

Part I
Recent Research in Autonomous Robots

The eight chapters which make up this part of the book span separate research areas in Autonomous Robots. It has long been clear that robots will play a significant role in applications which are dirty, dull or dangerous. However many fundamental challenges remain to be addressed before robots become ubiquitous. The chapters in part I of this book address some of these challenges. Some chapters take a basic research perspective, and others take an application-driven viewpoint. In the first chapter, Agah and colleagues at the University of Kansas describe the design of mobile robots for seismic and radar remote sensing of ice sheets in polar regions - one of the most hostile environments on the planet. This is followed by an account of autonomous spacecraft from Hadaegh and colleagues at the Jet Propulsion Laboratory, another example of robots in extreme environments. In chapter three Sukhatme and Zhang at the University of Southern California describe the design of networked robotic systems with applications to sensing and sampling the aquatic environment. While the first three chapters deal largely with mobile robots (albeit with dramatically different kinds of mobility), clearly autonomy implies the ability not only to sense and move, but to manipulate the environment. In chapter four, Fagg and colleagues at Oklahoma University describe their recent research in robotic grasping using inputs from vision systems. Designers of autonomous systems cannot help but admire the plethora of natural autonomous systems in the world around us - living beings. In chapter five, Howard and colleagues at the Georgia Institute of Technology discuss advances in both manipulation and mobility which are inspired by human control systems. This is followed by a discussion by Kim on new directions in human-robot interaction. Lewis and Klein also take a biomimetic approach to autonomous robot design, and provide an introduction to neurobotics. A fundamental characteristic of living beings is that they learn. In this spirit, the eighth and final chapter by Yeung and Zhang investigates the feasibility of applying multi-task learning to the problem of inverse dynamics.