The Department of Mechanical Engineering/College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar

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Lecture Title: Estimation, Sensing and Control of Tire/Road Interactions

Friday, February 18, 2PM, Room 173 Light Engineering

Abstract

Pneumatic tires and rubber wheels are critical components in mobile systems such as vehicles and ground robots that are widely used for passenger and goods transportation. The tire/road interactions in these systems play an extremely important role for not only system design but also safe operation. In this talk, I will first present two different modeling schemes for on-line estimation of the tire/road friction coefficient and braking control for automated vehicles. I will then present the development of a tire rubber deformation sensing system for enhancing real-time tire/road friction estimation. An analytical sensing output model that is used to capture the tire/road friction characteristics will be presented. The preliminary testing data has showed the feasibility of the estimate of wheel/ground interactions such as tire friction coefficient. I will further discuss how to use the developed tire model to understand stability and agility of professional racing car driving skills and design human-inspired autonomous aggressive maneuvers for active vehicle safety control.

Biography

Professor Jingang Yi received the B.S. degree in electrical engineering from Zhejiang University, China in 1993, the M.Eng. degree in precision instruments from Tsinghua University, China in 1996, the M.A. degree in mathematics, and the Ph.D. degree in mechanical engineering from the University of California, Berkeley, in 2001 and 2002, respectively. Dr. Yi is currently an Assistant Professor in mechanical engineering at Rutgers University. His research interests include autonomous robotic systems, dynamic systems and control, automation science and engineering, with applications to biomedical systems, civil infrastructural and transportation systems. Dr. Yi is a member of American Society of Mechanical Engineers (ASME) and a senior member of the IEEE. He is a recipient of the 2010 US National Science Foundation Faculty Early Career Development (CAREER) Award. He currently serves as an Associate Editor of the ASME Dynamic Systems and Control Division and the IEEE Robotics and Automation Society Conference Editorial Boards. He also served as a Guest Editor of IEEE Transactions on Automation Science and Engineering.

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Refreshments will be served