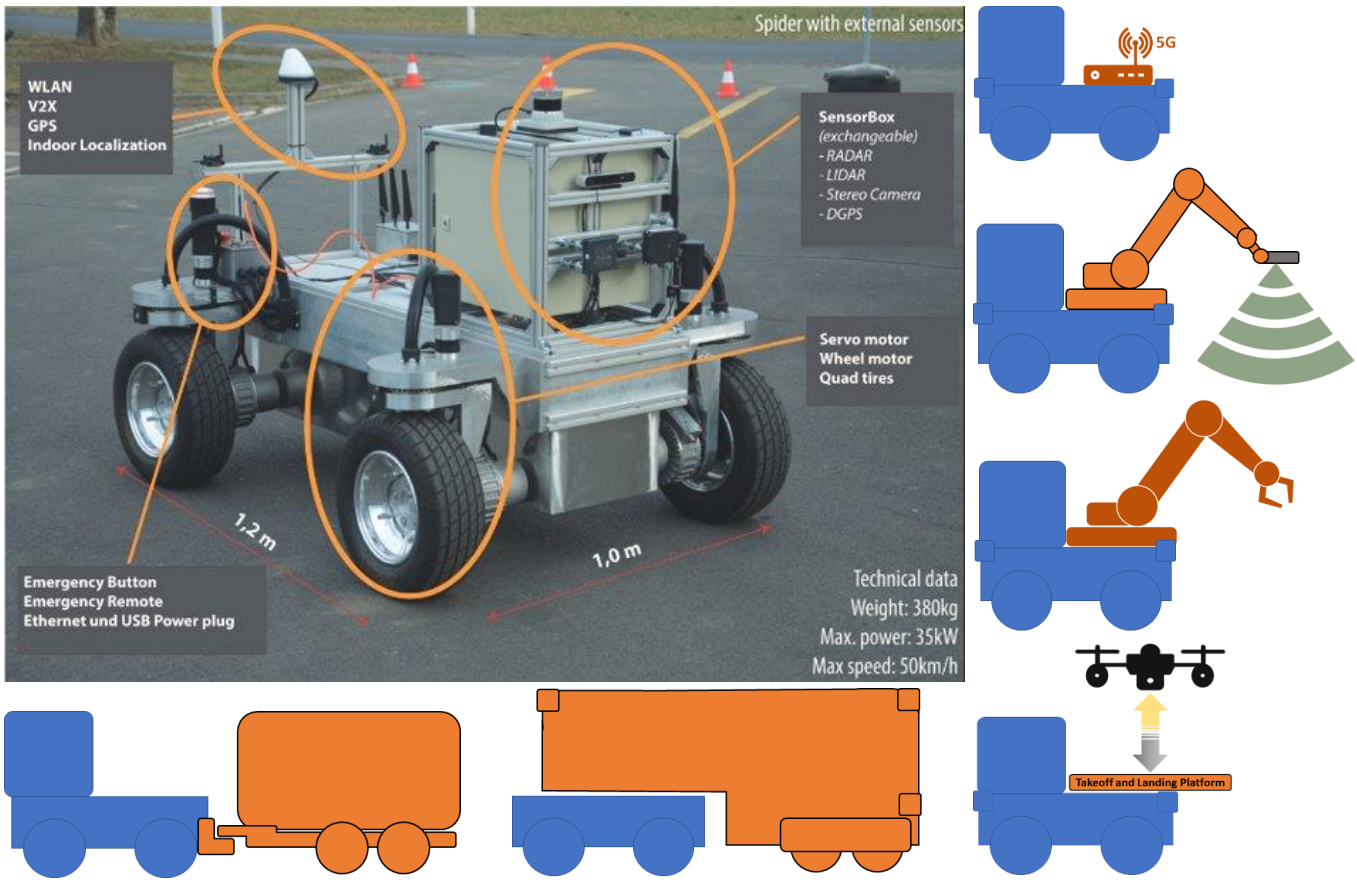
OPEN CALL – LIVING INNOVATION LAB
Extensions and Use-Cases for Autonomous Robot (SPIDER)



BACKGROUND & ADDRESSED CHALLENGE

In the field of autonomous driving or robotics, verification and validation of solutions in the real world are essential. Varying traffic and weather conditions, sensor noise, or noisy hardware feedback from motor controllers can only be simulated with a huge effort. Integration of new functions into a demonstration vehicle is often the faster and more reliable testing method.

