





The R1 robot

R1 is a service robot designed at IIT starting from the experience and know-how of the iCub (with which it shares the software API). R1 is 1.3m tall. The torso is equipped with a mechanism that allows varying its height from a minimum of 1.15m to a maximum of 1.45m. R1 has an especially small footprint to move in cluttered office/home/mall environments. R1 is safe for interaction. Arm joints contain a simple torque overload protection, which behaves as a clutch mechanisms providing intrinsic safety. In addition, R1 can be torque controlled (active torque control) via read outs from two 6-axial force-torque sensors and tactile pressure sensors in the hands and forearms. R1 has two eight degree of freedom (DoF) arms. The target payload is 1.5kg in the fully stretched configuration – reaching at 0.7m distance from the robot’s body. The robot has two four-DoF, two degrees of actuation (DOA) hands. The hands are equipped with distributed pressure sensors, joint angle encoders and series elastic actuators to allow monitoring grip forces. The robot has a two-DoF head equipped with sensors and devices for HRI. The robot mounts an Xtion Pro Live RGBD sensor, for depth sensing. Higher performance depth sensors are possible. The head also mounts a Leopard Imaging OV580 twin camera module, which allows for multiple configurable video resolutions and sampling rates. The head also integrates eight microphones, a loudspeaker and a special, custom designed, programmable RGB LED matrix.



Key Features

- Sensors: cameras (2), RGBD camera, microphones (up to 8), joint encoders (28), inertial sensors (linear, angular, compass), capacitive tactile sensors (~1000), 6-axis force/torque sensors (2), lasers (2)
- Footprint: 40cm
- Weight: 51kg
- Payload (hand): 1.5kg
- Degrees of freedom: 28
- Height: 130cm up to 145cm
- Middleware: YARP, ROS

Possible Applications

- Human-Robot Interaction
- Vision – including 3D vision, object recognition, visuo-tactile integration
- SLAM/navigation
- Study mobile manipulation
- Artificial Intelligence
- Service robotics target

Access information

Corresponding infrastructure	Instituto Italiano di Tecnologia iCub Facility
Location	Via Morego, 30, 16163 Genova GE, Italy
Unit of access	Working day



Technical specifications

Hands	2 DoF
Arms	8 DoF
Skin sensors	Capacitive, ~1000 sensing points
Max force at the hand	1.5kg
Cameras	640x480 RGB @30fps
Weight	51kg
Power supply	48V/onboard battery
Interface	Ethernet/Wi-Fi
DoF	28
Head	2 DoF
Torso	4 DoF
Base	2 DoF

Additional information

Additional example of applications may be found <https://github.com/robotology>