

The Mechanics of Robot Grasping

In this comprehensive textbook about robot grasping, you will find an integrated look at the major concepts and technical results in robot grasp mechanics. A large body of prior research – including key theories, graphical techniques, and insights on robot hand designs – is organized into a systematic review, using common notation and a common analytical framework.

With introductory and advanced chapters that support senior undergraduate- and graduate-level robotics courses, this book provides a full introduction to robot grasping principles that are needed to model and analyze multi-finger robot grasps. This textbook also serves as a valuable reference for robotics researchers and practicing robot engineers. Each chapter contains many worked-out examples, exercises with full solutions, and figures that highlight new concepts and help the reader master the use of the theories and equations presented.

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“The Mechanics of Robot Grasping, by two of the world’s leading experts, fills an important gap in the literature by providing the first comprehensive survey of the mathematical tools needed to model the physics of robot grasping. The book uses configuration space to consistently characterize equilibrium, immobilizing and caging grasps, and clearly conveys important points such as the distinction between first-order and second-order form closure. The book also contains new material on the effects of gravity, compliance, and hand mechanism design. Grasping remains a Grand Challenge for robots, and this book provides the solid foundation for progress for students and researchers in the years ahead.”

Ken Goldberg,
University of California–Berkeley

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The Mechanics of Robot Grasping

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