However, the process of integrating hardware and software into a test vehicle is a complex task and the gained results are often not reproduceable if the tests are executed manually. Therefore, Virtual Vehicle developed an autonomous robot prototype, the Smart Physical Demonstration and Evaluation Robot (SPIDER). This mobile hardware-in-the-loop (HiL) platform does not only provide solutions for a simple and fast integration of hardware and software, it further implements a broad set of base functions which can be used for the automated execution of tests.

We face two different types of challenges. On the one hand we continuously work on improving SPIDERs base hardware and software functionality. On the other hand, we are open to innovative ideas and technologies which are using the SPIDER as platform.

Virtual Vehicle Research GmbH

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OFFERED TECHNOLOGY

The main features of the SPIDER are highly dynamic omni-directional movement, robust and splash-water proof design, extensibility, and provision of power and data interfaces allowing to control its movements within a built-in safety framework. The flexible driving capabilities allow to execute a wide range of driving scenarios, which are not possible with cars.

The SPIDER can autonomously track predefined paths and uses different localization methods to increase precision and, by using indoor and outdoor systems, ensuring an interruption free test execution also in harsh test environments or within buildings.

The SPIDER is designed for extensibility and can carry all kinds of hardware starting from lightweight sensors, electronic control units up to heavy weight vehicle fronts at arbitrary mounting positions.

You can use your own computing platform and connect it via network or use an integrated industrial computer with CUDA support. For a fast development, the Robot Operating System (ROS) can be used for software integration. Further, SPIDER provides hardware and software for standardized vehicle-to-everything (V2X) communication.

The default sensor set of SPIDER contains four lidar sensors, high precision dual antenna GPS, cameras, odometry and IMU information. We can offer support for the mechanical, electrical, and software integration of your components and provide a set of base functions like localization, path tracking, or collision avoidance.

EXPERIMENT SCOPE

We expect ideas or solutions which either extend the base functions of SPIDER or take advantage of SPIDER in a use case. Below you find a list of extensions (F1-F3) and use-cases (UC1-UC5) for inspiration.

Extension of SPIDER functions:

- **[F1]** Implementation/adoption of a global planner to SPIDER within the ROS framework. The planner should be able to calculate a drivable trajectory within a given grid-map in real-time.
- **[F2]** V2X via 5G. Extension of the existing V2X functions for communication via 5G.
- **[F3]** Extend perception systems of SPIDER. E.g. camera vision or laser-based object detection and tracking.

SPIDER as test platform:

- **[UC1]** Build up a multifunctional robot arm on top of SPIDER. Use the existing functions of SPIDER to safely move the arm to its targets and mount sensors or grasp objects.
- **[UC2]** Use SPIDER as take-off and landing platform for drones.
- **[UC3]** Provide algorithms or functions to use SPIDER as a drawing vehicle for a trailer.
- **[UC4]** Provide ideas or solutions for SPIDER in use cases like first responder, transportation/logistics, road maintenance.
- **[UC5]** Use SPIDER for evaluation of your sensor fusion, localization (indoor or outdoor) or trajectory planning algorithms.

The expected outcome of the experiments is further development of ideas and publication.

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Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
Bundesministerium Digitalisierung und Wirtschaftsstandort
FFG Promoting Innovation.
Das Land Steiermark
SFG

FUNDING OPPORTUNITIES

Start-ups and SMEs benefit from various opportunities of support from the VIRTUAL VEHICLE:

Membership

Financial support for project initiation

In case your application is selected, there is little effort and no risk for you. We help to initiate collaborations and research projects and embed you into VIRTUAL VEHICLE' s existing Partner-Network.

Conditions: Membership: 500 €/p.a.; In the event of project-proposal acceptance, we claim a success fee based on a bilateral agreement. This represents a low-risk activity for SMEs concerning proposal preparation efforts.

Accelerator Support

Financial support for accelerating product development to help SMEs to get to the market.

