Joint Department of

BIOMEDICAL ENGINEERING

UNC CHAPEL HILL | NC STATE UNIVERSITY

Coulter Seminar Series Presents

Rehabilitation Engineering

Supporting and Facilitating Social Interaction through Human-Machine Interaction in Children with Autism and Older Adults with Cognitive Impairment

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Nilanjan Sarkar is the David K. Wilson Chair of Engineering and Professor and the Chair of Mechanical Engineering Department at Vanderbilt University. Dr. Sarkar received his Ph.D. from the University of Pennsylvania in the field of robotics. Dr. Sarkar's research interests lie in developing new generations of robots and computer-based intelligent systems that are able to interact with people in a smooth and natural way by sensing human emotions from various implicit signals and cues such as one's physiology, gestures, and facial expressions and integrating them in task design. The applications of this research range from helping individuals with autism, schizophrenia, and dementia in learning new skills and interaction, to aiding stroke patients regaining some of their movement abilities through robot-assisted rehabilitation, and to providing more autonomy in robots for a variety of tasks. His research has been supported by NSF, NIH, DARPA, NASA, ONR, ARO and various foundations. Dr. Sarkar is a Fellow of the ASME.

ABSTRACT

Social interaction influences both mental and physical health. Lack of desired social interaction may negatively impact daily life and contribute to stress, loneliness, anxiety, and depression. Providing social interaction opportunities and skill training using human experts can be expensive and time consuming. In this seminar, I will discuss how intelligent human-machine systems can facilitate social interaction through carefully designed human-machine interaction and sensing. This presentation will cover applications in two populations where improving social interaction can have lasting impact: children with autism spectrum disorder (ASD) and older adults with cognitive impairment. I will first present our collaborative virtual reality (CVR)-based systems where two children with ASD could collaborate towards a common goal and in the process, were able to communicate and interact socially through the support of embedded interaction strategies and measurements. I will then present a robotic system that we have integrated with a virtual reality environment to foster social interaction in older adults with cognitive impairment, many of whom experience apathy. The presentation will discuss the potential for such human-machine interaction systems that can individualize interaction and quantitatively measure relevant social interaction parameters.

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