



Spotlight: Engineering tomorrow's mobility

Focus on e-mobility

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»»
Our goal is to develop intelligent and sustainable mobility solutions that meet both the requirements of industry and the needs of society.«

Prof. Dr. Sanaz Mostaghim,
Fraunhofer IVI Institute Director

Shaping transformation together



*Kornelia Brüggert (l.) and
Prof. Dr. Sanaz Mostaghim (r.).*

Mobility is undergoing a transformation—one that is more complex and rapid than ever before. Rising energy prices, technological upheavals, and societal challenges make clear that tomorrow's solutions do not emerge in isolation, but through the collaboration of many stakeholders. This is precisely where Fraunhofer IVI comes in.

For our institute, the past year was marked by strategic realignment. Through a participatory process, we refined our perspectives, developed new ideas, and launched concrete initiatives. This journey was characterized by open dialogue, extensive technical discussions, and a clear commitment to actively shaping change. We have consistently kept in mind the balance between strategic as well as professional issues and efficient administrative processes in order to create a stable foundation for the coming years. Thanks to the support of our employees, as well as the Fraunhofer Headquarters and our advisory board, we have succeeded in this endeavor. We would like to express our heartfelt thanks to everyone involved.

What particularly sets us apart as a Fraunhofer institute is that we combine scientific excellence with market-driven application. Our goal is to develop intelligent and sustainable mobility solutions that meet both the requirements of industry and the needs of society. In this way, Fraunhofer IVI positions itself as a reliable driving force at the intersection of research, business, and the public sector.

Current developments underscore the relevance of this work. The dynamics of the energy markets have recently demonstrated impressively how strongly mobility is influenced by external conditions—and how great the need is for resilient, efficient solutions.

E-mobility is increasingly coming into focus, but at the same time raises new questions, such as the need for high-performance charging infrastructure solutions suitable for everyday use. We are making concrete contributions in this area with practical approaches such as our underbody charging system.

The combination of technological expertise and comprehensive domain knowledge forms the backbone of our applied research ranging from solutions for civil security to innovations in public transport ticketing and autonomous shuttle systems. We have strategically expanded our portfolio by establishing a new research group on swarm technologies and by launching initiatives to support small and medium-sized enterprises in implementing AI-based processes. Our work on accident prevention among children and adolescents received special recognition: The Fraunhofer IVI Accident Prevention School (FAPS) was featured in the ZDF Plan b series and honored with the DVR Vision Zero Award.

This magazine is aimed at our partners in academia, business, and politics, as well as anyone interested in the future of mobility. It provides insights into our current research topics, highlights technological developments, and introduces the people whose dedication and expertise are shaping this transformation.

We hope you will be inspired.

Sanaz Mostaghim

Prof. Dr. Sanaz Mostaghim
Institute Director

Kornelia Brüggert

Kornelia Brüggert
Head of Administration



Long-term perspective on research: Strategy process



The research departments at Fraunhofer IVI

Range of services and equipment



Interview

All good things come from below: Seven questions for Dr. Frank Steinert



Read the digital version and discover additional content.

Spotlight

Electrification of commercial vehicles: Practical support via the IVImon analysis platform and the Underbody Charging System (UBCS)



Trade fairs and events

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Fraunhofer IVI

About us

Fraunhofer IVI carries out research and development work to create intelligent, functionally safe, and resilient solutions for mobility and infrastructure. The institute's client target groups include industry, public transportation operators, the public sector, and academia. With a focus on automated systems in logistics and agriculture, autonomous driving and flying, vehicle and traffic safety, ticketing and fare systems in public transportation, complex security systems, and AI-supported process development and optimization, the institute offers industry-specific solutions across the entire innovation chain—from pre-competitive research to practical application.

Fraunhofer IVI cooperates closely with Dresden University of Technology, Otto-von-Guericke-Universität Magdeburg, as well as Technische Hochschule Ingolstadt.



Facilities and equipment

In addition to high-performance laboratory equipment, innovative test platforms and vehicles as well as state-of-the-art IT structures, the institute's research infrastructure also includes a technical center comprising a vehicle hall and an adjacent test track.

More detailed information can be found directly on the department pages (p. 12 to 14).



Group and Alliance membership

Fraunhofer ICT Group

www.iuk.fraunhofer.de/en.html

Fraunhofer Big Data and Artificial Intelligence Alliance

www.bigdata-ai.fraunhofer.de/en.html

Fraunhofer Transport Alliance

www.verkehr.fraunhofer.de/en.html

Fraunhofer Energy Alliance

www.energie.fraunhofer.de/en.html

Fraunhofer Battery Alliance

www.batterien.fraunhofer.de/en.html

Advisory board

Chairman

Nils Schmidt,
Head of Yunex Traffic Deutschland

Members

Prof. Dr.-Ing. Thomas Brandmeier,
Scientific Director, CARISMA-ISAFE, Research Professor
for Vehicle Safety and Vehicle Mechatronics,
Technische Hochschule Ingolstadt

Prof. Dr.-Ing. Marcus Geimer,
Director, Division Mobile Machines,
Karlsruher Institut für Technologie

Dr. Babett Gläser (until 2025),
Head of Research Department, Saxon State Ministry for
Science, Culture, and Tourism

Mario Herber,
Senior Chief Superintendent, Head of Department »Central
Services«, Dresden Police Department

