without a hint. But in this game, we cannot find survivability of player or not count any score. So we cannot predict the player is good or weak. Disaster risk management serious games addressed various types of natural disasters. But the proposed game focused only on flood disaster management which is the most common type of disaster.

P. Meera et.al [3] mentioned the serious game on flood risk management. The design of this game explores a flood management system contains four steps such as mitigation, preparedness, response, and recovery. In this game, at first, the risk situation is pop up on the screen and then select the appropriate resources for solving the risk. The score will generate after solving different risk management tasks. After some time limit, the flood comes, if the player has overcome the risks and saves the lives then the score will increase. If the score is good then the quiz will be allotted to the player. But answering the quiz questions and memorization of facts is very difficult for the player. Again this serious game constitutes a multiplayer mode, it seems to assume that they may stimulate conflicts or misunderstandings at the time of selecting a suitable risk.

Felicio et.al [4] mentioned a serious game for different kinds of natural hazards. Firstly, the player chooses one disaster that he would like to play in. But, the game has some limitations such as the game has poor graphics, the player is unable to stop or pause the game, and disaster scenarios in the game are not user-centric. Also, this game does not support multiplayer mode and does not have different levels in the game.

Meesters et.al [5] mentioned a serious game focusing on disaster risk management. The game contains teams, where every team conquers the barriers in various scenarios and teams can communicate with each other. The first responder in the game evacuates the civilians engage in the disaster in a secure place. If medical support is needed then responders can make use of the player's mobile application to call in the medics. The game is effective and provides information about different methods for evacuating the citizens and also instructs them on how to manage information on disasters effectively. The responder should manage available experience and data with real-time feedback.

Syukril et.al [6] mentioned a serious game on flood management that focuses only on the response phase of flood disaster management. In the game, players are

challenged with various monsters these monsters are nothing but the different scenarios of natural disasters. The player score is increased after solving each monster and this monster is challenging as a puzzle. Every player obtain the role of a magician. This game is an example of active learning because each learner gets knowledge from their own experience.

III. DISASTER MANAGEMENT

Every year, lots of people are affected by different types of natural disasters. Disasters may be landslides, earthquakes, floods, hurricanes, cyclones, volcanic eruptions, and wildfire. In a disaster, many people faces the danger of death or physical injury.

Disaster management focuses on to prevent the possible destructions from risks, ensure immediate and suitable support to the sufferer of disaster, and achieve quick and adequate recovery.

To keep people secure during various natural hazards, preparedness safety training can prevent damages and losses. The people required to do important things in an emergency such as stay informed, have a plan for moving out from disaster, keep emergency kits, avoid unnecessary risks, etc. [9].

IV. SYSTEM ARCHITECTURE OF VR BASED DISASTER MANAGEMENT

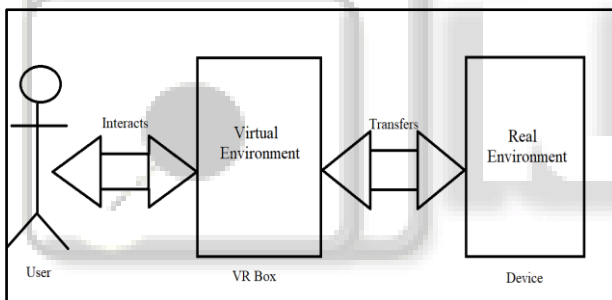


Fig. 4: The architecture of VR based Disaster Management. The serious games make learning, training, and understanding more enjoyable and easy through Virtual Reality which is depicted in fig. 4.

- The device is used to play the game in a real environment.
- VR shares the device screen to provide a simulated/virtual environment to the user.
- The user interacts with the game via the VR box.
- The user controls the training environment using a controller, and Head Mounted Display (HMD) used to render the output.
- VR displays survivability of users, calculated by the disaster management system.

V. APPLICATION

The virtual reality serious game contains a number of applications. Disaster management training can be put into action using virtual reality. Virtual reality training makes people feel like reality which provides a real-time simulated environment of different disasters.

The survival training simulates the effect of natural hazards provides a better understanding of different disaster risk management techniques. This extreme survival training will be addressed all types of natural disasters like earthquakes, floods, wildfire, landslides, cyclones, etc.

This virtual reality-based serious game training for disaster management applications will be developed with the voice recognition technique to interact with the virtual environment and examine user's actions in a virtual environment.

In survival training, Kolb's learning method is used for experimental learning. Kolb's learning model contains four stages that are helpful for a learner's understanding and discover the solution to various disaster risk situations. Kolb's experimental learning four-stages are Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation [7].

VI. CONCLUSION

Finally, the paper concludes that proposed serious games for disaster management centering on protection and recovery operations occurring before and later the disaster. By using virtual reality, it increases public awareness for disaster situations and provides a more concentrative and interactive virtual environment for training and learning of various kinds of disastrous situations. It helps the people to mentally prepare at the time of real-time disaster.

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