Name	Laboratory of Applied Mechanics for Robotics
Acronym	**LAM4R**
Responsible	Prof. Sergio Savino, Prof. Vincenzo Niola, Prof. Stefano Pagano, Prof. Chiara Cosenza
Group	Applied Mechanics
Location	Via Claudio 21, building 4; floor 0
Links	
s/w	The study and research activities in the laboratory are mainly carried out with the MATLAB and ROS work environments. The individual equipment is then equipped with proprietary software.
h/w	**Robotic arms** The Laboratory has collaborative manipulator robotic arms (cobots) and robots for educational and research use. In particular, the following are part of the instrumentation: - a six-degree-of-freedom cobot with an electric gripper, 850 mm reach and 5 kg payload (UR5e), equipped with a conveyor belt for performing iterative handling cycles; - a six-degree-of-freedom cobot, 626 mm reach, and 3 kg payload (Jaka Zu3); - a 4-axis desktop robot, 320mm reach, and 500g payload (Dobot Magician) for education and research purposes equipped with supports to perform various activities: 3D printing, laser engraving, drawing, etc. **Mobile robots** The Laboratory's equipment for mobile robotics includes: -3 two-wheel drive mobile development platforms (Turtlebot4, Clearpath Robotics) equipped with 3D vision systems; -1 rover for Outdoor/Indoor applications (Leo Rover, Fictionlab) with four-wheel drive and differential bar suspension system; - 1 six-wheel drive outdoor application rover (RB-VOGUI6, Robotnik) and a load capacity of 150 kg. **3D Vision systems** The lab is equipped with Intel® RealSense™ Depth Camera D400 Series RGB depth cameras, used for both mobile robotics and manipulation applications, and cameras from the Luxonis® OAK-D AI spatial stereo camera series, used primarily for mobile robotics applications. **3D Printing**

	To support the prototyping phases that characterize the experimental and systems development activities, the laboratory is equipped with a Raise3D Pro3 Plus dual-extruder printer. **Prototypes** In the laboratory there are several prototypes developed during the study and research activities. A three-degree-of-freedom revolute robotic arm used for educational purposes, entirely designed and built within the laboratory. The management and control system was also developed internally and is therefore accessible in all its parts. There are 3 small six-wheel drive rovers with rocker-bogie suspension, equipped with control boards and appropriate sensors. One of them is also equipped with a 5-degree-of-freedom robotic arm. The lab also hosts a large rover prototype (approximately 1m x 1m x 0.5m) designed and assembled in-house for agritech applications. The rover is equipped with six-wheel drive and a rocker-bogie suspension.

Aims

The laboratory was created to support all research activities that aim to study and deepen the issues related to the automation of mechanical systems, from design to management and planning of handling operations.

Within LAM4R, study and research activities are carried out regarding various aspects of mechatronics and robotics, with particular interest in robotic manipulators, mobile robotics and the interaction of mechatronic systems with different types of sensors, including vision systems with the aim of making the systems themselves more autonomous. The LAM4R is also used for laboratory teaching purposes in the courses Robot Mechanics, Complements of Mechanics and Simulation and Experimental Testing of Autonomous Vehicles. Every year, numerous theses are carried out by students of the Bachelor's Degree in Automation and Robotics Engineering, the Master's Degree in Mechanical Engineering for Design and Production, the Master's Degree in Automation and Robotics Engineering and the Master's Degree in Autonomous Vehicle Engineering.