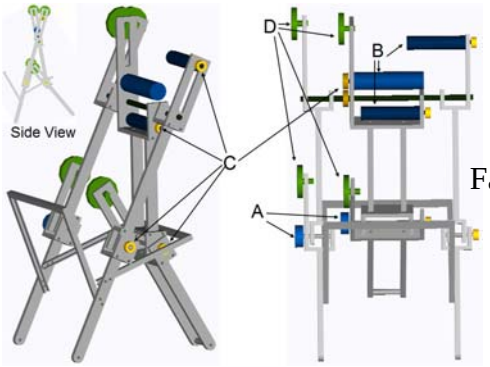
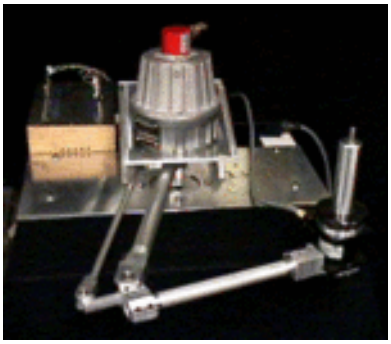
MECHANICS COLLOQUIUM



Tuesday, June 12, 2007
12:45-13:30 h.
Delft University of Technology
Faculty of Mechanical Engineering
Mekelweg 2, Delft
Room J



Differentially Flat Design of Bipeds and Under-Actuated Robots

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Abstract – Trajectory planning and control of bipeds and other autonomous machines to traverse between desired end points is an important engineering problem. A fully actuated robot can execute any joint trajectory within its configuration space. However, under-actuated robots such as bipeds or wheeled robots, with non-holonomic behavior, may be severely restricted in their ability to perform motions. This talk will exploit the underlying structure of the governing dynamics, and through possible alteration of inertia distribution in the system, establish properties such as "feedback linearizability" and "differential flatness". Once these properties are established, trajectory planning and tracking can be solved in a simplified manner. This approach will be demonstrated through a number of examples, including under-actuated arms, bipedal robots, mobile robots, and space robots.

About the speaker - Sunil K. Agrawal received a Ph.D. degree in Mechanical Engineering from Stanford University in 1990. He is currently a Professor of Mechanical Engineering at University of Delaware and is the Director of Mechanical Systems Laboratory. He has published close to 250 journal and conference papers and 2 books in the areas of controlled mechanical systems, dynamic optimization, and robotics. Dr. Agrawal's honors include a *Presidential Faculty Fellowship* from the *White House*, a *Bessel Prize* from Alexander von Humboldt Foundation in Germany, *a Fellow of the ASME*, a Humboldt U.S. Senior Scientist Award, and an *ASME Distinguished Lecturer*. (agrawal@udel.edu and http://mechsys4.me.udel.edu) Local host: Arend L. Schwab.