# Robotics

<u>Finalità</u>
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.

<u>Programma</u>
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

<u>Attività d'esercitazione</u>
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.

<u>Modalità d'esame</u>
Oral discussion about the design project and about topics covered during the lessons

<u>Propedeuticità</u>
Rational mechanics, Applied Mechanics, Computer Aided Design

<u>Testi consigliati</u>
G. LEGNANI: "Robotica Industriale", Casa Ed. Ambrosiana, ISBN  88-408-1262-8, Milano.