WORLD AUTOMATION CONGRESS

Robotics Track

KEYNOTE Mon-3

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Chair: Donald Cox

University of Northern Florida, USA

1100-1200

Open Architecture Intelligent Mechanical System

by

Delbert Tesar and Chetan Kapoor

University of Texas - Austin, USA

ABSTRACT

The emphasis here is to build on the past breadth of applications for the discipline of mechanical engineering, develop a completely modern science base for intelligent machines (assembled on demand) in order to create a new wave of technology building on the success of the last wave associated with computers (see chart below). This wave will have a greater impact than that provided by computers over the past 40 years by modernizing all our basic systems (aircraft, ships, manufacturing and construction equipment, automobiles, household appliances, etc.) moving into the field of robotics, reducing human drudgery, and enhancing the relationship between man and machine. This new wave will be made of two major components. The hardware component is actuators (just as the computer chip is for computers – Intel Corp.) and the software component operates all machines made up of these actuators (just as Microsoft's Windows runs all P.C.'s). Actuators drive anything that moves on cars, airplanes, ships, manufacturing systems, space systems, human orthotics, prostheses, etc. It is more important than computer chips in the future economy. The system software is universal; it provides for maximum performance (norms and envelopes prioritized by the human operator), condition based maintenance for timely repair (plug-and-play actuator replacement), and fault tolerance (on-line recovery from a fault to prevent loss of life or large economic-loss).

ABOUT THE SPEAKERS:

Delbert Tesar is Carol Cockrell Curran Chair in Engineering at the University of Texas at Austin, 1985 – present. He was the Founder and Director, Center for Intelligent Machines and Robotics, University of Florida, 1978 - 1985. Presently, he is the Director of The University of Texas Robotics Research Group funded at $2.5ML/year, involving 28 graduate students, a staff of seven, and a $3.5 ML laboratory in 16,000 sq. ft. of space at the J.J. Pickle Research Campus. Multiple test beds are used to evaluate the activity in 35 research topics in robotics covering all aspects of the design, operation and integration of these systems for applications in space, manufacturing, nuclear facilities operations, microsurgery, manufacturing cells, etc. He is a Member, Air Force Review Committee for the MANTECH Program, 1980; Member, Air Force Science Advisory Board, 1982 - 1986; Member, Air Force Studies Board panel, 1988; Member of three national review panels on robotics (NBS, AF, NASA), 1988 - 1991. He is a member of Standing review committee of the National Research Council on the Space Station (1992-95). He is a Member of National Research Council Committee for Long-Term Research Needs for Deactivation and Decommissioning at Department of Energy Sites, 2000. His research interests are machine systems; the creation and analysis of mechanical devices, including the robotic manipulator; interactive design; manufacturing and logistics. Pursued research in the machine system field for 45 years. Developed six unique undergraduate and graduate courses. Recently began a concentration on ten classes of intelligent actuators and their evaluation in 4 test-beds. He has 90 position papers; 215 Journal Publications; 227 major reports, advised 129 M.S. and 53 Ph.D. dissertations; and 502 invited lectures.

Chetan Kapoor received B.E., M.S. and Ph.D. degrees in Mechanical Engineering from Punjab University, India, in 1990, University of Alabama, Tuscaloosa in 1992, and the University of Texas at Austin in 1996, respectively. Since then, he has worked at National Instruments and from fall 1997 he has been with the University of Texas as Austin as the Chief Scientist of the Robotics Research Group. His research interests include software architecture and frameworks for intelligent robotics, software engineering for mechanical systems, kinematics, motion analysis, and obstacle avoidance for manipulators, and 3D simulation of mechanical systems. In recent years, he has also applied his expertise to the application of industrial robotics technology to medical use.