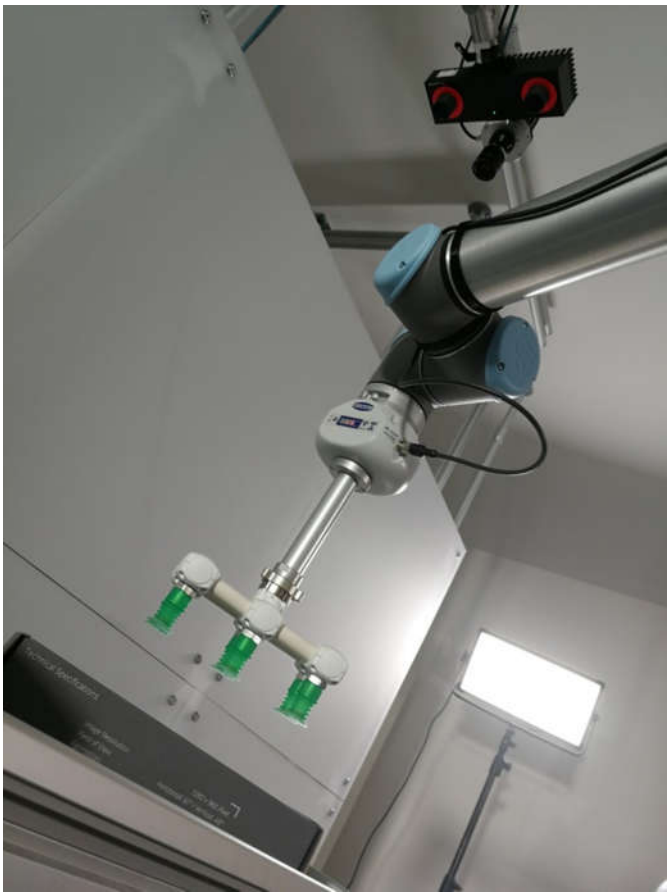
ICRA 2019 Workshop on Bringing perception-based manipulation to the real world: standardizing robot manipulation learning

LEARNING PLATFORM: UR5e + rc_Visard + End effector (Schmalz Cobot – Robotiq gripper – Schunk gripper)

DATASHEET



COMPONENTS AND AVAILABILITY:

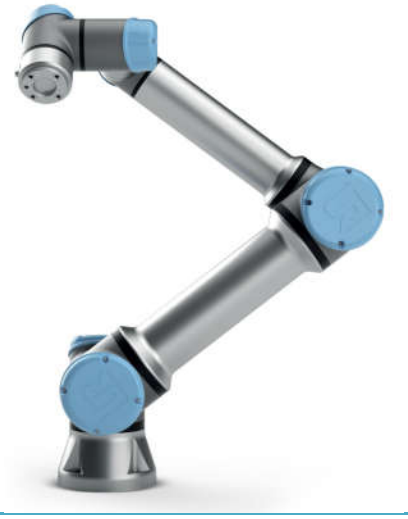
Component	Availability
Robot manipulator: UR5e (Universal Robots)	Worldwide
Vision: rc_visard 160 (Roboception)	EU / Americas
End effector – option 1: Vacuum generator ECBPi (Schmalz)	Worldwide
End effector – option 2: Robotiq 2F-85 (Robotiq)	Worldwide
End effector – option 3: Schunk Co-Act gripper (Schunk)	Worldwide

Price: final price of each component is provided by the corresponding manufacturer. Final prince depends on the options chosen for each product and the geographical location (local currency/exchange rate/customs).

All hardware has a URCaps package for communication with the robot manipulator.

