

Computer Augmented Rehabilitation Using Games and Virtual Reality Environments

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Considering that traditional training and exercises are often boring and repetitive, using computer games to augment physical and cognitive rehabilitation offers the potential for significant therapeutic benefit. Games are likely to engage a person's attention through the cognitive and motor activity required. Besides, most games challenge the player to achieve sustained success through progression to increasingly difficult levels. Another advantage is that games can be used to aid the management of pain by diverting the patient's attention.

The goal of our project is to develop innovative computer games and virtual reality environments and integrate them into physical and cognitive rehabilitation processes to deliver high quality care to the aging population and patients recovering from injuries, such as soldiers returning from the two wars. We focus on areas with the greatest needs, including balance training, gait training, strength training and portable/wireless telerehabilitation solutions. We are working with Biodex Medical Systems (www.biodex.com), a Long Island company that manufac-

tures, markets, and distributes products used in physical rehabilitation. According to Ed Behan, Director of Market Development for Biodex, the market opportunities in the areas of fall prevention, stroke and neurological rehabilitation, and treatment of traumatic injuries are significant and ready for new technologies. Another project partner is POW Studios (www.powstudios.com), which is a game development start-up cofounded by a Stony Brook student entrepreneur.

Although development of computer augmented rehabilitation is still in early stages and used mostly in research settings at the moment, this may change very quickly, partly because of the huge success of the Nintendo Wii. Some therapists have been using the Wii in so-called "Wiihabilitation" programs. Our goal isn't to compete against Nintendo in sports/exercise games. Our computer game and virtual reality-based solutions will be integrated into Biodex's existing rehabilitation systems and provide rich rehabilitation strategies, protocols and applications. Unlike the Wii which is more appropriate for home-

based exercises and entertainment, the Biodex systems are more specialized and will be positioned as diagnosis and treatment tools used by physical therapists and other care givers in clinical settings.

The balance game pilot project, which is being carried out by a team of undergraduate and graduate students, is the first step to leverage the R&D resources at Stony Brook and CEWIT and the experience in technology transfer and commercialization to assist and expedite the development of next generation rehabilitation systems. These games are designed to engage the patients using the Biodex Balance System in an enjoyable and interactive experience. Three game concepts, catch, skier and racer, are currently being developed.



The objective is to create fully functional game applications that incorporate the implementation of all the stability elements and facilitate real-time, customized analysis of patient condition. We will work closely with clinicians and physical therapists at Stony Brook University's School of Health Technology and Management to assess and enhance the effectiveness of these rehabilitation

game applications. In the future, we plan to develop various competition-type training programs to increase the motivation and further engage patients in the interactive rehabilitation process. We also plan to enhance these game applications by adding decision support functions to assist clinical evaluation and facilitate evidence-based therapeutic treatments.