

FZI LIVING LAB SERVICE ROBOTICS

The FZI Living Lab Service Robotics develops new robotic technologies for environment recognition, robot control, grasp and motion planning, and human-machine interaction. These basic technologies are used in many different robotic systems and various fields of application. The developed solutions support people and help them with everyday routine jobs that are exhausting or hazardous. With more than 20 years of professional experience from research projects and long-term industrial cooperations, FZI is a reliable partner in the development of innovative navigation solutions for mobile systems.

Selected areas of innovation from our portfolio:

- Intuitive programming of mobile service robots for flexible manufacturing at a reduced cost:
Programming by demonstration
- Intelligent two-armed service robots: companions in smart homes of the future
- Development of robust robots for inspection tasks in hazardous, unstructured environments
- Multi-sensor fusion as a basis for mapping and reliable navigation systems
- Planning, scheduling and coordination for scalable autonomy
- Modular, behaviour-based robot control systems for complex, dynamic environments
- Intelligent mechatronic systems as a foundation for innovative, light-weight service robots
- Development of ROS-I (Robot Operating System Industrial) software as well as support and training



THE FZI HOUSE OF LIVING LABS

The FZI House of Living Labs incorporates all FZI Living Labs in one building and offers a modern infrastructure for development, evaluation and demonstration of trend-setting technologies. Researchers from FZI and partners from industry and society can exchange across fields of application and develop interdisciplinarily integrated solutions in information and communication technology. Profit from our FZI Living Labs as a platform for integration and technologies!

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Autonomous, Mobile Robots for Routine Jobs in Industrial and Home Environments



HOLLIE

HoLLiE is a mobile service robot with two arms and an actuated upper body. In the future, this robot will serve as a companion, assistant or service robot at the FZI House of Living Labs (HoLL), where it was developed. This is why we call it HoLLiE – „House of Living Labs intelligent Escort“.

RESEARCH TOPICS

- Life-long Learning for Mapping and Navigating in Indoor Environments
- Bimanual Manipulation of Everyday Objects
- Symbolic Planning for Complex Manipulation Tasks
- Hierarchical GPU-Based Mobile Manipulation Planning
- Human-Machine Interaction
- Scalable Autonomy and Intuitive Programming

KAIRO II

The snake-like mobile robot KAIRO II consists of two different types of active modules which allow it to perform impressive manoeuvres. Its robust and modular character enables KAIRO to be employed in many different fields of application. Most of the modules provide extra space for application-specific sensors and tools. A rotational laser scanner at the front creates a detailed model of the environment which can be used for navigation and the execution of inspection tasks.



RESEARCH TOPICS

- Inspection of Hazardous Environments
- Biologically Inspired Locomotion Schemes
- 3D Environment Modelling for Autonomous Navigation
- Reconfiguration for Greater Flexibility
- Multi-Robot Localisation with Inexpensive Sensors

LAURON V

The design and control architecture of the six-legged walking Robot LAURON was inspired by the stick insect. With the insect-like kinematics, LAURON is able to safely traverse challenging terrains and thus enables the inspection of environments not accessible for humans or wheeled robots. The fifth generation LAURON V is equipped with an additional rotational joint in each leg to further increase its manoeuvrability and enable it to manipulate objects with its front legs.

RESEARCH TOPICS

- Autonomous Navigation and Exploration in Rough, Unknown Environments: Planetary Exploration
- Walking Patterns for Rough and Steep Terrain
- Object Manipulation with Front Legs
- Behaviour-Based Control Architecture as a Fault-Tolerant, Robust Robot Control System
- Energy Efficient Locomotion with Multi-Legged Robots