Prof. Dr. rer. soc. Meike Jipp (since 2026),
Divisional Board Member for Energy and Transport,
German Aerospace Center

Stefan A. Lang,
Director Market Strategy & Solutions,
Sensor-Technik Wiedemann GmbH

Peter Merz,
Advisor for Research & Innovation,
Nokia Solutions&Networks GmbH & Co. KG

Katja Müller,
Head of HR Transformation,
Lausitz Energie Bergbau AG

Sonja Penzel,
Inspector, Saxony Police Department

Prof. Dr.-Ing. Peter Pickel, (until 2025),
Honorary professor, RPTU Kaiserslautern-Landau

Dr. rer. nat. Ann-Kathrin Schatz (since 2026),
Director of Division »Federal-States-Research Institutions«,
Saxon State Ministry for Science, Culture, and Tourism

Dr.-Ing. Katharina Seifert,
Head of Strategy and Steering Group R&D China,
Volkswagen Group China

Lars Seiffert,
Board of Operations and Human Resources,
Dresdner Verkehrsbetriebe AG



Organizational structure

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	Traffic Safety and Vehicle Automation	Prof. Dr. Thoralf Knotz Phone +49 351 4640-628 thoralf.knotz@ivi.fraunhofer.de <i>Vehicle Control and Sensor Systems</i> Dr. Felix Keppler <i>Vehicle and Road Safety</i> Maria Pohle
	Strategy and Optimization	Dr. Kamen Danowski Phone +49 351 4640-660 kamen.danowski@ivi.fraunhofer.de <i>Digital Business Processes</i> Denise Holfeld <i>Disposition</i> Dr. Kamen Danowski
	Intelligent Cooperative Systems	Prof. Dr. Sanaz Mostaghim Phone +49 351 4640-700 sanaz.mostaghim@ivi.fraunhofer.de <i>Cooperative Systems</i> Dr. Thomas Otto <i>Swarm Technology</i> Dr. Christoph Steup
Application Center	Connected Mobility and Infrastructure	Prof. Dr. Sanaz Mostaghim Phone +49 351 4640-700 sanaz.mostaghim@ivi.fraunhofer.de

Long-term perspective on research: strategy process

What key areas will our research address through 2030 and beyond? This question shaped a comprehensive strategic planning process at Fraunhofer IVI in 2025. The goal was to systematically develop and ensure the future viability of our research areas and business units. We focused on the respective strategies of the individual research divisions: Existing thematic orientations were critically examined, trends were analyzed, and potential for cross-group collaboration was identified.

The process was not intended as an abstract exercise, but rather as concrete support for managers in their day-to-day work. The use of practical methods and tools, combined with extensive professional exchange, enabled the participants to gain clarity on goals and refine priorities. The target was to strengthen the institute's ability to make its own decisions in order to take responsibility for the targeted allocation of resources in the dynamic research and innovation environment and set a sustainable course for the institute.

A key element of the process was the active involvement of all employees. Participatory formats such as surveys and an interactive townhall meeting made it possible to incorporate perspectives from across the entire institute and to ensure transparency in the processes. It became clear that strategy cannot emerge solely from the leadership level; rather, it thrives on a shared understanding, on dialogue, and the input of many.

The strategy process was officially completed with a comprehensive audit. This, however, does not mark the end. Rather, the results form the basis for concrete measures to be implemented this year that will actively shape the institute's strategic development. For example, the conceptual foundation was laid for an innovation lab that will bring new impetus and foster more intensive networking for activities in the field of artificial intelligence at Fraunhofer IVI. Strategy 2030+ thus remains an ongoing process—and a key success factor for our collaborative work in the future.



Strategy thrives on a shared understanding, on dialogue, and the input of many.«



Business units



Cooperative automated systems



Mobility and digital services



Vehicle and road safety



E-mobility



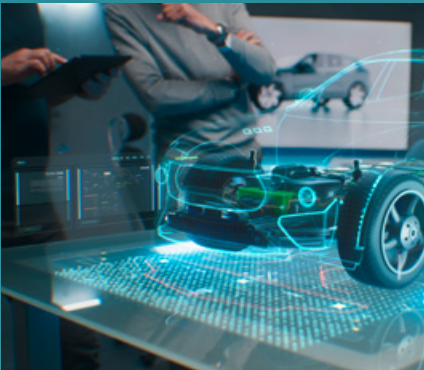
Autonomous public transportation shuttles



