www.clemson.edu/computing

www.musc.edu

What is Duck Duck Punch?

- Duck Duck Punch is a low-cost, post-stroke upper extremity rehabilitation game system using the Microsoft Kinect for upper extremity (upper arm) therapy, designed in collaboration with stroke therapy experts.
- Stroke survivors play the game by making reaching motions with their impaired arm which is tracked by the Microsoft Kinect and mimicked by the virtual arm seen in the game.
- The system compensates for each patient's individual level of impairment to allow both unimpaired gameplay and different levels of challenge.

The Problem: Stroke Disability

- Worldwide, stroke is the **second leading cause of permanent disability.**
- **75%** of stroke survivors have arm disability too severe to be helped by conventional rehabilitation.
- Those who can participate in therapy often do not follow through and do not complete tasks they find **frustrating** and **tedious.**

What Stroke Rehabilitation Looks Like Today

- Today, rehabilitation for upper extremity impairment is repetitive practice of reaching and grasping tasks to stimulate the brain to "relearn" motor skills.
- Research suggests that stroke survivors need to make **300-1000** movements **daily** to recover movement, but only receive **20-40** per **week** in conventional rehabilitation**.**
- Rehabilitation does not include promising research called "mirror therapy".

How Duck Duck Punch Can Help

- Motivating game environment encourages extended practice sessions needed for better recovery.
- No expensive motion-capture hardware for arm tracking or attached sensors to encumber already impaired movement.
- Incorporates promising "mirror therapy" research not found in conventional rehabilitation.

Clemson University is a top 25 public university in the United States. The School of Computing combines a strong computer science core with a vision to integrate computation with the arts, sciences and engineering. The School has three divisions: Computer Science, Visual Computing and Human-Centered Computing. Seven degree programs are available in computer science (B.S., B.A., M.S., Ph.D.), computer information systems (B.S.), digital production arts (M.F.A) and human-centered computing (Ph.D.). **www.clemson.edu/computing**

Patrick Dukes	Austen Hayes	Dr. Larry F. Hodges
Ph.D. Student	Ph.D. Student	Director, School of Computing
psdukes@clemson.edu	ahayes@clemson.edu	LFH@clemson.edu
patrickdukes.weebly.com	www.austenhayes.net	www.clemson.edu/~lfh

DUCK DUCK PUNCH!

Post-Stroke Upper Extremity Rehabilitation Using the Microsoft Kinect

Score 320   Reach #6

60

Reach to the target

Stroke Survivor

Microsoft Kinect For Upper Extremity Movement Tracking

KINECT

Play longer to unlock achievements!

"Seascape"

"Wild West"

"Ducks in Space"

75   40
65   40
100   15
90   15

75   40
65   40
75   40
55   30
80   15