

1 »Care-O-bot® 3« hardware setup

2 Omnidirectional platform

3 Sensor head

## Care-O-bot® 3

### ROBUST RESEARCH PLATFORM WITH INDUSTRIAL COMPONENTS

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[www.care-o-bot-research.org](http://www.care-o-bot-research.org)

#### Starting Point

The research and development of complex service robot technologies and applications calls for new, powerful robot platforms that make the required sensors and actuators available in a compact form.

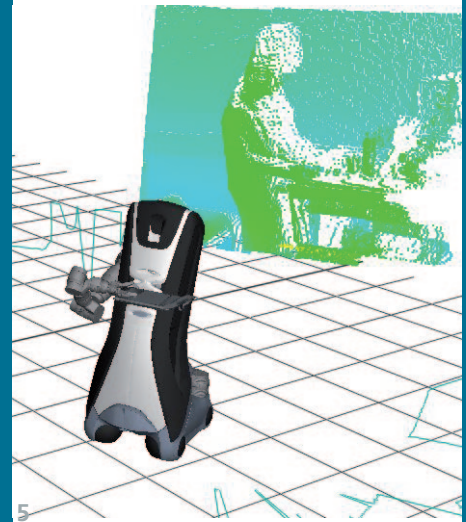
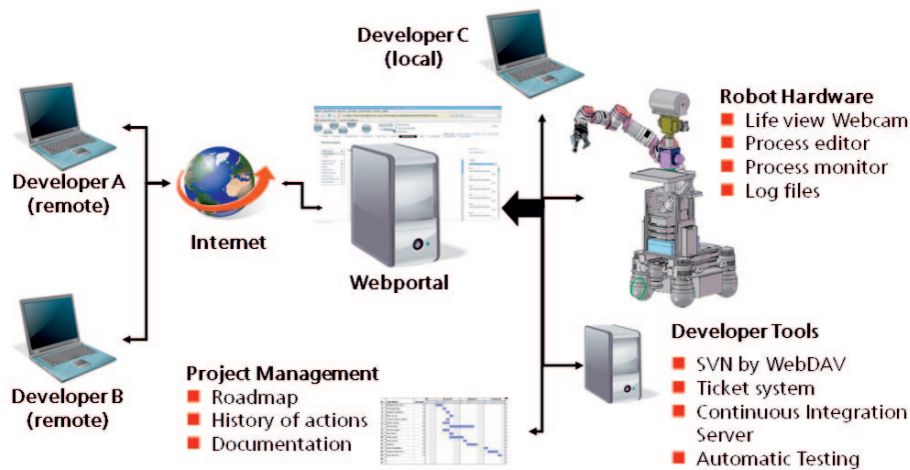
To be able to focus the necessary development work on the actual key areas of research, there is a need for high reliability of the robot hardware, open hardware drivers, suitable visualizations and simulations of the robot and a large possible number of freely accessible software components for robot control. Additional challenges arise from the distribution of development work, which is made indispensable by the complexity of the applications and geographical distribution of the project teams.

#### Robot Hardware

Thanks to its extensive use of field tested industrial components, Care-O-bot® 3 delivers a robust and reliable hardware platform that is suitable as a testing and validation platform for addressing current issues in the field of robotics research.

The robot is characterized by the following technical data:

- Dimensions (L/W/H): 75/55/145 cm
- Weight: 180 kg
- 28 driven axes
- Power supply:
  - Gaia rechargeable Li ion battery, 60 Ah, 48 V
  - Internal: 48 V, 12 V, 5 V
  - Separate power supplies to motors and controllers
  - All motors connected to emergency stop circuit



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- Omnidirectional platform:
  - 8 motors (2 motors per wheel:
    - 1 for rotation axis, 1 for drive)
  - Elmo controller (CAN interface)
  - 2 SICK S300 laser scanners
  - 1 Hokuyu URG-04LX laser scanner
  - Speed: approx. 1.5 m/s
- Arm:
  - Schunk LWA 3 (extended to 120 cm)
  - CAN interface (1000 kbaud)
  - Payload: 5 kg
- Gripper
  - Schunk SDH with tactile sensors
  - CAN interfaces for tactile sensors and fingers
- Torso
  - 1 Schunk PW 90 pan/tilt unit
  - 1 Schunk PW 70 pan/tilt unit
  - 1 Nanotec DB42M axis with Elmo controller (CAN interface)
- Camera head
  - 2 AVT Pike 145 C, 1394b, 1330x1038 (stereo circuit)
  - MESA Swissranger 3000/4000
- Tray:
  - 1 Schunk PRL 100 axis
  - LCD display
  - Touch screen
- Processor architecture:
  - 3 PCs (2 GHz Pentium M, 1 GB RAM, 40 GB HDD)

drivers and basic components for various open-source frameworks, such as ROS, Orocos and Player/Stage. The repository can be used as a basis for own developments. Many hardware components of the Care-O-bot® 3, e.g. the omnidirectional platform and the robotic arm, are available in the form of simulated components, which allows initial developments and tests to be carried out without the robot hardware. There are also 3D models of the complete robot with functioning actuators and sensors in common simulation environments, such as Gazebo, OpenRave and Blender.

### Web Portal for Easy Access

The web portal developed at Fraunhofer IPA provides a central, remotely accessible web interface that not only makes tools available for distributed development but also considerably simplifies the control and monitoring of the robot. The web portal can be used in particular for the testing of new software components on the Care-O-bot® 3 platform available at Fraunhofer IPA. The following functionalities are provided by the web portal:

- Wiki for the documentation of interfaces and components
- Version and bug management
- Automatic build of new software versions and deployment of components on the robot
- Execution of component and system tests, error logging
- Support of remote tests

In particular, elements of the open-source repository can continuously be integrated, validated and tested on the hardware using the web portal.

### What we offer

With Care-O-bot® 3 we offer a reliable, highly integrated mobile research platform that can also be customized and equipped with sensors and actuators individually. Further services include:

- Supply of drivers and basic software components in an actively maintained open-source repository
- Supply of simulation models for hardware components
- Remote access to the robots on our premises
- Organization of research camps for development on our robots
- Coordination of software integration by means of the web portal

We will be pleased to discuss with you the ways in which we can support your research using Care-O-bot® 3. Just contact us.

### Open-Source Interfaces

In order to facilitate work with existing software components, an open-source repository is made available that provides

4 Accessing Care-O-bot® 3 through the web portal

5 Simulation of Care-O-bot® 3