Mobility data



Civil protection



Automotive technologies



Autonomous commercial vehicles



Digitalization and decision support



Safe infrastructure

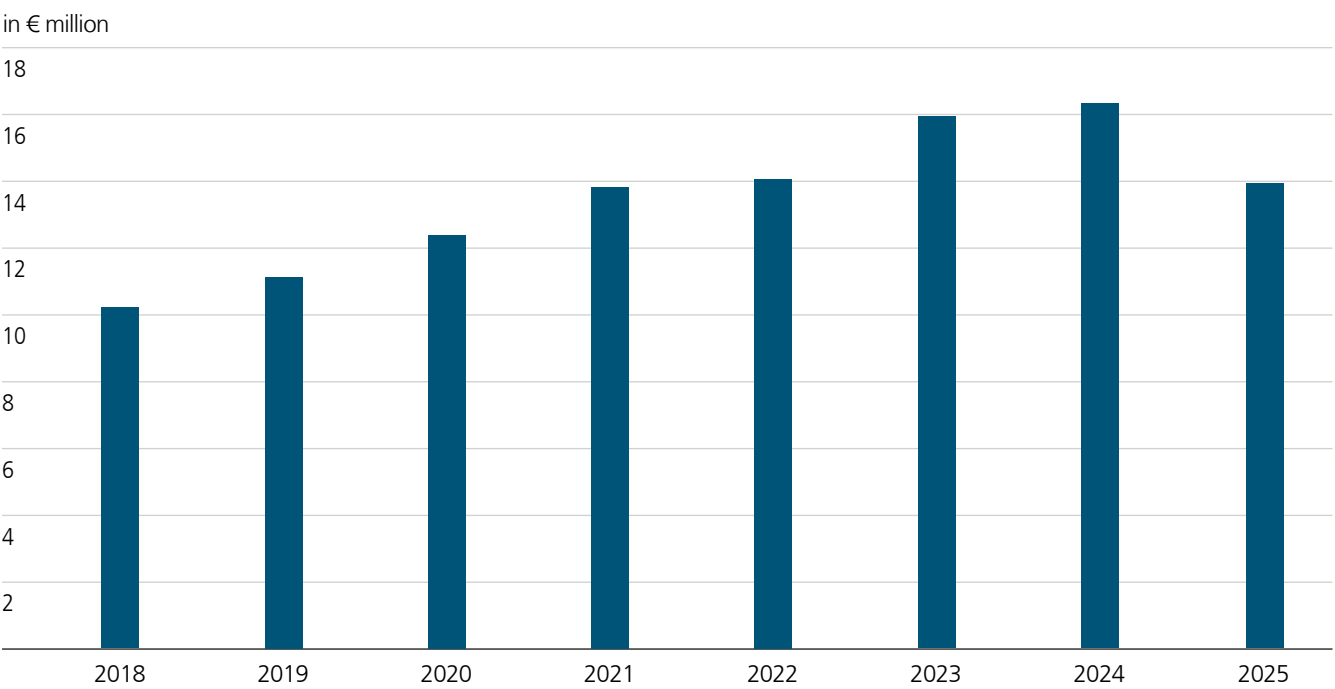


Automation in agriculture

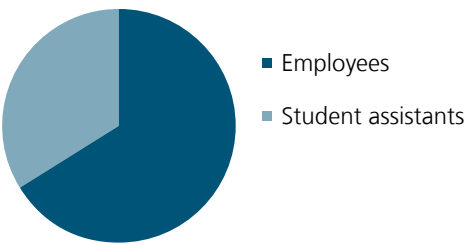
Facts and figures

Economic development 2025

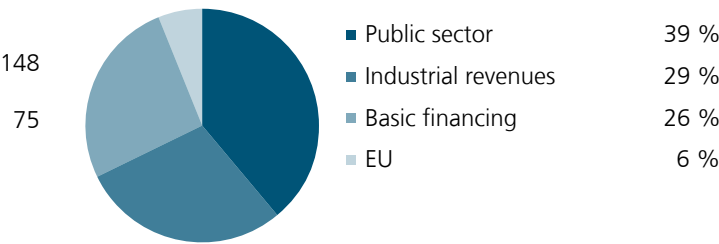
Financial development



Staff



Operating budget



Academic output

- Publications
- Teaching engagements
- Final theses
- Public body membership
- Patents and certificates
- Trademarks

All details on the institute's academic output:



Departments



Mobility and Digital Services

Complex transportation systems are becoming increasingly digital and interconnected. With the help of information and communication technologies, it is possible to improve traffic coordination, establish new mobility services and involve passengers and other road users more actively. For 25 years, Fraunhofer IVI has been developing robust and practical solutions in the field of mobility and accompanying digital services. In this context, the institute is cooperating closely with a wide range of stakeholders, such as transport companies and associations, partners from industry, and public institutions.

The two working groups »Data Systems and Assistance« and »Ticketing and Fares« have an interdisciplinary profile. The department's successful work is based on in-depth knowledge and extensive experience in the fields of computer science, mathematics, software technologies, information and automation technology, and transportation science, combined with expertise gained from applied projects.



Vehicle Systems

Mobility is the key to both economic success and individual quality of life. To safeguard this vital asset of modern industrial society for the long term, the entire transport sector must be made more efficient and climate-friendly.

The department has many years of expertise and experience in the engineering of vehicle drives—this includes complete vehicle design as well as component solutions, innovative and hybrid drives, methods for energy-efficient vehicle operation in both the drive and the auxiliary units, and software solutions for system and component diagnostics and predictive maintenance. The R&D work focuses on commercial and special-purpose vehicles, commercial vehicle fleets, as well as machinery for agriculture, construction and mining. Particular challenges lie in holistic system integration with the aim of reducing weight, volume and costs, as well as in minimizing energy consumption and emissions in both individual vehicles and vehicle fleets.

Contact and range of services

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Traffic Safety and Vehicle Automation

Rising costs, the pressure of international competition and staff shortages are forcing many industries, including agriculture and logistics, to seek innovative solutions. The focus in these sectors is on the automation of process flows. Highly automated vehicles are subject to special safety requirements, as they must be able to navigate safely in a wide variety of traffic situations—both on public roads and in non-public areas.

