Institute of Advanced Study

University of Bologna

IN COLLABORATION WITH

DIPARTIMENTO DI ELETTRONICA, INFORMATICA E SISTEMISTICA

COLLEGIO SUPERIORE ALMA MATER STUDIORUM DI BOLOGNA

INSTITUTE LECTURE

CATERINE BIDARD

Research engineer at Robotic Architectures and Prototypes

Laboratory CEA/LIST Fontenay-aux-roses, France and ISA Guest

"A DESIGN METHOD FOR SMART COMPLIANT STRUCTURES"

Friday, July 23rd 2004, 11.00 a.m.

C.A.S.Y. - Center on Complex Automated Systems "Giuseppe Evangelisti"
Via Pepoli 3/2 - Bologna

ABSTRACT AND BRIEF CURRICULUM VITAE

The talk, "A DESIGN METHOD FOR SMART COMPLIANT STRUCTURES" will first give an overview on robotics activity at CEA laboratory which main activities started from telerobotics. Then the current work on design methods for smart compliant structures will be presented. The developments in MEMS (Micro Electronics and Mechanical Systems) for the manipulation in 3D space of micro-objects or smart miniaturized surgical tools motivate the research in compliant mechanisms design method. A compliant mechanism is a single-piece, flexible structure that delivers the desired motion and force by undergoing elastic deformation as opposed to rigid-body mechanisms. Compliant mechanisms eliminate backlash, friction, wear and effectively reduce the production and maintenance cost associated with the multiple piece assembly. This work focuses on the conceptual design method of compliant mechanisms. A new method is proposed, based on the optimization of the distribution of compliant building blocks within a given design domain. A case study on the re-design of a polysilicon microgripper will be presented.

Catherine BIDARD, is research engineer at Robotic Architectures and Prototypes Laboratory CEA/LIST Fontenay-aux-roses, France

Previous experiences
1991-2004 research engineer at CEA in robotics laboratory
Nov. 1999-July 2000: sabbatical at biomedical Biomedical Signal and Systems, university of Twente, working on "trunk stabilization and supports for handicapped persons"
1986: Master in Mechanical Engineering (D.E.A) of Lyon University
1994: PhD in Mechanical Engineering of Lyon University on the subject: "screw-vector bond graph for modelling and kinestatic analysis of mechanisms"

Main past projects
bond graph based modelling software development, kinematic design and test of wrist with semi-parallel structure, design and control of a 7 dof electric arm for telemanipulation, identification and force control of electric and hydraulic actuated joints
co-advisor of PhD thesis on the subjects: workspace analysis of redundant manipulators: singularities and parcourability (Delmas 1996), master arm design for telemanipulation (Gosselin 2000), design and optimization methods for smart compliant structures (Bernardoni, end 2004)
current projects and research interests: geometric calibration of high reach robots taking into account flexibilities, dynamic identification of slave-robots for monitoring and collision detection purposes, kinematics in design and control of parallel and semi-parallel robots, design of compliant structures