Gustavo Stefanini
ADVANCED ROBOTICS RESEARCH CENTER

A research lab of the Scuola Superiore Sant'Anna

Distinguished lectures series in Field Robotics

APRIL 26,28 2010

Prof. Dr.
Steven Dubowsky

Dr. Dubowsky is a Professor of Mechanical Engineering at the Massachusetts Institute of Technology, Cambridge, Massachusetts. He is currently the director of the Mechanical Engineering Field and Space Robotics Laboratory. Dr. Dubowsky has been the Head of the Systems and Design Division of the Mechanical Engineering Department and Associate Head of the M.I.T. Interdepartmental Laboratory for Manufacturing and Productivity.
Dr. Dubowsky is a Fellow of the ASME and the IEEE. He has been also elected to the Sigma Xi, the National Scientific Honorary Society, and Tau Beta Pi, the National Engineering Honorary Society. Dr. Dubowsky has been elected as a Distinguished NATO Fellow (Paris France) and an Honorary Senior Research Fellow by the United Kingdom Scientific and Engineering Research Council. Dr. Dubowsky is the Principal Investigator of a number of research programs sponsored by governmental agencies and industry in the area of the design and control of mechanical and electromechanical systems, including robotic systems. Dr. Dubowsky has published over 100 papers professional journals and conference proceedings. He has also been an advisor to the National Science Foundation, the National Academy of Science/Engineering, the Department of Energy, and the U.S. Army. He also serves as an engineering consultant to various industrial companies and governmental agencies and laboratories.

Schedule of Events

The challenges of the control of high speed rough terrain unmanned robotic vehicles

26 April 2010, h 15:00 - 18.00
Gustavo Stefanini Center, Conference Room
La Spezia

In recent years, substantial progress has been made in the research of unmanned robotic vehicles in rough terrains. For the past 15 years, the students and staff of the FSRL have been studying the planning and control of high-speed autonomous unmanned vehicles with support of NASA and the US Department of Defense. Initially, this work focused on autonomous vehicles moving slowly **through highly unstructured environments, such as Mars** Exploration Rovers. Algorithms were developed in which rovers would use understanding of its mechanics to proprioceptively estimate the shape and properties of the terrain. This type of sensing permits the vehicles to optimize their mobility and prevent entrapment. These results are then combined with long-distance vision to "project" the terrain knowledge into the far field.

Fundamentals of Digital Mechatronics: A New Robotics Design Paradigm with example Applications: Mars Walking explorers to Surgical Robots.

28 April 2010, h 10:00 - 13.00
Scuola Superiore Sant'Anna
Pisa

Digital mechatronic devices approximate the motion of continuous mechanisms by using larger numbers of binary degrees-of-freedom. Digital mechatronic devices have excellent repeatability, are reliable, robust and simple to control. Muscle actuators made of elastomers, have limitations, however they are well suited for digital mechatronic devices. These **actuators have unique properties such as they can** produce large displacements with substantial forces. Furthermore, they are light and inexpensive. In the work presented here, digital mechatronic systems were first considered for planetary exploration walking robots. This study has led to the development of surgical robots that can function effectively inside of MRI systems with important medical benefits.

For further information about the lectures contact :

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