The helyOS® (highly efficient online yard operating system) control tower system was developed to coordinate driving tasks in automation zones. It enables efficient processes across diverse sectors such as logistics, airport operations and agriculture. Driving and test scenarios for vehicle automation are designed based on accident data and traffic observations, covering the entire process chain from scenario creation to implementation on test tracks.



Strategy and Optimization

The increasing availability of data and up-to-date information offers public authorities and companies new opportunities to optimize their processes. For this, however, solutions are required that can quickly and effectively process large amounts of data and cope with domain-specific problems.

The department focuses on research topics in civil security and hazard control, business process analysis and infrastructure management. The team develops innovative optimization methods and algorithms, and designs and implements complex systems for practical use. A major objective is providing decision support for the optimized planning and control of resources.

The department's interdisciplinary team, which includes computer scientists, mathematicians, and geoscientists, collaborates very closely with end users.



Intelligent Cooperative Systems

Automated and connected mobility solutions are highly complex. Difficult-to-assess traffic situations, multimodal on-demand services in rural areas, or automated fleet solutions using swarm intelligence on highways and in depots—automated mobility services must be able to handle all these situations safely and efficiently.

Through functionally safe infrastructure assistance, resilient connectivity and collaboration, vehicles are enabled to safely navigate complex situations. Algorithms for data analysis and mobility management are used to record traffic-relevant scenarios and evaluate anomalies in the transportation network. With the help of simulation environments, alternative courses of action can be analyzed and evaluated based on this information. Thanks to the integration of swarm intelligence, it is possible to optimize and efficiently control entire mobility systems.



Fraunhofer Application Center »Connected Mobility and Infrastructure«

Infrastructure assistance for smart city applications and infrastructure-enabled autonomous driving is currently facing a wide range of challenges. The same is true for the field of autonomous aviation. On the one hand, there is a lack of comprehensive multimodal datasets needed to bring the required technologies to market maturity. On the other hand, AI systems are required to achieve higher levels of reliability and trustworthiness.

The application center brings together extensive expertise in the development of new and trustworthy AI and sensor systems, as well as in the fields of communication technologies, robotics, and sensor data fusion, to develop tailored solutions. The R&D work conducted in recent years has laid an important foundation for enabling targeted data set generation in both domains, as well as comprehensive reliability analytics.

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Spotlight: Electrification of commercial vehicles

Practical support for the transformation of company vehicle fleets

The electrification of heavy-duty transportation is no longer a vision for the future—it is an operational reality. However, the transition to electric vehicles presents fleet operators and municipal services with new challenges: How can vehicle availability be maximized? How can batteries be used optimally without shortening their service life? How can the flood of data be transformed into concrete recommendations for action, and how can electric commercial vehicles be charged safely, quickly, and in a space-efficient manner without costly overhauls of existing operational structures? With the IVImon analysis platform, the underbody charging system (UBCS), and a wide range of consulting services, Fraunhofer IVI offers answers to these questions.

Economic and political conditions are currently creating favorable circumstances for the transition to e-mobility. The German federal government is supporting the expansion of charging infrastructure for battery-electric heavy-duty commercial vehicles—including both company-owned depot solutions and publicly accessible charging stations. At the same time, the toll exemption for zero-emission trucks has been extended through mid-2031, providing companies with long-term planning certainty and enabling them to achieve significant operational cost savings compared to diesel vehicles. Rising diesel prices, as well as stricter climate protection and CO₂ targets, are also increasing the economic pressure to decarbonize road freight transport. At the same time, real-world examples from the logistics sector show that electric trucks can already be operated profitably today, particularly in regional transport and especially when using in-house charging solutions that enable high vehicle utilization rates. Added to this are technological advances in range, charging speed, and charging infrastructure. Against this backdrop, now is a particularly opportune time to invest in e-mobility, gain experience, and benefit from subsidies and regulatory advantages.

Comprehensive support for the transition to electric vehicles

Fraunhofer IVI works hand in hand with partners from industry and academia and draws on in-depth expertise in the development of disruptive technologies. The institute's researchers analyze the specific requirements derived from each operator's or municipality's particular use case and identify the core objectives of the innovation. This leads to cost- and energy-efficient solutions for the electric mobility challenges of tomorrow.

Beyond charging infrastructure, the institute provides consulting on all aspects of the transition to electric vehicles—from operational planning to calculating economic viability—and works with users to develop appropriate implementation strategies. Fleet operators, municipal services, and logistics companies thus receive support throughout the entire value chain, including fleet design, the development of operational and charging strategies, and assistance with issues of data sovereignty in battery monitoring and analysis.



Hands-on applied research: The Underbody Charging System demonstrator shows users how charging from below works.



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Our goal:
to ensure and
optimize the
cost-effective
operation of
electric vehicles
through
data-driven
decisions.«

Data-driven analytics for cost-effective fleet operation with IVImon

To ensure optimal use of charging times and batteries, modern solutions today rely on detailed route planning, intelligent charging strategies, and precise range predictions. In addition, new business models centered on batteries are emerging, such as separate leasing of vehicles and batteries, partnerships with charging infrastructure operators, and new service center concepts.

A key focus in this context is on data-driven approaches. With this angle in mind, Fraunhofer IVI is developing telemetry and analysis systems that generate real added value from vehicle and battery data, and integrates these with smart charging and infrastructure solutions. This enables efficient battery use and helps shape mobility for the future.

