



INNOVATIVE ROBOTIC SYSTEMS

Our range of services covers the development of highly innovative robotic and sensor systems and technologies. We specialize in the development of novel robot and sensor systems that are commercially unavailable. In addition, our experts will provide you support when you are developing new technologies and systems, from your idea through its implementation:

- Consulting and feasibility studies
- Design and planning
- Development
- Commissioning and system optimization
- Integration of complex systems

The Robotic Systems Business Unit specializes in the development of:

- Assistance robotics
- Safe human-robot interaction
- Service robots for inspection, cleaning and maintenance
- Robotics in manufacturing and the life sciences

FRAUNHOFER INSTITUTE FOR FACTORY OPERATION AND AUTOMATION IFF

Director
Prof. Michael Schenk

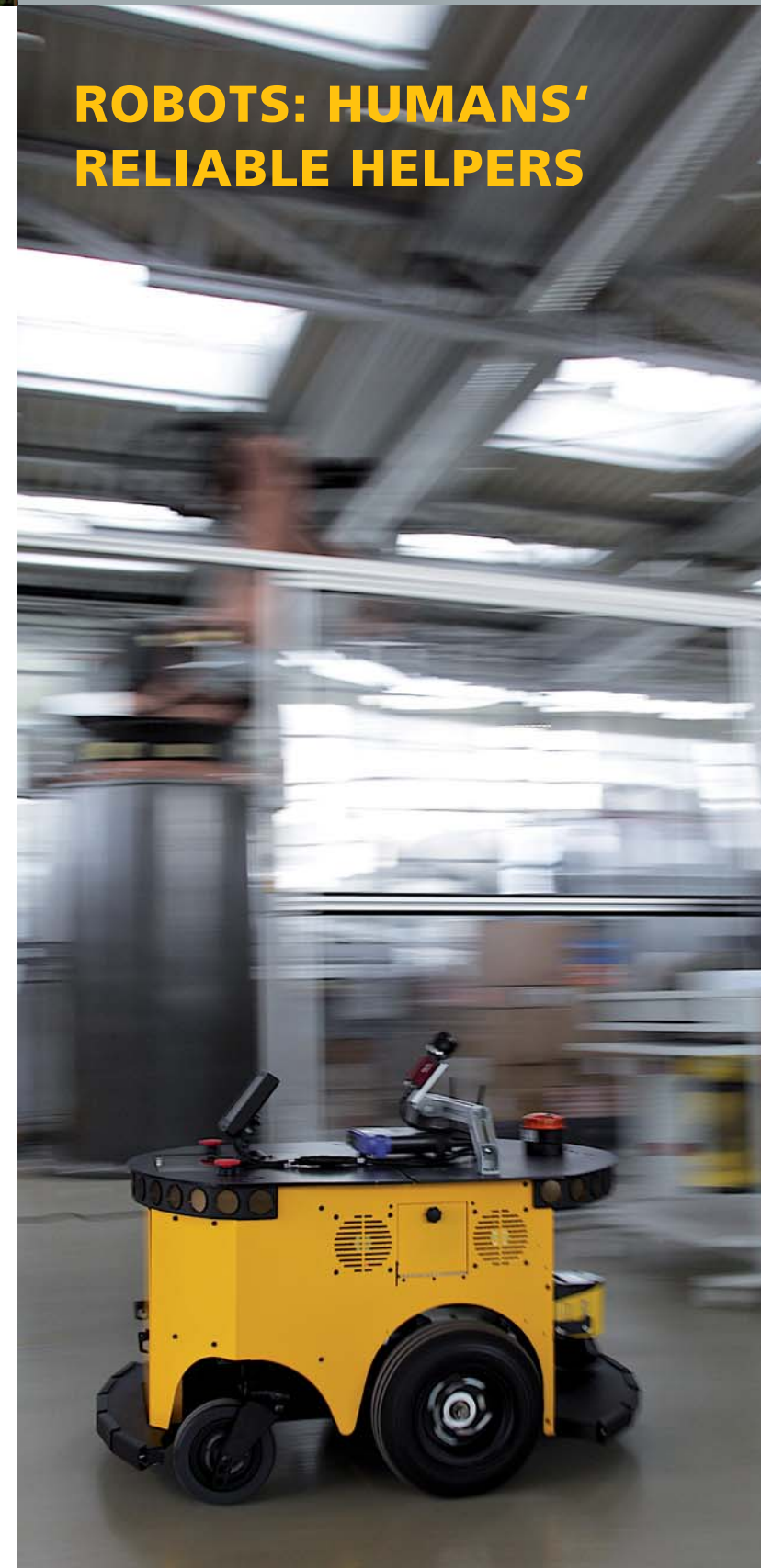
Sandtorstrasse 22 | 39106 Magdeburg | Germany
Phone +49 391 4090-0 | Fax +49 391 4090-596
ideen@iff.fraunhofer.de
<http://www.iff.fraunhofer.de> | <http://www.vdtdc.de>

