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Introduction

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This special issue on Micro/Nano Robotic Perception, Control and Manipulation describes several complementary research efforts from Asia, the United States, and Europe. The topic is timely and the work published in this special issue shows how traditional robotics research is contributing to the emerging micro and nano technologies that are already beginning to demonstrate a strong impact on our society. At milli to microscales, three research efforts in inspection and microassembly are presented. From the University of Minnesota, a force controlled microgripper for photonics microassembly applications is presented. Another important aspect of microassembly is the tracking and alignment of microparts using vision feedback. Work by Dr. Yesin at the Swiss Federal Institute of Technology-Zurich (ETHZ) is directed towards using CAD model-based full 3DOF tracking for closed-loop control of automated microassembly. Moving towards submicron and nano scales, work from the University of Oldenburg in Germany in developing a novel platform for nanohandling using mobile microrobots has given rise to interesting concepts in how systems that perform future nanomanipulation tasks may be configured. A paper co-authored by researchers at the University of California-Berkeley and Carnegie Mellon University considers the use of optical tweezers integrated with chemical linkages for manufacturing 2D and 3D structures at micro and nanoscales. A microbial separation system at the University of Nagoya uses a novel touch sensor and a micropipette, and demonstrates the interesting research problems that exist in the rapidly emerging field of BioMicroRobotics. It is clear that micro/nano robotics research efforts, like those presented in this special issue, represent a key component of robotics studies, and illustrate one direction where robotics must head in order to ensure that the field of robotics remains relevant to science, engineering and society as a whole.

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