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- Introduction Bruno Siciliano and Oussama Khatib
- Part A Robotics Foundations David Orin
- Part A presents the fundamental principles and methods that are used to model, design, and control a robotic system
- All of the foundational topics are included in this part: kinematics, dynamics, mechanical design and actuation, sensing and estimation, motion planning, motion control, force control, robotic systems architectures and programming, and AI reasoning methods for task planning and learning
- A chapter is devoted to each of these topics
- The topics are expanded and applied to specific robotic structures and systems in subsequent parts
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- Chap 2 Dynamics Roy Featherstone and David Orin
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- Chap 4 Sensing and Estimation Henrik Christensen and Gregory Hager
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- Chap 8 Robotic Systems Architectures and Programming David Kortenkamp and Reid Simmons
- Chap 9 AI Reasoning Methods for Robotics Joachim Hertzberg and Raja Chatila
- Part B Robot Structures Frank Park
- Part B is concerned with the design, modeling, motion planning, and control of the actual physical realizations of a robot
- Some of the more obvious mechanical structures that come to mind are arms, legs, and hands; to this list can be added wheeled vehicles and platforms, and robot structures at the micro and nano scales
- With separate chapters devoted to performance criteria and model identification, the chapters in this part successively examine serial redundant mechanisms, parallel mechanisms, flexible robots, robot hands, robot legs, wheeled robots, and micro- and nanoscale robots
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- Part C Sensing and Perception Henrik Christensen
- Part C covers different sensory modalities and integration of sensor data across space and time to generate models of robots and the external environment

- The main sensor types such as tactile, odometry, GPS, ranging and visual perception are presented
- Both basic sensor models, sensor data processing and associated representations are covered
- Finally, a chapter on sensor fusion introduces the mathematical tools needed for integration of sensor information across space and time
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- Part D Manipulation and Interfaces Makoto Kaneko
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- Chap 32 Networked Teleoperation Dezhen Song and Kenneth Goldberg and Nak Young Chong
- Chap 33 Exoskeletons for Human Performance Augmentation Hami Kazerooni
- Part E Mobile and Distributed Robotics Raja Chatila
- Part E Mobile and Distributed Robotics, covers a wide span
- The topics address motion planning and control of wheeled robots with kinematic constraints, perception and world modeling, simultaneous localization and mapping, and the integration of those capacities in a control architecture, as a mobile robot is actually the paradigm of a complex integrated system
- In addition, multirobot interaction and systems are developed, including modular and reconfigurable robots as well as networked robotics
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- Chap 41 Networked Robots Vijay Kumar and Daniela Rus and Gaurav Sukhatme

- Part F Field and Service Robotics Alexander Zelinsky
- Part F covers topics related to creating field and service application based robots that operate in all types of environments
- This includes applications ranging from industrial-robots, through a diverse array of air, land, sea and space applications to educational robotics
- This part of the handbook draws on Parts A-E and describes how robots can be put to work
- The chapters describe fit for purpose robots and include hardware design, control, perception, and user interfaces
- The economic and social drivers for the particular applications are also discussed
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- Part G Human-Centered and Life-Like Robotics Daniela Rus
- Part G covers topics related to creating robots that operate in human-centered environments
- This includes the design of robots with humanoid and other biologically inspired morphologies, sensors, actuators, and control architectures
- User interfaces such as programming by demonstration and programming for safety are also included in this part
- The part concludes with the socio-ethical implications of robots
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