
Robot mechanics

Finalità

This course teaches the basic knowledge about kinematics and dynamics of industrial robots. For this purpose, techniques based on multibody formulations will be adopted. Such methods allow a systematic approach to the analysis of threedimensional mechanisms, hence providing a valuable system to the computer-aided numerical simulation of industrial robots.

Practical topics related to the design of robotic devices will be discussed as well.

Programma

History of robotics and automation

Applications of robotics in research and in industries

Main features of robots and their classification

Cinematic analysis of multibody systems, either in 2D and 3D

Inverse and Direct Kinematics, Jacobian, working volume, trajectories

Dynamics of multibody systems

Issues about dynamics in industrial robots

Numerical methods for the analysis of complex mechanisms

Programming and operative modes of industrial robots

Drives and transmissions for industrial robots

Grippers, safety devices, sensors and accessories

Recent developments: parallel kinematics, artificial vision, off-line simulation

Attività d'esercitazione

During the course, the students will realize a preliminary design of an industrial robot, adopting various software tools: C++ and Matlab programming languages, parametric 3D CAD software, multibody simulation tools, etc.

Modalità d'esame

Oral discussion about the design project and about topics covered during the lessons

Propedeuticità

Rational mechanics, Applied Mechanics, Computer Aided Design

Testi consigliati

G. LEGNANI: "Robotica Industriale", Casa Ed. Ambrosiana, ISBN 88-408-1262-8, Milano.