Virtual Reality Video Game for Vestibular Rehabilitation Therapy (VG-VRT)

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Project Budget:

$14,000

Abstract:

Over 30% of adults age 40 year or older, a population of more than 60 million people, report experiencing some form of inner ear (vestibular) related dizziness or vertigo. This incidence rises to 80% in people over the age of 65. Vestibular symptoms may be mild, lasting perhaps only seconds or minutes, or they may be severe, resulting in total disability with symptoms that room spinning (vertigo), a lightheaded, floating, or rocking sensation (dizziness), blurred vision, and/or nausea. While in many cases these conditions are time-limited, according to the National Institute on Deafness and Other Communication Disorders (NIDCD), 8 million American adults report a chronic problem with balance and an additional 2.4 million report a chronic problem with dizziness by itself.

A primary treatment for chronic vestibular disorders will often include a course of home-based vestibular rehabilitation therapy (VRT) designed to promote vestibular and balance system compensation, reducing symptoms and restoring more normal balance system function. While effective, the value of home-based VRT is limited due to issues associated with patient compliance and follow-through.

To be truly effective, VRT exercises should be done multiple times daily, over a period of several months. Since these exercises are designed to be repetitive challenges to vestibular and balance systems, patients will often stop doing them complaining that they are uncomfortable and monotonous (boring). Furthermore, as the patient is doing these exercises at home with no clinical supervision, it is difficult for the prescribing clinician to be sure that the exercises are being done correctly or with the appropriate level of follow-through.

The objective of this proposal is to design, develop, and test a virtual and augmented reality game-based form of physical therapy to address chronic symptoms associated with these disorders. Video game-based vestibular rehabilitation therapy (VG-VRT) will engage the patient in a set of virtual and augmented reality games that promote head and body movements similar to those included in traditional VRT while addressing some of the shortcomings common to traditional therapy.

As noted previously, VRT requires the patient to do a series of repetitive and symptom provoking movements of the head and body. As such, many patients find the exercises boring and uncomfortable and fail to fully complete a full course of treatment required to address their symptoms. The goal of VG-VRT is to address these issues by creating a more engaging and fun environment in which to do these exercises. Using commercially available virtual reality headsets and programming environments such as the Oculus Quest, games can be created that require the patient to follow moving targets with their eyes, head, and body. Gamifying this environment will help make the experience more interesting to the user with the use of scoring, choices of visual environments, and the use of encouraging voice and visual feedback.

Additionally, the VG-VRT approach allows for more a more customizable VRT exercise set that is controllable by the clinician to adjust for patient capability including complexity of the gamified tasks and level. As one final advantage, as the VG-VRT is internet connected, the clinician has access to patient data directly to evaluate patient compliance and performance and can use this information to help counsel and direct the patients progress towards recovery.

Project Budget Amount:	$14,000
Personnel:	$3,600
Travel:	$2,000
Equipment:	$5,000
Supplies/Materials:	$3,000
Postage/Printing:	$200
Other:	$200

Additional information to explain or expand on budgetary needs:

Funding is requested to provide summer support for students and support student conference travel. Equipment funds will support purchase of VR headsets, upgrades, and dedicated computer hardware and software for the project. A supply and materials line is to support items associated with running trials including cleaning supplies, replacement head straps and cabling, and small parts needed for anticipated system modifications that may be needed. Miscellaneous expenses are included in the postage/printing and other line. These are to cover incidentals primarily associated with project presentation and conference costs.