

Virtual Reality Training with Earthmoving Machinery

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Virtual reality is mainly thought of as a cool way to play games; however, it is a great tool for training people in dangerous fields (medical, industrial, etc.). Virtual reality is useful in training simulations because a person can be trained in how to handle stressful and potentially life-threatening activities in a safe and controlled environment. “Virtual reality technology is based on computer graphics, which can build virtual scenes and items to be manipulated by the user through input devices, and to be seen, heard, touched, even smelled through output devices, and the user can feel high immersion during the interaction” (Zhang, Hui, p. 1). Heavy machinery is very dangerous to operate and require copious amounts of training. Earthmoving machinery are very common on construction sites, and they contribute to a large amount of workplace injuries because the operator has not been properly trained. Training people to use earthmoving machinery is dangerous, so it would be useful and potentially lifesaving to train people using VR techniques.

Earthmoving machinery is very dangerous to operate. It has been noted that “a majority of the earthmoving equipment related accidents results in fatality” (Kazan, Emrah, and Mumtaz A. Usmen, p. 7). There have been numerous studies to show the true extent of the injuries that earthmoving machinery can cause. A study from 2018 showed that excavators alone caused 298 injuries. Further inspection would show that 122 of the 298 injuries were nonfatal while the other 176 were fatal. “It was observed that lack of adequate safety training was a factor in considerably more fatal cases (35.5%) than nonfatal cases (9.9%)” (Kazan, Emrah, and Mumtaz A. Usmen, p. 5). With proper training, operators of excavators would be able to decrease the number of injuries on the worksite.

“Due to the intrinsic properties of VR-to offer almost real-world experience in harmless virtual environment- it is born to be a perfect tool for training...” (Zhang, Hui, 1). Training with virtual reality has been shown to be useful, and it has a better impact on the safety of training all together. It allows people to be trained for dangerous possibly life-threatening activities in a safe controlled environment that would not cause harm to others. In fields where handwork is important, “haptic feedback is used within VR to train tactile skills, making VR especially useful for learning physical skills where feeling and touch are important” (Vaughan, Neil, et al., p. 7). Haptic feedback is a useful tool for training in virtual reality because it can help show the user how the task will feel in real life, or it could show the user the mistakes they are making.

“Hydraulic excavators are widely used in construction, agricultural, forestry, and mining industries, due to their kinematic flexibility and high-power density. The excavator operation is mostly executed by skillful operators who manipulate hydraulic joysticks to drive multiple links. Because of harsh working environment and physical fatigue from long working time, the excavator operation is avoided. Also, the excavator operation by the intuition of the operator always includes potential risk caused by lack of skill and mistakes” (Nam, Yun-Joo, and Myeong-Kwan Park, p. 1). Some excavator operators put those around them in danger due to their ‘lack of skill’. Virtual reality simulators for excavators have already been created and have resulted great findings. During one of the tests that was constructed for a virtual excavator simulator, the difference between part-task and whole-task training was emphasized. In their study, they had a range of 48 people fill a trench using part-task and whole-task techniques.

Their findings showed that the part-task group had better retention of the skills that they learned, and their skills could possibly transfer easily to a real excavator (So, Joey C. Y., et al., p. 9).

Virtual reality is more than just a toy for the average household; it is becoming more of a tool to help train people for difficult and potentially life-threatening jobs. Virtual reality training has become so valuable that the European Commission has funded copious amounts of money to industrial VR training (€900K in 2008, €1.4M in 2011, and €9M in 2013). (Vaughan, Neil, et al, p. 13). In the previously mentioned research projects, excavator simulators have been showed to work, and if part-task training is used, the operators will have better retention over the skills they learned in the simulator. Thus, virtual reality should be used as a step to help train people to safely learn how to operate earthmoving machinery.

Work Cited

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