

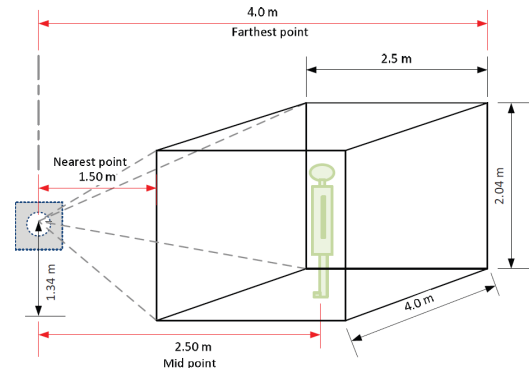
## Using Virtual Reality to Help Persons Walk Post Stroke



**Judy Deutsch**, PT, PhD, FAPTA is a Professor and Director of the Rutgers Research in Virtual Environments & Rehabilitation Sciences (RIVER) Lab. Her research focus is on the development and testing of virtual reality and interactive video games for rehabilitation of mobility and fitness in individuals with neurologic conditions. Judy is also a licensed physical therapist and a Fellow of the American Physical Therapy Association.

**Rutgers co-inventor:** Robb Gosine, Harish Damodaran

**Intellectual Property Status:** PCT application #PCT/US16/49695



**Innovation Summary:** Virtual reality has been used successfully for rehabilitation of balance and mobility, but traditional systems are large and expensive, making them impractical for clinic as well as home use. Rutgers University researchers have developed a low cost and scalable solution for bringing virtual reality rehabilitation into the clinics as well as homes of patients. The VSTEP system can run on a traditional Windows laptop or desktop computer and utilizes the body motion detection capabilities of the Microsoft Kinect® device.

The developers of this system have created software sub-routines that allows precise tracking of foot leveraging the capability of the Kinect®. Further they are developing the HR sensing capabilities. These two features make it possible to design virtual reality games that incorporate specific real-world movements into game play as well as allow for fitness training. The first of these games is a stepping game that uses simple stepping actions that increase in stepping speed and complexity as the user's physical capability improves.

### **Advantages:**

- The VSTEP system allows for both testing and training
- The adaptive algorithm allows for customization of the game play for different abilities.
- Patients can complete physical therapy appointments directly from their home
- Data collected from each virtual appointment can be shared with doctors and therapists to direct future treatment
- The therapeutic platform has been developed for use with a readily available home gaming system (Microsoft Kinect motion sensor and camera) allowing it to be easily scaled for every home of someone undergoing rehabilitation

**Market Applications:** The system and games were developed to be used at home by patients needing physical therapy. In its current model, a therapist will first work with the patient and the game in person. Once convertible, the sessions can be moved entirely virtual with the therapist monitoring the patient during game play and adjust the game to meet the needs of the patient. Data collected from the game can be shared with physicians and other therapists to help direct future care. It is anticipated that this device along with the virtual sessions with a therapist will be covered or reimbursed by health insurance.

### **Potential Social and Economic Impact:**

- More than 700,000 people suffer a stroke each year, and approximately two-thirds of these individuals survive and require rehabilitation.
- Stroke costs the nation \$34 billion annually, including the cost of health care services, medications, and lost productivity.
- The average cost of yearly rehabilitation service utilization was \$11,689 per patient for a 1-year period after discharge
- Will allow great access to rehabilitation therapy for those living in rural areas and for those who have difficulty leaving their homes to travel to therapy
- The physical therapy rehabilitation industry is estimated to generate revenues of \$29.5 billion each year in the US alone

### **Next R&D Steps:**

- Develop additional virtual reality scenarios/games
- Optimize the algorithm
- Conduct patient trials to confirm efficacy of the system and file for 510(K) clearance with the FDA
- Package the software into a commercial ready product