

## Teleoperated driving with a SPiDER: successful pre-tests for Austria's largest automated city bus

In around four months the first prototype of Austria's largest automated city bus will be ready for test operation. But the hardware and software that will later be used in the full electric vehicle can already be tested in practical operation. This is made possible by SPiDER, a HiL platform that behaves like the future bus. VIRTUAL VEHICLE, Mission Embedded and ALP.Lab used this opportunity to test teleoperated driving with unrestricted 360-degree real-time view.

Graz, February 5, 2024 - How do you test systems for an automated city bus that doesn't yet exist? The right answer is SPiDER, a mobile hardware-in-the-loop (HiL) platform that is equipped with the same interfaces as the future bus and can also behave like the bus if desired, turning circle included.

To better explain the context, let's take a look into the near future. In (only) four months TORUS, Austria's largest automated city bus, will be available for testing. With a length of 6.9 meters and (legally limited) 15 seats, the test vehicle stands out from other shuttles due to its size alone. Even more important is the built-in technology: equipped with "open systems" - unique on the market - TORUS can be easily expanded with additional components. Built-in sensors, software used, etc. can be flexibly expanded and individually adapted for each test case - ideal for manufacturers, suppliers, and research projects to be able to test comprehensively.

One of the first test cases deals with the topic of remote-controlled driving, specifically teleoperated assistance: if the automated vehicle encounters an obstacle, a teleoperator takes over and moves the vehicle back onto familiar terrain. This is where our partner Mission Embedded comes in, who provided their established camera system that delivers the essential unrestricted 360-degree real-time view, supporting further automated driving functions such as AI based object detection.

This camera system has now been tested in practice for the first time. Not in the TORUS itself, but in the SPiDER, a test platform that has the same interfaces as the future bus. And thanks to its special driving dynamics capabilities (including 4-wheel steering), SPiDER can also behave in the same way as the future bus.

The testing included teleoperated swerving, driving, and parking with optical support from the camera system. Additionally, the change from fully autonomous operation to remote-controlled operation was tested using traffic cones serving as "obstacles" that had to be avoided manually.

The pre-test was conducted by VIRTUAL VEHICLE, who developed and operated the SPiDER in-house, in collaboration with Mission Embedded who was responsible for the intelligent camera system and ALP.Lab who provided support in developing the use cases and coordinated the successful collaboration.

### FOTOS



Download-Link: <https://www.alp-lab.at/press-corner> (© ALP.Lab)

### VIDEO

A video of the first successful tests can be found here: <https://youtu.be/ENYQFIU1e38>

### **About ALP.Lab**

ALP.Lab is the Innovation Hub for automated climate-neutral mobility and provides comprehensive services for safe and secure testing of automated driving technologies. Founded in 2017 with the support of the Federal Ministry for Climate Protection and the Austrian Research Promotion Agency FFG. Headquartered in Graz, ALP.Lab provides an integrated test chain for automated driving functions and technologies, offering testing activities on test tracks and public roads. Additionally, ALP.Lab offers a holistic traffic monitoring solution to create testing scenarios out of real-life driving behavior in primary, secondary, and urban road networks. Further, ALP.Lab is an accredited Euro-NCAP laboratory for active safety testing and is highly experienced with different testing equipment and proving grounds. A strong network of industrial and scientific partners support the capabilities of ALP.Lab for safe and secure testing of any autonomous mobility solutions.

For more information, visit [www.alp-lab.at](http://www.alp-lab.at) and follow ALP.Lab on [LinkedIn](#) or [YouTube](#)

### **About Mission Embedded**

Mission Embedded is an Austrian high-tech company that provides highly reliable embedded systems and integrated end-to-end system solutions for safety-critical applications. Operating across various industries, including rail & transportation, special vehicles & heavy machinery, industry, medical technology, and aerospace & defense, Mission Embedded offers custom solutions based on intelligent technologies that help businesses to fully exploit the potential of digitalization. The company's expertise lies in developing AI supported assistance and automation solutions, as well as robust communication systems. Mission Embedded is a member of the [Frequentis](#) Group, a leading supplier of safety-critical information and communication systems and builds on 75 years of experience in the development of mission-critical system solutions.

For more information visit [www.mission-embedded.com](http://www.mission-embedded.com) and follow Mission Embedded on [LinkedIn](#)

### **About VIRTUAL VEHICLE**

The VIRTUAL VEHICLE Research GmbH is Europe's largest R&D center for virtual vehicle technology with 300 employees. Research priority is the linking of numerical simulations and hardware testing, which leads to a powerful HW-SW whole system design and automation of testing and validation procedures. Following this focus on industry-related research VIRTUAL VEHICLE is the innovation catalyst for future vehicle technologies.

The international partner network of VIRTUAL VEHICLE consists of around 100 national and international industrial partners (OEMs, Tier 1 and Tier 2 suppliers as well as software providers) as well as over 40 national and international scientific institutions.

For more information, visit [www.v2c2.at](http://www.v2c2.at) and follow Virtual Vehicle on [LinkedIn](#) or [YouTube](#)