

## Press release

Vienna, 7.3.2024

# AUTONOMOUS WORKING MACHINES: ROBOTIC MOWERS FOR MAINTAINING ROAD EMBANKMENTS

In the SMARTER project, AIT and its partners are presenting a pioneering demonstrator for efficient and safe applications in infrastructure, municipalities and logistics

Automation in the areas of infrastructure, municipalities and logistics is becoming increasingly important in order to relieve the burden on qualified workers and make jobs more attractive. "Our vision is to develop autonomous machines that relieve people of heavy, monotonous and dangerous work. Skilled workers should then concentrate on supervisory activities," says Manfred Gruber, explaining the motivation behind the AIT Austrian Institute of Technology's (AIT) development of autonomous commercial vehicles and work machines. Gruber is an expert in this field and heads the relevant research group at the AIT.

A central prerequisite for autonomously operating systems is reliable environment recognition and navigation. This must also be guaranteed in difficult conditions with poor visibility so that the machines can avoid obstacles and react appropriately in the event of an impending collision or loss of orientation. To achieve this, it is crucial that the software, intelligent algorithms and physical hardware - such as the mechanics and hydraulics - are perfectly coordinated. In addition, high-performance communication technology is required to enable immediate, i.e. real-time intervention by a monitoring person in the event of an emergency.

### Demonstrator for mowing work on embankments along roads

Under the leadership of AIT, experts from REFORM-WERKE Bauer & Co Gesellschaft m.b.H, Robot Makers, the University of Applied Sciences Upper Austria and LINZ AG TELEKOM (LINZ Strom Gas Wärme GmbH) have jointly taken on these challenges. The SMARTER project (Slope Maintenance Automation using Real-Time Telecommunication and advanced Environment Recognition) focused on the development of a machine that autonomously carries out mowing work on embankments along roads. The robotic mower consists of an automated platform called "Metron", to which a mowing machine is connected. Depending on the task, other machines can be used.

### Robust environment detection, extensive databases and real-time telecommunication

With a weight of 1.5 tons, the robotic mower can stably negotiate slopes. It has been equipped with robust environment detection and suitable safety and operating concepts. The hardware has been adapted for autonomy so that the machine reliably fulfills the task at hand.

"The vehicle navigates safely at a speed of up to 10 km/h, even through grass 1.5 meters high. Despite the poor visibility caused by the high grass, the vehicle can work autonomously thanks to modern camera-based sensor technology. Here at AIT, we have many years of expertise in the development of robust environment recognition for automated and autonomous work machines and

commercial vehicles. In the meantime, we have also created various, very extensive databases with annotated image data of road scenes or in the open field. Using machine learning, we can thus increase the intelligence of autonomous systems," says Oliver Zendel, project manager and senior scientist, describing AIT's contribution to the project.

Another focus of the SMARTER project was the use of state-of-the-art 5G telecommunications technologies. The testing and evaluation of infrastructure components and mobile equipment for automated work machines should ensure that these technologies can be used effectively. At the same time, transmission concepts for sensor and telemetry data as well as for teleoperation in emergency situations were researched.

To further develop autonomy and collect important data for future developments, several tests were carried out on the ASFINAG premises and at DigiTrans GmbH, the test region for autonomous vehicles. At the final demonstration on the ASFINAG site, the robotic mower showed its capabilities and the consortium presented a promising combination of innovative technologies for the efficient and safe use of automated work machines in public spaces, away from road traffic.

#### Another milestone reached in the autonomy of work machines

In the future, the technology could be transferred to similar systems. Automated tasks such as mowing, snow clearing or other municipal applications, but also in logistics, e.g. at airports for guiding luggage trolleys, could be implemented. The SMARTER project marks a significant step towards autonomous work machines. It was funded by the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK) as part of the RTI program Mobility of the Future and was carried out by the Austrian Research Promotion Agency (FFG).

#### About the AIT Austrian Institute of Technology

The AIT is Austria's largest non-university research institution. At European level, it plays a key role as the research and technology institution that deals with the central infrastructure issues of the future.

The Center for Vision, Automation & Control is one of the AIT's seven research units. It is dedicated to industrial automation and digitalization and uses opportunities to initiate and drive forward innovations for industry. The Center conducts research in the fields of image processing, automation and control as well as in the application of artificial intelligence methods. The research work at the Center results in innovations to increase the flexibility, adaptivity and resilience of companies while improving energy and resource efficiency and minimizing production costs. The focus of the research is on protecting the environment and people and conserving their resources.

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#### Press contact

Dr. Iman Kulitz, MA  
Marketing and Communications  
AIT Austrian Institute of Technology  
Center for Vision Automation & Control  
Mobil +43 (0) 664 8890 4335  
[iman.kulitz@ait.ac.at](mailto:iman.kulitz@ait.ac.at) | [www.ait.ac.at](http://www.ait.ac.at)

Daniel Pepl, MAS MBA  
Corporate and Marketing Communications  
AIT Austrian Institute of Technology  
T +43 (0)50550-4040  
[daniel.pepl@ait.ac.at](mailto:daniel.pepl@ait.ac.at) | [www.ait.ac.at](http://www.ait.ac.at)