The IVImon analysis platform developed at the institute is specifically designed for fleet applications in areas such as logistics, freight shipping, and municipal operations. Its goal is to ensure and optimize the cost-effective operation of electric vehicles through data-driven decisions.

A general fact is usually the following: The data is available, but its potential is far from being fully realized. IVImon combines state-of-the-art analytics with practical functions that significantly simplify day-to-day fleet management. Real-time remote diagnostics enable the continuous monitoring of battery states and aging processes without having to take vehicles out of service. Operators have insight into critical parameters at all times and can take proactive steps.



Customizable dashboards for practical recommendations.

Long-term data retention is the foundation of IVImon. The continuous recording of relevant parameters creates a kind of digital twin of the fleet, making it possible to track developments over months and years—an essential basis for investment decisions and maintenance planning. Costly downtimes can be avoided: The system identifies anomalies and performance deviations at an early stage, long before they lead to critical operational disruptions. By adapting operating and charging strategies to the actual battery conditions, service life can be extended by up to 20 percent.

The IVImon platform is not being developed in an ivory tower, but rather in close collaboration with fleet operators, manufacturers, and other stakeholders. In workshops, analytical procedures and evaluation methods are specifically tailored to the requirements of real-world operations. Customizable dashboards ensure that all IVImon users receive exactly the information relevant to their role—from dispatchers to technicians to managing directors. The dashboards, too, are continuously refined in collaboration with users.

A long-term study on public transport vehicles conducted by Fraunhofer IVI demonstrates that data-driven fleet management is not just theoretically sound: Over a period of more than two years, the energy consumption and charging behavior of an urban electric bus fleet were analyzed in detail. The results show that targeted adjustments to operations and to charging management can reduce energy consumption, extend battery life, and significantly lower CO₂ emissions without requiring major changes to operational procedures.

Intelligent charging infrastructure as the key to availability

Whether for light vehicle fleets, heavy trucks, ferries, or large machinery: Professional users need charging processes that do not slow down operations. Specifically, this means that maximum amounts of energy must be transferred in the shortest possible time without disrupting workflows and with minimal effort on the part of the operating staff. An optimal charging system integrates seamlessly into the operational schedule, requires virtually no user interaction, and thus ensures maximum equipment availability.



**Optimized battery strategies
for public transport: study
published in World Electric
Vehicle Journal WEVJ**

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Prototype of the UBCS on the Fraunhofer IVI test track in Dresden.

Underbody Charging System: automated, space-saving, future-proof

Municipal services, logistics companies, and operators of large depots often face the same question: How can we electrify our fleets without having to acquire additional space? One solution that addresses this challenge is a system that enables automated, space-saving charging via the vehicle underbody.

Based on many years of experience and pre-competitive research, Fraunhofer IVI developed the Underbody Charging System (UBCS). Unlike inductive systems, which have comparatively long charging times and high energy losses, the UBCS operates conductively. Thanks to the butting principle optimized at the institute, it does not require active cooling and is therefore ideally suited for high charging power.

The infrastructure component of the charging system is recessed into the ground. Once a vehicle is positioned above it, an automated charging process can be started at the push of a button. The contact unit then extends out of the ground, connects to the interface on the vehicle, and transfers energy at high power. There is no need to handle heavy plugs at any time.

Another advantage: The existing infrastructure can remain unchanged. Vehicles are parked side by side, just as before. Additional charging stations that would block parking spaces are not necessary.

The technology is also practical from an economic standpoint. Installation only requires standard civil engineering work without any additional specialized structures. Especially in cities where every additional square meter is expensive, the system can be integrated into already planned renovations or refurbishments without requiring major restructuring of the existing space. For operators, this means planning certainty because they are investing in charging infrastructure that will remain usable in the long term, even as vehicle models change in the future.

Fraunhofer IVI invites municipalities and companies whose fleets are about to be electrified, those rethinking their depot strategy, or those planning new investments, to participate in further pilot projects.

Through a combination of comprehensive consulting, data-driven decision support, and smart charging infrastructure—including automated underbody charging systems—the institute is developing solutions that not only enable the transition to electric mobility but also make it economically viable and ensure its long-term sustainability.

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Underbody Charging System

- No additional space required for charging infrastructure at the charging location
- No open cables, no vulnerability to cable theft and vandalism
- One contacting principle for different use cases: from trucks to cars and autonomous public transport shuttles to autonomous agricultural machinery
- Fully automated charging process at the push of a button: no manual handling of heavy cables and plugs
- Charging capacities
 - up to 1.2 MW for cars
 - up to 4.5 MW for electric commercial vehicles
- Maximum charging voltages of up to 1000 V (cars) or 1250 V (trucks) and very high charging currents of up to 2000 A and above
- Vehicle interface (ACD-U counterpart) is easy to retrofit and compliant with DIN EN 61851-23-1
- Operation without any contact to electrical components: no additional training for driving staff required

Interview

All good things come from below

Seven questions for Dr. Frank Steinert

Electric commercial vehicles have long been more than just a topic for the future—they are currently becoming a critical competitive factor for logistics, municipalities, and industry. In this interview, Dr. Frank Steinert explains why the total cost of ownership is shifting in favor of electric trucks, what role the right charging infrastructure plays, and why the Underbody Charging System is key to cost-effective depot charging.

Dr. Steinert, why do you think the electrification of fleets is a key issue for logistics, local governments, and industry right now? And what role does the Underbody Charging System developed by you and your team play in this?

