

Micro-Scale Biological Task Automation

James K. Mills
Department of Mechanical and Industrial Engineering
University of Toronto

Abstract:

In recent years, there has been tremendous interest within the medical and biological research communities into the development of transgenic organisms, drug testing on small groups of cells or single cells, and removal of human embryonic cells formed during cell cleavage for Pre-implantation Genetic Diagnosis (PGD) amongst other activities. It has become evident that such tasks must be carried out on a large scale to keep pace with the needs of the medical and biological research communities. Currently, much of this cell processing activity is carried out by highly skilled technicians using manual techniques. Addressing this increasing demand for large scale processing of single cells, the research work reported on in this presentation is directed towards the automation of biological micro-scale tasks using robotic technology. The work presented will address aspects of both control and automation methods utilized to achieve automation of single cell surgery tasks.

James K. Mills is with the Department of Mechanical and Industrial Engineering, University of Toronto. He received the B.Sc. and M.A.Sc. in Electrical Engineering and the Ph.D. in Mechanical Engineering, specializing in robotic control. His research interests include: control of multi-robots, design and control of high speed machines, 3D MEMS robotic assembly, meso-scale machine design, smart structure sensing and control, and micro-scale biological task automation. He has been an Invited Visiting Professor at the Centre for Artificial Intelligence and Robotics in Bangalore, India, a Visiting Professor at the Hong Kong University of Science and Technology, Chinese University of Hong Kong and the City University, Hong Kong.