

IFTToMM Japan Council Special Seminar
IRT Control System Seminar

- Date:** July 22nd, 2009 16:00-17:00
Place: Room 31A, 3rd Floor, Engineering 2, Hongo Campus
University of Tokyo, <http://www.ynl.t.u-tokyo.ac.jp/location/index.php#map>
- Title:** Personalized Mechatronics Systems: From Motion Capture (MOCAP) to Motion Replication (MOREP)
- Speaker:** Professor I-Ming Chen
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- Host:** Professor Yoshihiko Nakamura, nakamura@ynl.t.u-tokyo.ac.jp

Abstract: The human body motion is a very important mean of expressing a person's emotion, knowledge and experience, as well as an effective communication tool in inter-personal interaction in our real life. Thus, capturing, identifying and processing human movements in digital manner become a very important research topic in a highly connected information world. Human body motion has a uniform underlying structure of articulated multi-degree of freedom rigid bodies but contains infinite variety from individual to individual. Current development in the motion sensing technology enables 3D body motion of a real human to be captured, processed, and rendered in digital form for computer animation, biomedical, entertainment, and sports applications. The most prominent devices are camera-based motion capture systems, like VICON, Qualisys, etc. However, such motion sensing technology allows only one-way interaction from the physical space to the virtual space. It lacks the spirit of spontaneous and intuitive interaction between the real and virtual entities. In this lecture, we will present a series of works embarking on novel wearable sensors, actuator-arrays, flexible haptic devices toward personalized mechatronics systems for duplicating human body movements in physical and digital spaces with high fidelity. Notably, our new invention for body joint angle detection as well as body motion capture, Optical Linear Encoder (OLE), high performance low-cost SmartGlove based on Multi-point OLE principle, and Vibro-tactile with inertia measurement unit (VIMU) will be introduced and demonstrated. Our R&D goal is to develop high fidelity body motion replication between the digital and physical spaces as a core technology for applications involving the usage of human body motion, like entertainment, medicine rehabilitation, sports engineering, etc. With the software and hardware prototype, we wish to facilitate human motion processing as a consumer level technology and not limited to studio or lab type of technology.

Speaker: Dr. Chen received the B. S. degree from National Taiwan University in 1986, and M. S. and Ph. D. degrees from California Institute of Technology, Pasadena, CA in 1989 and 1994 respectively. He has been with the School of Mechanical and Aerospace Engineering of Nanyang Technological University (NTU) in Singapore since 1995. He is currently Director of Intelligent Systems Center in NTU, a partnership between Singapore Technology Engineering Ltd. and NTU. He was JSPS Visiting Scholar in Kyoto University, Japan in 1999, Visiting Scholar in the Department of Mechanical Engineering of MIT in 2004, and Fellow of Singapore-MIT Alliance under Manufacturing Systems and Technology (MST) Program from 2003 to 2007. He was also Adjunct Professor of Xian Jiao Tong University, China from 2002 to 2007. His research interests are in wearable sensors, human-robot interaction, reconfigurable automation, parallel kinematics machines (PKM), biomorphic underwater robots, and smart material based actuators. Dr. Chen has published more than 190 papers in refereed international journals and conferences as well as book chapters. He is now serving on the editorial boards of IEEE Transactions on Robotics, IEEE/ASME Transactions on Mechatronics, Mechanism and Machine Theory, and Robotica, and also Associate Editor-in-Chief of Frontier of Mechanical Engineering (Springer-Verlag). He was General Chairman of 2006 IEEE Conferences on Cybernetics, Intelligent Systems, and Robotics (CIS-RAM) in Thailand, and General Chairman of 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM2009) in Singapore. He is a senior member of IEEE and member of ASME, and member of RoboCup Singapore National Committee.