WHAT IS ROBDEKON?

ROBDEKON is a competence center funded by the Federal Ministry of Education and Research and develops robotic systems that support humans in complex decontamination tasks. The robots equipped with sensors and AI map the environment (partially) autonomously, determine the degree of contamination, localize and manipulate objects, decontaminate surfaces, recover hazardous substances and remove them. Via the ROBDEKON interface, the robot systems can be operated intuitively from a control station using telepresence.

Companies and authorities that want to use or offer autonomous decontamination technologies in the future can use ROBDEKON‘s system solutions in practical pilot projects in the current second funding phase.
The robot systems are being tested and further developed in real environments. At the annual participation event, interested parties can experience the ROBDEKON technologies and try them out for themselves. ROBDEKON‘s training program offers users access to the state of the art of robotic decontamination systems and supports the training of specialist personnel.

The ROBDEKON participation events offer opportunities for testing and networking. (Photo: Fraunhofer IOSB)

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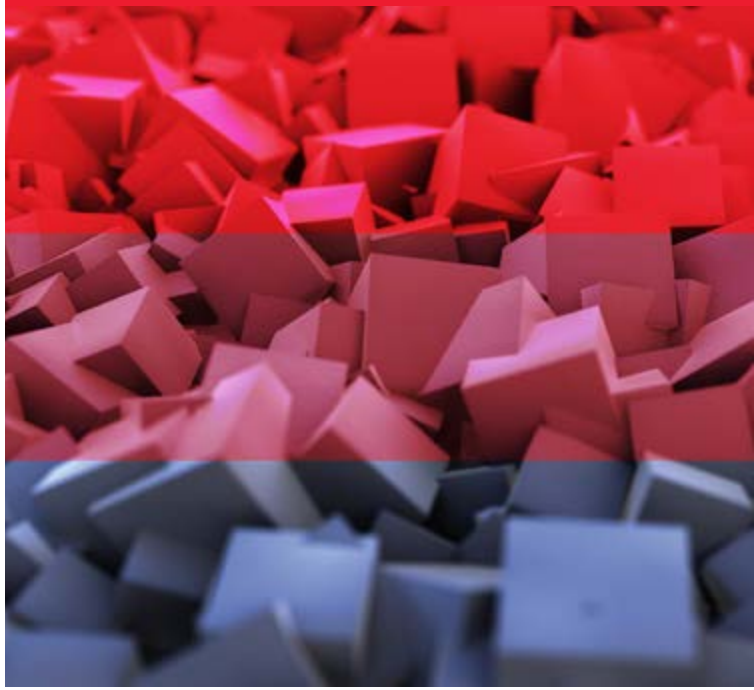

ROBDEKON

Robotersysteme für die Dekontamination in menschenfeindlichen Umgebungen

ROBDEKON
APPLICATION SCENARIOS

ROBDEKON

DECONTAMINATION OF NUCLEAR FACILITIES

Thorough decontamination, clearance measurements and documentation are essential when dismantling nuclear facilities. People who carry out this work are exposed to high levels of physical stress. The use of robotic systems largely protects people from this stress and the documentation is automated. The systems developed in ROBDEKON can travel autonomously to their place of use and map the building structure. They record geometric and radiological data and display it visually in a 3D model.

Contaminated building surfaces can be processed with the specially developed milling tool and measured with the contamination array. Facility components to be cleaned are inspected with the aid of robots. The unknown objects are detected, grasped and visually mapped. Using object detection, the robots automatically receive information on further steps such as the decontamination trajectories for the cleaning process in a decontamination cell. The aim is to automate the dismantling process chain as far as possible and to develop universal, robot-based solutions for different environmental conditions.

Contamination array for free measurement in buildings. (Photo: KIT/Amadeus Bramsiepe)

REMEDIATION OF CONTAMINATED SITES AND LANDFILLS

ROBDEKON is researching automated construction machinery for the remediation of hazardous waste landfills, dangerous egacy disposal sites or chemical industry contaminated sites. During the remediation of contaminated sites, our robot systems drive autonomously on rough terrain, scan their surroundings and always avoid collisions.

The heavy machinery identifies and determins movable objects, such as barrels, and to perform excavation and loading independently. To achieve this, robotic teams (e.g. excavator and transport vehicle) work hand in hand. The autonomy capabilities are implemented in the form of a modular system so that new platforms can be quickly automated and adapted to the respective application. The robots can autonomously collect samples from landfills and place them in sample magazines. With the help of telepresence technologies, the operator can intervene on site and has access to a comprehensive visualization of the sensor data at various control stations. In specialized control stations, interaction with haptic feedback is also possible

Autonomous loading by an excavator in a landfill. (Photo: Fraunhofer IOSB)

SAFE RECOVERY OF HAZARDOUS SUBSTANCES

ROBDEKON develops robotic teams that are specifically designed to retrieve hazardous materials from challenging and difficult-to-access environments. The teams are composed of highly mobile systems that also perform complex manipulation tasks. For example, they can remove objects to gain access to hazardous materials underneath. Other important assistance functions that support the operators include coordination and collaborative mapping by several robot systems, the specification of waypoints to explore the environment and assisted teleoperation for difficult handling tasks.

The basis is a powerful visual recognition and classification of objects using AI models. To this end, methods are being developed to interactively train new objects into the system. This not only improves the robots‘ ability to adapt to unknown or variable conditions, but also significantly increases the efficiency and safety of the recovery process by enabling hazardous substances to be precisely identified and safely handled.

Four-legged walking robots for exploration in rough terrain. (Photo: Fraunhofer IOSB)