There are several reasons why the topic of electrification is currently so high on the agendas of fleet operators. For one thing, the regulatory framework for purchasing electric trucks is very favorable at the moment—consider, for example, the toll exemption in Germany. Second, fuel prices have risen so dramatically in recent months and years due to the global political situation that electric vehicles have now become very attractive to logistics companies in terms of total cost of ownership. In addition, there have been significant developments in the manufacturer market over the past two years. Vehicles produced today have significantly longer ranges, and maintenance requirements have also decreased. This finally makes electrification a realistic option for operators. Many freight carriers have already purchased electric trucks and are finding that the transition is going smoothly; beyond the initial trial phase, they can certainly envision continuing to opt for electric vehicles for their next fleet.

This brings us to the exact point where we need to give more thought to the charging infrastructure. Thanks to developments in the passenger car sector, the public infrastructure will soon be ready to enable practical charging of electric trucks on the road. From an economic perspective, however, depot charging is of central importance—and this is where the underbody charging system offers a decisive advantage: Not only can it transfer very large amounts of energy, but, more importantly, it does not require any additional space at the depot, since it is recessed into the ground in such a way that vehicles can simply drive right over it. There is no need to purchase additional land, and from a structural point of view, the depot can remain as it is.

The system builds on your experience with the roof pantograph for electric buses. Why was overhead charging chosen for urban public transport?

The roof pantograph is a charging system that we developed about 15 years ago for electric city buses. The primary requirement was to fully recharge the vehicle at the end of the line as quickly as possible during the drivers' breaks, in time for the next cycle.

City buses offer the advantage of them all having a very similar design, regardless of the manufacturer. The roof is the lowest common denominator here, so it was clear to us that our charging system would have to be mounted on the roof and operate automatically at the push of a button. Our solution: A canopy with a multipole contact system is suspended above the bus on the roadside; the bus drives underneath it, the pantograph extends, and establishes a connection with the infrastructure. Through this principle, we struck a chord with the bus industry just as the topic of electric mobility in public transportation was gaining momentum. We demonstrated the entire system with the EDDA-Bus prototype vehicle in Dresden, which was met with enormous interest from numerous transport agencies and subsequently implemented in practice.



From fast charging on the roof to a fully automated charging system below the vehicle—what principles did you transfer from one to the other?

Building on the expertise we had developed in the areas of contact technology and automation, we then turned our attention to other industries where electrification plays a role. Our vision: Making the charging of electric vehicles as quick and easy as filling up a conventional gas tank.

Ideally, this solution should work for both passenger cars and all other vehicle categories—especially in the commercial vehicle sector, which has historically been our focus. And since the lack of space for charging infrastructure is a major challenge here, we realized early on that a solution with a laterally mounted plug connection was out of the question. This left us with only one option: charging from below—and tackling all the challenges that entails: water, dust, leaves, as well as the weight and proper positioning of the vehicle. Our researchers have succeeded in finding a viable solution for all the constraints involved in underbody charging, so that the system has now reached the point where it is market-ready.

Many fleet operators ask very openly about cost-effectiveness. How does the Underbody Charging System help reduce costs, make better use of space, and simplify operations at the depot or maintenance facility?

Energy costs are a key factor in cost-effective operations, and efficient charging at depots plays a crucial role in this regard.

Here, operators can charge their vehicles much more affordably than on highways or at public charging stations. This makes a system that meets charging needs right on the company's own premises particularly attractive for hub-to-hub transport. This is particularly interesting, for example, for use cases in which vehicles shuttle between a company's various locations, or in distribution operations: In these cases, a vehicle completes a daily route with its cargo and returns to the depot at the end of the workday to recharge.

Our numerous discussions with users have also shown that the space required for the charging infrastructure plays a particularly important role: Every charging station means fewer parking spaces for the fleet. Compared to purchasing new land—which can be extremely expensive, especially in urban areas—purchasing a solution for charging from below is the more cost-effective and therefore preferred option for operators.

Safety and standardization are crucial when it comes to charging. What role does Fraunhofer IVI play in the relevant committees? How does this benefit industry partners?

The short charging times we have achieved are accompanied by very high system voltages of up to 1,250 volts and high charging currents of 2,000 amps and more. Therefore, safety played an essential role in the development of the contact system—whether in terms of protection against accidental contact, preventing unintended overheating, or safeguarding the overall charging process control.

Standardization is extremely important for resolving the so-called »chicken-and-egg problem.« This means that vehicle manufacturers will only integrate a technology if compatible charging infrastructure also exists and for which there is demand. At the same time, a new charging technology will only be implemented if there are vehicles on the market that can use it for charging. Our institute therefore supports the development of these systems through active participation in standardization committees and industry associations at both the national and international level.

One thing is certain: There will be a standard for underbody charging that both vehicle and charging infrastructure manufacturers can rely on. It should be defined so that even very high charging capacities will be covered in the future. With our system, which achieves charging capacities of up to 4.5 megawatts, we are well on our way to playing a decisive role in shaping the global standard. Our industry partners are already benefiting from this today, as they are testing the system with us at an early stage and, as early adopters, are able to experience the future of charging firsthand.

One of these partner organizations is Stadtreinigung Dresden, with which you are testing the system in real-world conditions. What feedback surprised you?

We were surprised by how enthusiastic the drivers were about the technology and how quickly they got the hang of using the system. We had planned a training session on proper vehicle positioning to ensure that the positioning tolerance of the charging interface would not be exceeded.



