

# Robotic Micromanipulation and Its Applications

## Abstract.

Micromanipulation technology has been an increasingly hot research area that enables new science discoveries and industrial applications by multidisciplinary interactions. This lecture will introduce cutting-edge micromanipulation technologies especially developed for biological targets, such as zebrafish, a kind of important vertebrate model animals widely used in scientific research and bioindustry. Specially, traditional operation of zebrafish larva is laborious, time-consuming, and of low accuracy due to its limited controllability, complicated structures, fragile body, and inaccessible in vivo organs. Here we develop a series of micromanipulation technologies that can flexibly position and orient a single zebrafish to desired postures, trap it in a low-damage manner, detect its in vivo organs, track trajectories for a large number of zebrafish larvae. Several practical applications based on the developed techniques will also be introduced including behavior study, heart monitor, transportation, and drug test.

## Biography.



**Huijun Gao** received the Ph.D. degree in control science and engineering from the Harbin Institute of Technology, Harbin, China, in 2005.

From 2005 to 2007, he carried out his postdoctoral research with the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, AB, Canada. Since 2004, he has been with the Harbin Institute of Technology, where he is currently a Full Professor, the Director of the Research Institute of Intelligent Control and Systems, and the Director of Interdisciplinary Research Center. His research interests include intelligent and robust control, robotics, mechatronics, and their engineering applications.

Dr. Gao is the Vice President of IEEE Industrial Electronics Society and a Council Member of the International Federation of Automatic Control (IFAC). He serves/served as Editor-in-Chief of the IEEE/ASME Transactions on Mechatronics, Co-Editor-in-Chief of the IEEE Transactions on Industrial Electronics, and Associate Editor of the Automatica, the IEEE Transactions on Cybernetics, and the IEEE Transactions on Industrial Informatics, etc. He is a Fellow of IEEE and a Distinguished Lecturer of the IEEE Systems, Man and Cybernetics Society. He is also a member of the Academia Europaea.