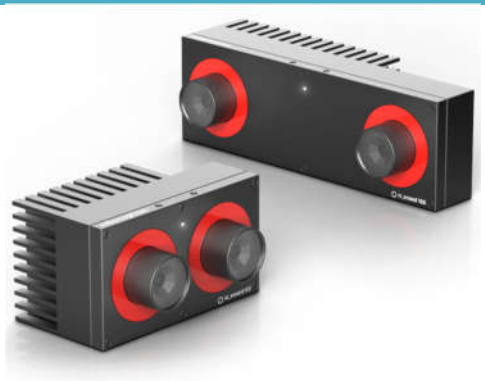
HARDWARE CONFIGURATION

Robot Manipulator: UR5e (Universal Robots)



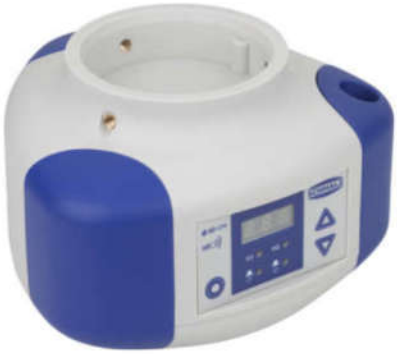
- Payload: 5 kg, reach 850 mm
- Power consumption: approx.. 200 W using a typical program
- IP classification: IP 54 (robot), IP44 (control box)
- Connectivity: I/O ports, RS-485
- Sensor data: F/T sensor
- Programming: Polyscope graphical user interface on 12 inch touchscreen
- Advanced programming: ROS Industry integration, 'daemons' running on robot controller
- Control frequency: 500 Hz
- Communication: Modbus TCP, digital and analog I/Os, Profinet and Ethernet IP, USB ports
- Other options: robot manipulator also available with 10 kg payload (UR10e)

Vision: rc_visard 160m (Roboception)



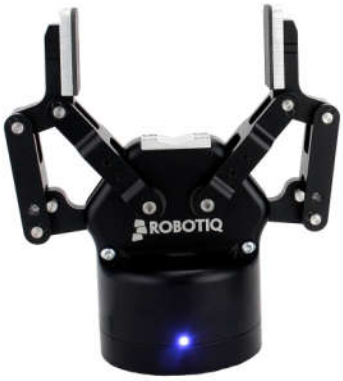
- Weight: 850 g
- Power consumption: 20 W
- IP classification: IP54
- Onboard computation (Nvidia Tegra K1)
- Connectivity: 8-pin A-coded M12 socket for GigE, 8-pin A-coded M12 plug for GPIO, power.
- Sensor data: camera stream, disparity map, confidence values, ego motion estimation.
- Programming: WebGUI, Rest-API, GeniCam, GigEVision, UDP based ego-motion interface, ROS
- Depth image and resolution: 1280x960 (F) @ 0,8 Hz; 640x480 (H) @ 3Hz; 320x240 (M) @ 15 Hz; 214x160 (L) @ 25 Hz
- Ego motion: 200 Hz
- Other options:
  - Sensor is available in both monochrome and color version, and also with a smaller baseline (rc_visard 65, 65 mm baseline).
  - Additional randomDot projector is also available
  - Options for software onboard: Itempick, TagDetect, BoxPick, SLAM

End-effector: vacuum generator ECBPi (Schmalz)



- Weight: 775 g
- Power consumption: 13W
- Suction rate: 12 l/min
- Connectivity: IO-link, NFC interface, digital I/O
- Data: vacuum signal
- Other options: modular kit for designing the suction cup geometry and distribution

End-effector: Robotiq 2F-85 (Robotiq)



- Weight: 0.9 kg
- Power consumption: 24W
- IP classification: IP 40
- Communication protocol: Modbus RTU (RS-485), RS-485, RS-232
- Commanded options: Stroke, grip force, closing speed
- Other options:
  - The gripper is also available with wider stroke, as 2F-140 (140 mm stroke)
  - A Robotiq Universal Controller is also available, to enable communication using Modbus TCP, Ethernet IP, EtherCAT, PROFINET, DEVICENET, CANopen

End-effector: Co-Act gripper (Schunk)

- Weight: 0.65 kg
- Power consumption: 9.6 W
- IP Classification: IP 30
- Communication interface: digital I/O
- Options: gripping force can be adjusted
- Other options: connectivity with UR available as feed-through (electrical tool interface) or external cabling