

Mechanical Engineering Fall 2007 Seminar

Wednesday, September 19, 2007

1:00 PM – 2:25PM

ROOM: 224 MEC

“Parallel Kinematics Machines, Contactless Drives, and Gait Generation Devices”

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Dr. Zhiming Ji is an associate professor in the department of mechanical engineering at the New Jersey Institute of Technology. He obtained his B.S. from Northeast University in China, M.S. from Southeast University in China; and Ph.D. from Stanford University in California, all in mechanical engineering. His areas of interest include: machine design, robotics, and biomechanical systems. He has authored more than 60 technical publications and 3 patents.

ABSTRACT

Parallel Kinematics Machines (aka parallel robots) constitute two or more independent kinematics chains between the base and the platform where the end-effector is located. Their closed-loop structure makes them inherently stronger than serial robots and potentially more precise and faster, but also make them to have more limited workspace and complicated kinematics for motion control. Their applications include motion simulators and machine tools.

A contactless drive system is a magnetic nut/leadscrew and air bearing assembly that operates on the principle of magnetic coupling and aerodynamic suspension to position a load with high accuracy. Magnetic coupling make it possible to have finer pitch threads and can lead to better precision for motion control.

For therapy related to the re-acquisition of natural gait patterns and lower limb motor function, gait training with body weight support has been used to improve ambulation in patients with spinal cord injury and paraplegic patients with little or no muscle activation. Robotic gait training systems provide paraplegic patients with consistent, labor-saving, and adjustable physical therapy over traditional manual trainings.

This talk reviews our research activities in these areas.

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