12/3 (Monday) **Noon – 1:00 pm** **Silleck Lounge**

Fall control of humanoid robots

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Keen interest in humanoid robot balance research sometimes makes us overlook the consequences of a balance failure. Although fall appears to be a rare event in the life of a humanoid robot, its occurrence is virtually unavoidable, and its consequences can be disastrous. A major reason that humanoid robots are not allowed to move freely in human environments is the concern of self-damage and injury that can be unintentionally caused by a falling robot.

A falling robot is an underactuated system that rapidly gains speed under gravity. The time to act is very short. How can one intervene? In this respect, we will describe our ongoing work on humanoid robot fall strategy which tries to modify the robot's fall direction in order to avoid hitting a person or an object in the vicinity. Our approach is based on intelligent foot placement as well as a method called "inertia shaping" which is aimed at controlling the centroidal inertia of the robot. We demonstrate our results through the simulation and hardware experiments.

Biosketch

Ambarish Goswami has been with Honda Research Institute in California, USA, for the past ten years, where he is currently a Principal Scientist. His field is dynamics and control, and his main research is in the application areas of humanoid robots, assistive exoskeletons and vehicles. He received the Bachelor's degree from Jadavpur University, Kolkata, India, the Master's degree from Drexel University, Philadelphia, PA, and the Ph.D. degree from Northwestern University, Evanston, IL, all in Mechanical Engineering.

Ambarish Goswami's Ph.D. work, under Prof. Michael Peshkin, was in the area of automated assembly and robot-assisted surgery. For four years following his graduation he worked at the INRIA Laboratory in Grenoble, France, as a member of the permanent scientific staff (Charge de Recherche). He became interested in human walking and in biomechanics while working on "BIP," the first anthropomorphic biped robot in France. This interest in gait study subsequently brought him to Prof. Norm Badler's Center for Human Modeling and Simulation at the University of Pennsylvania, Philadelphia, as an IRCS Fellow, and a three year position as a core animation software developer for 3D Studio Max at Autodesk. Ambarish has held visiting researcher positions at the Ohio State University and the University of Illinois at Urbana-Champaign for short periods. Ambarish has more than 70 publications with a total of more than 3000 Google Scholar citations; he has eight granted patents and several pending patents.

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