BIOMEDICAL ENGINEERING
Carnegie Mellon University

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Posner Hall A35

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Enhancing Acquisition and Performance of Complex Motor Skills

Abstract: Understanding how human learn and perform motor skills is not only important for developing theoretically-based interventions for physical assistance and rehabilitation, but also for improving human-robot interaction and advancing robot capabilities. Most of what we understand about human motor skill acquisition, however, stems from assessing performance on tasks that lack the complexity of real-world tasks. This talk presents a methodological approach to study the acquisition of novel and richer skills that capture coordination challenges inherent to everyday motor skills, such as managing task redundancy and physical interaction. Through the use of mathematical modeling and virtual technologies, this approach allows one to accurately examine the control and acquisition of complex skills in a controlled manner, without sacrificing task complexity. Analysis of a discrete throwing skill and a rhythmic ball bouncing skill exemplify how this approach was used to understand, and even enhance, novel skill acquisition and retention. An extension of this method to understand what perceptual information humans use to understand and learn from observing the motor behavior of others is also described. Ultimately, this research serves to both advance our fundamental understanding of human neuromotor control and provide novel insights to improve how intelligent systems guide, assess, and learn from human motor behavior.