Robot Modeling and Control
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DESCRIPTION

*Robot Modeling and Control* introduces the fundamentals of robot modeling and control and provides background material on terminology, linear algebra, dynamical systems and stability theory, followed by detailed coverage of forward and inverse kinematics, Jacobians, Lagrangian dynamics, motion planning, robust and adaptive motion and force control, and computer vision. Both basic and advanced material is presented in a style that is readable and mathematically rigorous. The book provides relevant applications from industrial robotics and mobile robotics. Suitable for a one or two term course, this text is appropriate for undergraduate and graduate students from electrical engineering, mechanical engineering, computer science, and mathematics and can be used as a research reference. Many detailed worked examples and extensive problems illustrate theory and point the reader to more advanced topics.

ABOUT THE AUTHOR

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- **Computable treatment of kinematics and jacobians** allows students to derive and compute the forward kinematics, inverse kinematics, and Jacobians for the most common robot designs. No other text offers both the detailed theoretical development and step-by-step computational approach to kinematics. All formulas are rigorously derived and proved. For examples, see separate chapters on kinematics and on Jacobians that contain both step-by-step formulas and worked examples.

- **Vision and visual servo control** provide a self contained introduction to the basics of computer vision as applied to robot manipulator. Students will be able to program robots to manipulate objects sensed by cameras. Many instructors have indicated a need for a text that includes computer vision in addition to kinematics and dynamics. See chapters on vision and vision-based control.

- **Detailed treatment of dynamics** allows students to compute the dynamics of the most common manipulator designs after reading the dynamics chapter. Lagrange’s equations are derived from first principles and applied to robotics. The treatment is rigorous and complete.

- **Basic treatment of geometric nonlinear control** is presented in a more basic and readable form than in more advanced texts. Students will be able to study research articles and advanced texts more easily after going through this material. An entire chapter is devoted to this topic with worked examples on feedback linearization and control of nonholonomic systems such as mobile robots.

- **Advanced material is self-contained and easy to present.** See the section on feedback linearization of flexible joint robots.

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