However, the drivers were almost offended that we wanted to practice positioning the truck with them—on the very first try, all the test drivers parked the truck in the correct spot. Of course, this was also impressive proof for us that our system works as seamlessly as planned and does not require any costly training.

In a nutshell: What slogan would you print on a large billboard?

It won't get any easier than this!



With the Underbody Charging System, we are well on our way to playing a decisive role in shaping the global standard.«

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Trade fairs and events 2025

February 25-26, 2025 | C-ITS Forum 2025

At the C-ITS Forum, more than 220 experts from the fields of research, business, and government gathered to discuss potentials, rollout strategies, and practical solutions for cooperative intelligent transportation systems. Fraunhofer IVI participated by presenting a talk on FGSV guidelines for technology upgrades at traffic signal systems and by moderating a session on C-ITS prioritization for emergency vehicles and public transportation.

March 18, 2025 | Completion of iECO project

Over three years, 11 partners collaborated in the BMWK-funded iECO project to develop a future-proof digital infrastructure for the construction industry. The key outcome: a Gaia-X-compliant data space that serves as the foundation for a digital twin of the entire building lifecycle and enables innovative smart services.

March 25, 2025 | Data-based safety: exchange with the Saxony State Office for Geospatial Information

During their visit to Fraunhofer IVI, representatives from the State Office for Geospatial Information discussed the potential of precise geospatial data for emergency response. Using the MobiKat® crisis management system as an example, they explored how official geospatial data combined with scientific algorithms can add value to real-world operational scenarios.



March 28, 2025 | Visit by Saxony-Anhalt's Ministry of Infrastructure and Digital Affairs

Fraunhofer IVI welcomed high-ranking guests from Saxony-Anhalt: State Secretary Sven Haller and Sebastian Schmerbeck, Head of the Information and Technology Division at Nahverkehrsservicegesellschaft Sachsen-Anhalt GmbH, visited the institute to learn about its research priorities and areas of expertise. The visit provided a good opportunity to strengthen the dialogue between academia, politics, and the professional sector and to identify potential areas for future collaboration.



March 31 - April 4, 2025 | Hannover Messe 2025

Together with Fraunhofer CCIT, Fraunhofer IVI presented the »Edge-Cloud Continuum« research focus at the joint booth of the Fraunhofer-Gesellschaft. The »Smart Track« exhibit demonstrated how intelligent infrastructure solutions—ranging from traffic lights and sensors to smart traffic monitoring and infrastructure-assisted automated driving—can be implemented through the seamless integration of edge and cloud technologies.

April 2, 2025 | KoSiNuS research project launched

The goal of this ERDF-funded collaboration between Saxon supplier companies and Fraunhofer IVI is to develop key components and architectures for autonomous mobile machines in order to validate their perception systems and ensure their practical applicability.



April 10, 2025 | United by Traffic and Transport Sciences: kick-off meeting with TU Dresden

An initial meeting was held at the institute with representatives from the »Friedrich List« Faculty of Transportation Sciences at TU Dresden to discuss research approaches, areas of expertise, and opportunities for collaboration.

May 22, 2025 | Stadtreinigung Dresden tests Underbody Charging System for e-trucks

Fraunhofer IVI, in collaboration with Stadtreinigung Dresden GmbH, has launched a field test of an automated charging system designed to sustainably improve the efficiency and safety of electric vehicle charging in urban logistics operations.



June 3, 2025 | Automation of articulated bus successfully demonstrated within IDEA research project

The IDEA (Innovative Depot Automation) project focused on combining positioning and communication functions within a 5G campus network to enable the precise localization and targeted control of public transport vehicles. Using optimally tuned control algorithms, the project achieved precise control of an automated articulated bus in the depot. This result was presented during the final demonstration in Torgau.

June 5, 2025 | Completion of LAURIN project

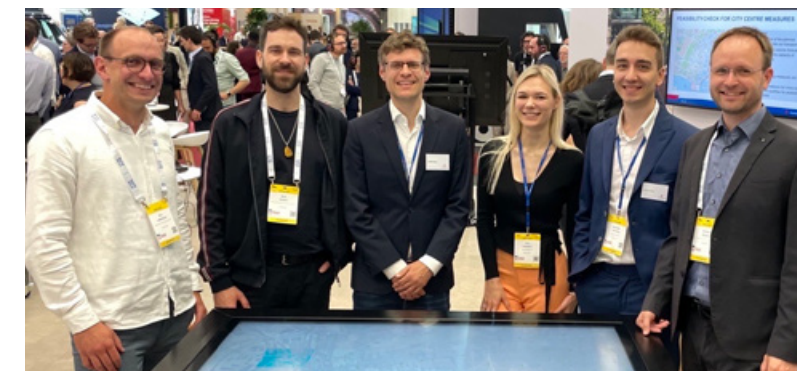
The BMDV-funded project was successfully completed at DEKRA Lausitzring. As part of the mFUND initiative, the consortium developed and tested digital data services and system architectures for the comprehensive validation of automated driving functions. A key result is the ability to reproducibly simulate complex traffic scenarios using real-world data and simulations on test tracks with vehicle swarms.