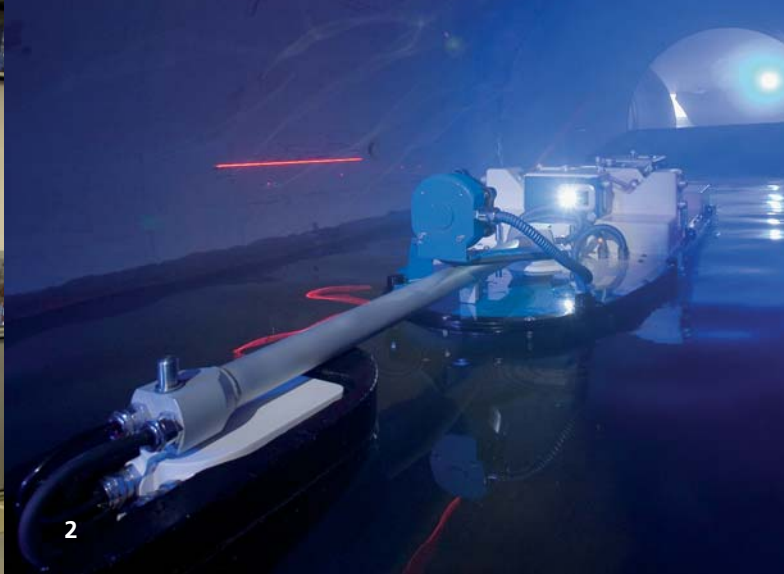
Contact
Robotic Systems Business Unit
Dr. Norbert Elkmann
Phone +49 391 4090-222 | Fax +49 391 4090-250
norbert.elkmann@iff.fraunhofer.de

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ROBOTS: HUMANS' RELIABLE HELPERS





The Fraunhofer IFF's Robotic Systems Business Unit is already developing tomorrow's robots and their key components in contracted industry projects and publicly funded research projects. The range of robotic applications is no longer isolated to manufacturing. New robot systems are taking over inspection and cleaning tasks for humans in hazardous environments and working directly together with humans. Others share workplaces with humans in offices or households.

ASSISTANCE ROBOTICS

Since they share workplaces and interact directly with humans, assistance robots constitute a new class of robots. Their distinctive features are their capability to perceive their environment and people with the aid of sensors and intelligent algorithms, communicate multimodally with humans, navigate autonomously and make decisions independently. Navigation, cognition and multimodal interaction are priorities of the Fraunhofer IFF's development work.

Model projects

- Assistant Robot in Life Science Company Labs (LiSA)
- Precise Autonomous Robot Localization in Large Environments such as Factory Buildings by Visual Navigation (AVILUSplus)
- Machine Attention for Enhanced Environment Understanding
- Autonomous, Flexible Robot for Welding Large Steel Structures (NOMAD)
- Tactile Sensing Systems for Robots Modeled on Insects

- 1 *Safe human-robot interaction*
- 2 *sewer line inspection*
- 3 *Safe robot kinematics (BROMMI)*
- 4 *Direct human-robot interaction*

SAFE HUMAN-ROBOT INTERACTION

Stringent safety requirements must be satisfied when humans and robots work in the same area. Humans must be completely protected from injury. The development of new safety technologies and components for safe human-robot interaction is one of the central foci of our research. In addition, we test the safety of robots in our lab for safe human-robot interaction.

Model projects

- Development of Highly Modular Planar Safety Sensors as an "Artificial Skin" Safety Sensor for Reliable Collision Detection
- Multi-sensor System for Optical Workplace Monitoring with Dynamic Safe Area Generation (ViERforES)
- Development and Experimental Evaluation of a Novel Optical Workplace Monitoring System (ECHORD – EXECELL)
- Universal and Mobile Lightweight Robot for Applications in Super Flexible Cells Based on the igus(R) robolink (ECHORD – ALEXA)
- Bionic Arm Kinematics for Safe Robotic Applications in Human-Machine Interaction (BROMMI)

SERVICE ROBOTS FOR INSPECTION, CLEANING AND MAINTENANCE

These robots fully automatically take over work that is dangerous, monotonous or unreasonable for humans. We develop novel systems such as inspection robots that detect and measure damage in sewer systems with great precision and facade cleaning robots.

Model projects

- Inspection and Cleaning Robots for Emscher Sewer System
- Application Driven Software Architectures, Distributed Systems and Telerobotics
- Facade Cleaning Robots for the Vaulted Glass Hall of Leipzig's New Exhibition Centre, Berlin Central Train Station (Filius) and SIRIUSc for High-rise Facades
- Robot for the Inspection of Wind Energy Converter Rotor Blades (RIWEA)

ROBOTICS IN MANUFACTURING AND THE LIFE SCIENCES

Flexible and intelligent robot systems are generating new fields of application in manufacturing. We combine biological requirements and the latest robot technologies for industrial applications in the life science and biotechnology sectors.

Model projects

- Super Flexible Robotic Cells with Reconfigurable Passive Kinematics (ECHORD – HYROPA)
- Automatic Generation of Large-area Parts with Industrial Robots (RoboGen)
- Lab Robot for Mass Tissue Screening (Telomics ex vivo Robotics)
- Robots as Tool Machines: Machining with Industrial Robots (RoboCasting)
- Flexible Manufacturing Cell for Combined Laser Machining with Adaptive Gripper System (koLas)
- Robotic Logistics Cell (AVILUS)
- Automated Industrial Plant Breeding in the Temporary Immersion System (AutoTis)
- Impedance-based Multiarray Screening (IMAS)