



Department of Biomedical Engineering
Graduate Seminar



Dr. Yujiang Xiang, Ph.D

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Subject: Developments of Human Motion Prediction and Its Applications in Biomechanics

Abstract:

Simulation-based method is a noninvasive approach to study movement biomechanics using human biomechanical models. Many simulation-based methods use experimental data to study movement biomechanics, i.e., data-driven models. In contrast, predictive modeling approach predicts movement biomechanics based on task parameters and anthropometric data. Experimental data are only used for model validation. This prominent feature makes it a suitable tool to predict injury risks and explore novel locomotion. Predictive modeling is essentially an optimal control method applied in biomechanical system. This seminar will present recent developments of human motion prediction and its applications in four aspects:

- (1) A novel inverse musculoskeletal dynamic optimization method for predictive modeling.
- (2) Dynamic joint strength based maximum weight-lifting prediction.
- (3) The real-time simulation of human-robot collaborative lifting.
- (4) Recursive Newton-Euler dynamics and sensitivity analysis for dynamic motion prediction.

Bio:

Dr. Yujiang (Mike) Xiang is currently an assistant professor in the Department of Mechanical and Aerospace Engineering at Oklahoma State University. He received his B.S. and M.S. degrees in Automotive Engineering at Tsinghua University, China. In 2008, he received his Ph.D. at the University of Iowa. His current research interests include human dynamics and control, human motion prediction, musculoskeletal modeling, and human robot collaboration.

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