
台灣大學應用力學研究所
演 講 公 告

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講 題：Real-time Motion Tracking of Microscopic Particles

主 持 人：陳建甫副教授

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☆☆ 歡迎聽講，敬請張貼 ☆☆

Real-time Motion Tracking of Microscopic Particles

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Abstract: This talk discusses using off-focus microscope images to render real-time 3-dimensional motion tracking of microscopic particles, including polystyrene beads, superparamagnetic beads, and fluorescent beads, in aqueous solution. It covers four topics: 1) mathematical derivation and automated calibration of off-focus image models; 2) development and realization of real-time computational algorithms enabling high-speed 3-dimensional particle tracking with sub-nanometer resolution; 3) theoretical analysis and prediction of measurement resolution; and 4) calibration and compensation of measurement bias. A real-time visual tracking system, which is reconfigurable and readily to be integrated with various systems to enable real-time control, is then introduced. Its application to enabling rapid steering of optically/magnetically propelled probing systems is discussed, wherein two objectives are emphasized. First, real-time estimation of the 3-D position matches the maximum frame rate of the camera. Second, timing of the output data stream of the system is precisely controlled.

Bio: Dr. Chia-Hsiang Menq received the B.S. degree from National Tsing-Hua University, Hsinchu, Taiwan, in 1978 and the M.S. and Ph.D. degrees from Carnegie Mellon University, Pittsburgh, PA, in 1982 and 1985, respectively, all in mechanical engineering. Since 1985, he has been with the Ohio State University, Columbus, where he is currently the holder of Ralph W. Kurtz Endowed Chair in Mechanical Engineering. Dr. Menq was selected as a 1989 NSF Presidential Young Investigator, awarded by the National Science Foundation of the United States Federal Government. In recognition of his very significant contributions to the College of Engineering at the Ohio State University, he received the 2003 Clara M. and Peter L. Scott Faculty Award for Excellence in Engineering Education. Dr. Menq is a Fellow of American Association for the Advancement of Science (AAAS), Society of Manufacturing Engineers (SME), and American Society of Mechanical Engineers (ASME).