Electrical & Computer Engineering

S E M I N A R

Louisiana State University

Increasing the Efficacy of Rehabilitation Protocols via a Robotic Therapy Agent

LaVonda N. Brown

Georgia Institute of Technology

Abstract—For individuals with a motor skill disorder, repetition of recommended therapy exercises is essential for motor improvement. Moreover, external feedback of performance is an important component of therapy such that individuals can correct their exercises and improve their performance. However, direct feedback is typically only provided by an expert therapist during weekly or monthly therapy sessions, which limits improvement on a daily basis. In order to promote the repetition of recommended exercises in a home setting, several serious games have been developed to promote compliance with therapy interventions. To advance this work, we have developed a novel framework to couple serious games with a robot playmate that provides various feedback during interaction. The playmate continuously tracks the user's kinematic performance and autonomously provides objective verbal and nonverbal cues in order to increase the efficacy of the intervention. To determine how various instruction, motivation, and correction cues affect an individual's kinematic performance, we have tested the complete system with 59 able-bodied adults. We conclude that the developed system is able to provide a combination of feedback (motivation, instruction, correction) throughout the therapy session that enabled 100% of individuals to reach their performance goals.

Bio—Dr. Brown is a recent (Dec. 2015) graduate of Georgia Institute of Technology in Atlanta, GA where she received her Ph.D. in Electrical Engineering with a focus in Robotics. Dr. Brown also received her Master's in Electrical Engineering from Georgia Tech in 2012 and her Bachelor's in Electronics Engineering from Norfolk State University in Norfolk, VA in 2010. While at Georgia Tech, Dr. Brown was the recipient of the NSF Graduate Research Fellowship, the Presidential Fellowship, and the Texas Instrument Fellowship. Her research has been published in the proceedings of IEEE International Conference of Systems, Man, and Cybernetics, IEEE Integrated STEM Education Conference, IEEE-RAS International Conference on Humanoid Robots, IEEE Symposium on Robot and Human Interactive Communication, and the ASEE Annual Conference. As a product of her work, Dr. Brown has received two best paper awards and a paper invitation to the ASEE Computers in Education Journal. Dr. Brown currently resides in Atlanta, GA where she is assisting Emory University in their Alzheimer's Disease Research Center as a research scientist.

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