Depending on a successful project partnership and in case your innovative company is selected, your solution development could be accelerated. You will get access to international networks, know-how and infrastructure, as well as improved market access. VIRTUAL VEHICLE would embed your product / service into follow-up research activities and disseminate your solution via the VIRTUAL VEHICLE network. Finally, we offer proportional funding to accelerate your product development.

Conditions: After successful completion of the product development and market exploitation, we claim a later repayment based on a bilateral agreement. Generated intellectual property rights remain with you.

K2-Research Project

Aligned with the defined long-term Austrian COMET K2 research program **fast-track experiments (up to 6 months)**, executed at VIRTUAL VEHICLE, can also be public (co-)funded within the K2 funding scheme.

Seed Innovation Action for SMEs and Start-ups will be free of charge.

Your application will be reviewed by our Scientific Assessment Board. The board will evaluate the applicant's proposals and select proper candidates. The final number of applications being selected might be different for each call.

Only selected applications will get our support.

CALL INFORMATION

Call Opening	01.09.2020	**Project Duration**	1-12 months; Seed Innovation Action: ~2 weeks
Proposal language	English, German	**Targeting Group**	Start-ups, SME, or mid-caps from EU member states

If you have a promising smart idea, we are happy to receive your application!

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Please use our online application form to send us your proposal and describe:

- In which technology field or discipline are you active
- Your planned application concept and its expected use
- The preliminary benefit
- The industrial relevance and potential impact of your experiment, as well as your plans for exploitation of the results and the future business outlook

Your experiments should be designed to be completed in a maximum of 12 months.

Experiment proposals are very welcome from organisations located in any EU member state and must be written in English or German. Submissions done in any other language will not be evaluated.

Contact: lil@v2c2.at

By transmitting your proposal for the "Open Calls – Living Innovation Lab", you agree to our Data Protection Notice and that your submitted application will be evaluated by an expert jury of VIRTUAL VEHICLE representatives. Virtual Vehicle reserves the right to reject any application at any time without giving reasons. The decision is binding and final. The right to appeal at court is excluded. Further details will be agreed in a separate agreement between accepted applicants and Virtual Vehicle. Any liability of Virtual Vehicle is excluded, except as stipulated by applicable mandatory law. Furthermore, you confirm that the contents of the submitted proposal are independently developed by you without the use of confidential information from third parties and are free of third-party rights to the best of your knowledge.

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LIVING INNOVATION LAB – BRIDGING THE GAP

VIRTUAL VEHICLE facilitates SMEs, Start-ups, and Enterprises to experiment and innovate with new technologies.

The LIVING INNOVATION LAB enables the transfer of knowledge – from academia to industry and the development of highly innovative product solutions. Together with academic and industrial partners, VIRTUAL VEHICLE is bridging the gap between your innovative solutions and early technology adopters.

Successful demonstrations of highly innovative technologies maximize the benefit in exploitation as well as the realistic chances for a market uptake. That's why the LIVING INNOVATION LAB initiates open calls for experiment proposals to expand and strengthen the transfer of technical capabilities and **making innovative solutions, platforms, and data available for experimentation.**

YOUR PARTNER: ACCELERATING INNOVATION WITH VIRTUAL VEHICLE

The Virtual Vehicle Research GmbH is Europe's largest R&D center for future vehicle technology with 300 employees. Our research priority is targeting on supporting virtual system development, which leads to manifold and powerful system design and automation of testing and validation procedures. The focus is on industry related research and thus makes VIRTUAL VEHICLE the innovation catalyst for upcoming digital mobility and transportation technologies.

WHO CAN APPLY?

You are…

- developing smart, innovative solutions in digital future technologies?
- bridging the physical and virtual world with advanced approaches and industrialized solutions?
- wishing to access the network, infrastructure, and know-how of VIRTUAL VEHICLE to improve your product or service?
- interested in using VIRTUAL VEHICLE's decades of experience in interdisciplinary and virtual system development?
- Interested to be embedded into upcoming and funded R&D-projects via a Single-point-of-contact-institution?
- Looking for a chance for financial support with manageable long-term costs

…then do not miss this outstanding opportunity and apply to one of the open calls to make your innovative idea come true!

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