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Nota di contenuto	Bipedal Robots: Modeling, Design and Walking Synthesis; Table of Contents; Chapter 1. Bipedal Robots and Walking; 1.1. Introduction; 1.2. Biomechanical approach; 1.2.1. Biomechanical system: a source of inspiration; 1.2.2. Skeletal structure and musculature; 1.3. Human walking; 1.3.1. Architecture; 1.3.2. Walking and running trajectory data; 1.3.3. Study cases; 1.4. Bipedal walking robots: state of the art; 1.4.1. A brief history; 1.4.2. Japanese studies and creations; 1.4.3. The situation in France; 1.4.4. General evolution tendencies; 1.5. Different applications; 1.5.1. Service robotics 1.5.2. Robotics and dangerous terrains1.5.3. Toy robots and computer animation in cinema; 1.5.4. Defense robotics; 1.5.5. Medical prostheses; 1.5.6. Surveillance robots; 1.6. Conclusion; 1.7. Bibliography; Chapter 2. Kinematic and Dynamic Models for Walking; 2.1. Introduction; 2.2. The kinematics of walking; 2.2.1. DoF of the locomotion system; 2.2.2. Walking patterns; 2.2.3. Generalized

coordinates for a sagittal step; 2.2.4. Generalized coordinates for three-dimensional walking; 2.2.5. Transition conditions; 2.3. The dynamics of walking; 2.3.1. Lagrangian dynamic model
2.3.2. Newton-Euler's dynamic model2.3.3. Impact model; 2.4. Dynamic constraints; 2.4.1. CoP and equilibrium constraints; 2.4.2. Non-sliding constraints; 2.5. Complementary feasibility constraints; 2.5.1. Respecting the technological limitations; 2.5.2. Non-collision constraints; 2.6. Conclusion; 2.7. Bibliography; Chapter 3. Design Tools for Making Bipedal Robots; 3.1. Introduction; 3.2. Study of influence of robot body masses; 3.2.1. Case 1: the three-link robot; 3.2.2. Case 2: the five-link robot; 3.3. Mechanical design: the architectures carried out; 3.3.1. The structure of planar robots
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4.5.5. A parametric optimization example

Sommario/riassunto

This book presents various techniques to carry out the gait modeling, the gait patterns synthesis, and the control of biped robots. Some general information on the human walking, a presentation of the current experimental biped robots, and the application of walking bipeds are given. The modeling is based on the decomposition on a walking step into different sub-phases depending on the way each foot stands into contact on the ground. The robot design is dealt with according to the mass repartition and the choice of the actuators. Different ways to generate walking patterns are considered, such