



WASTE ROBOTS IN PUBLIC SPACES

Future-oriented development in practice

Autonomous mobile robots empty litter garbage cans in public spaces fully automatically. Not a dream of the future, but a solution developed by LCM for Brantner green solutions in a practical test among passers-by in the model home park.

More sustainability is needed in the economy to slow down climate change and enable a better future. The automation and optimization of material cycles plays a key role in this.

Autonomous waste management

The waste disposal and recycling company Brantner Österreich GmbH in Krems (Lower Austria) pursued the idea of using autonomous mobile robots to automate the emptying of waste garbage cans in public areas.

The company had no experience in this area. The system, named SCARAB after the Scarab dung beetle, therefore had to be

developed from scratch, with all aspects including secure software, reliable sensor technology and a sympathetic design implementation in order to slowly get the unprepared public used to the new, autonomous vehicle. Key requirements were weather resistance and personal safety.

Dynamic solution development

The Linz Center of Mechatronics GmbH (LCM) was the right partner for Brantner. The company supported Brantner right from the start and collaborated on the requirements definition.



■ A cover designed by the University of Art and Design Linz makes the autonomous mobile robot SCARAB suitable for all-weather use.



■ To accommodate the waste container, LCM developed an adapter without potentially dangerous moving parts.



■ At the base, the containers are emptied, cleaned and checked while the robot recharges its battery.

LCM examined several models. The choice fell on a vehicle with the necessary robustness and personal safety for year-round outdoor operation. Its on-board electronics offer sufficient interfaces and expansion options for the integration of the robot arm, image processing and the protective cover.

LCM developed this together with the University of Art and Design Linz. It protects SCARAB from heavy rain or unauthorized access and opens like the wings of the Scarab when required.

Overall system

SCARAB finds its way to the waste garbage cans using a digital 3D map with constant landmarks throughout the year for autonomous navigation. It only drives to bins whose integrated sensors report a corresponding fill level via the Internet of Things.

While the navigation software was already integrated in the base vehicle,

LCM developed the software modules for all other tasks. Among other things, a dashboard on the user interface provides a clear display of all aspects of the system, including the current position of the vehicle and its charge status.

Strategy change included

To simplify the handling of the waste garbage cans in the first version, LCM project manager Dr. Johannes Schröck recommended replacing the bins with empty ones on site. The bins are therefore emptied and cleaned at the control center, while the batteries are recharged by SCARAB.

To pick up the waste container, LCM developed a gripper for the robot arm without any moving parts that could be dangerous to humans. A fine-positioning system with a camera on the robot's wrist, also developed by LCM, enables the container to be replaced smoothly and

with pinpoint accuracy. In addition to the movements of the robot arm, the LCM software also controls the opening and closing of the hood.

"LCM has implemented an innovative and future-proof solution. This helps us to further increase the sustainability of the circular economy."

*Christoph Pasching,
CEO and Managing Partner,
Brantner Digital Solutions*

Model house estate

In the "Blue Lagoon", a model house park near Vienna, the pilot system is undergoing a one-year demonstration and trial run. The knowledge gained from this will be incorporated into the transition to series production.

"By bridging the gap between research and development, LCM has succeeded in creating a practical solution in uncharted territory," explains Christoph Pasching, CEO and Managing Partner of Brantner Digital Solutions. "This enables us to make a technological leap and helps us to further increase the sustainability of the circular economy with new processes."

ABOUT BRANTNER GREEN SOLUTIONS

Brantner green solutions is an international waste disposal and recycling company based in Krems. In addition to traditional waste disposal activities, Brantner has been developing future-proof concepts with its spin-off "Brantner Digital Solutions GmbH" since 2019, which are to be implemented on the market as quickly as possible. The focus here is on digitalization and automation to increase sustainability.