

Applications of virtual reality in occupational falls rehabilitation

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Abstract: The purpose of our paper is to investigate the role of virtual reality in minimizing occupational accidents. A major focus of virtual reality has been in the area of balance rehabilitation. For maintaining balance or orientation in space, the human Central Nervous System (CNS) requires inputs from various sensors like the vestibular, the visual, the proprioceptive and the somatosensory sensors. Based on previous experiences and the demands of the situation, the CNS allocates “weights” to these sensory inputs, integrates them and makes cognitive decisions about balance maintenance and orientation. Virtual Reality (VR) not only provides an environment very similar to the real world to train the individuals to face balance perturbations, but also helps to understand the balance strategies employed by the CNS to cope with those perturbations. It also helps to differentiate the behavior of various sensory inputs under those conditions. VR is convenient to implement because of its low cost too. Studies show that there is a high dependency on visual cues and low use of proprioceptive cues in subjects with history of multiple falls or single falls in an occupational setting (e.g. nurses in a hospital) [1]. Also, some researchers point out that amateur players (soccer) rely more on visual inputs to maintain their balance as opposed to professional players. As a consequence amateur players fall more often in the playground [2]. Our paper proposes that virtual environment will help in developing adaptative strategies for workers to balance perturbations. It will enable them to rely more on vestibular and proprioceptive information, thereby giving less weight to the visual inputs, and hence minimizing work-place related falls. Also, a virtual environment will give a better view of various sensory strategies and neuromuscular responses used by falling workers in an occupational setting. We are hypothesizing that virtual reality rehabilitation will help in reducing the number of occupational falls by re-weighting the sensory cues, and by developing adaptative balance strategies that are responsible in maintaining balance and orientation in a particular occupational setting.

Keywords: Balance Control; Work place; Multi-sensory Interactions.

References

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