STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

Thursday April 10, 2008
Carnegie Room 315, Time: NOON

Design, DTFM Modeling and Analysis of Piezoelectric Forceps Actuator

Ken Susanto
Postdoctoral Fellow
Dynamic Systems Lab, University of Southern California

This seminar talks about the design, DTFM (Distributed Transfer Function Method) modeling and analysis of Piezoelectric Forceps Actuator (PFA) with potential applications in minimum invasive surgery (MIS) and miniature robotic grippers in biomedical and semiconductor manufacturing. The major improvement over existing conventional surgical tools and robotic grippers is that the PFA is simple in design, and is a small size, light-weight gripper with no moving parts such as gears, hinges, racks and pinions, and thus avoids problems in operation like friction, backlash, lubrication, leakage and sterilization. Furthermore, the user's index finger and the thumb bending movements can remotely control the PFA via a data glove. The first part of the talk will deal with the generic piezoelectric slightly curved beams based model of the PFA. Next, the DTFM is extended to carry out the transfer function formulation of the PFA model. This method will be used to solve for the radial displacement and natural frequencies of the PFA in exact and closed form solution. Finally, this talk will briefly discuss about future research directions and possible applications.

Dr. Ken Susanto is a Postdoctoral Fellow at the University of Southern California. He received the B.Sc. degree in mathematics and applied sciences from UCLA, in 1995, M.Sc. degrees in mechanical engineering and electrical engineering from WCULA and USC, respectively in 1996 and 1999, and the Ph.D. degree in mechanical engineering from USC in 2007. He previously worked as a mechanical design engineer at Allied Signal (currently Honeywell). He was the recipient of NAFSA & U.S. Information Agency Scholarship Award in 1998, best technical paper award from IEEE Bio-tech Application Contest in 2002 and innovative design awards from ANSYS, inc. and Design News Award in 2003. His current research interests include medical robotics, smart actuators and sensors, mechatronics, modeling structural dynamic systems of MEMS and nanotechnology, and vibration and control systems.

For more information, please contact Prof. Frank Fisher at Frank.Fisher@stevens.edu or 201-216-8913