June 11-15, 2025 | CVPR 2025: Improved environment perception for autonomous aviation

At the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) in Nashville, USA, Fraunhofer IVI and the Institut Polytechnique de Paris presented the new »Semantic Similarity Propagation« method for improving image stability in videos captured by autonomous aerial vehicles. The method ensures that the AI's »comprehension performance« remains stable across multiple video frames—even when the camera is moving rapidly.

June 15-18, 2025 | UITP Summit 2025

At the UITP Summit in Hamburg, the institute presented the ahoi research project. The project marks an important milestone for the targeted, safe, and scalable rollout of autonomous transportation in public transport.



June 18-19, 2025 | Öko-Feldtage 2025

At the Öko-Feldtage 2025 in Thallwitz, a Saxon trade fair for organic farmers, Fraunhofer IVI presented the fully electric field robot CERES in combination with a trailer featuring an automatic charging system. Another booth was dedicated to the Feldschwarm® Ecosystem project. The focus here is on developing a technology platform for highly automated and semi-autonomous machines.

August 19, 2025 | Participants of tryING study taster course visit the institute

As part of the tryING program, the all-female participants visited the institute to learn about current research projects in mobility. Following introductory presentations and discussions, the guests gained fascinating insights into innovative charging systems and were introduced to the institute’s electric dolly.



September 17, 2025 | Short Course Sustainable Mobility

As part of the 92nd UNEP/UNESCO/BMUKN International Short Course at TU Dresden, specialists from around the world visited Fraunhofer IVI. They gained insights into research on zero-emission commercial vehicles, energy storage systems for public transportation, vehicle automation, and megawatt charging. The exchange served to foster international networking and knowledge transfer.



September 26, 2025 | North Saxony Mobility Day

Featuring a mix of presentations, demonstrations, and test drives, the Mobility Day hosted by the North Saxony District in Schkeuditz provided an excellent platform for discussion on the future of public transportation. Fraunhofer IVI presented solutions for the control center used to oversee the automated FLASH shuttle buses.

October 9-11, 2025 | FLORIAN 2025

At the Dresden Trade Fair Center, the professional community in the fields of firefighting, civil protection, and disaster management gathered for the 24th edition of FLORIAN. The institute presented the MobiKat® technology, a modular system for operational command and the management of the necessary resources, as well as the EU project EO4EU, which aims to improve access to geodata.

October 21, 2025 | Using drones to protect solar plants

Fraunhofer IVI is collaborating with Droniq, Aumovio, ViaMon, and 4-Energy to develop a multi-stage operational concept for photovoltaic systems. It combines perimeter protection and PV module monitoring using drone and AI technology, effectively protecting solar parks from break-ins and copper theft. An initial project meeting at the institute laid the groundwork for a flexible security system that also has an eye toward the smart PV operations of the future.

October 24, 2025 | Visit of TU Bergakademie Freiberg to Fraunhofer IVI

Representatives from TU Bergakademie Freiberg visited the institute to discuss current research activities and opportunities for collaboration. The focus was on topics such as robotics and swarm technologies, augmented and virtual reality, human-machine interaction, autonomous driving, and communication between infrastructure and road users.



November 3-4, 2025 | NextTruck 2025

The European expert conference, which is accompanied by an exhibition, brought together professionals from logistics, freight forwarding, and many other companies across the entire truck value chain in Berlin. At the Fraunhofer IVI booth, the underbody charging system demonstrator illustrated how smart charging infrastructure saves costs, makes efficient use of space, and enhances safety.



November 15, 2025 | CIFAD III status event

Within the European CIFAD III project, the Görlitz district and the Polish Żarski County are working together to significantly improve cross-border communication for disaster management. The goal is to close gaps, particularly in the exchange of alert and situational information, as well as in the mutual request for emergency response resources.

November 20, 2025 | VALISENS final event

For three years, the project partners conducted intensive research to determine how the environment surrounding automated vehicles can be mapped in a way that ensures the safety of all road users. At the closing event at Fraunhofer IVI in Dresden, the consortium presented its findings to an audience of experts and demonstrated on the test track how research can be directly applied in practice.



November 9-15, 2025 | AGRITECHNICA 2025

At the world’s leading trade fair for agricultural technology in Hannover, guests experienced Fraunhofer IVI’s innovations for autonomous, safe, and efficient swarm-based field work—ranging from automated path planning and precise lane guidance to intelligent charging infrastructure.

November 11, 2025 | Karrierewege 2025

Under the motto »Networking – Charting Career Paths Together,« the institute was represented at the Karrierewege networking fair at Dresden University of Applied Sciences. Students from various fields—ranging from electrical engineering and computer science to geoinformation and energy management—were able to learn about internships, theses, and entry-level opportunities at the booth.

Award



FAPS project wins the DVR Vision Zero Award

No more casualties and severely injured persons in road traffic—this is what Vision Zero stands for as a global concept. The aim is to implement innovative technology, better infrastructure and comprehensive education initiatives in order to jointly create a future in which road traffic is safe for everyone. Since 2024, the Deutsche Verkehrssicherheitsrat (DVR, German Road Safety Council) has been presenting the DVR Vision Zero Award to projects that reduce the risk of road accidents through creative safety measures and bring us closer to Vision Zero.

In 2025, Fraunhofer IVI was able to win first place with their FAPS project (Fraunhofer IVI Accident Prevention School). Maria Pohle, Nora Strauzenberg und Vanessa Hilse, who are part of the vehicle and road safety team, accepted the award on December 9 at the ceremony in Berlin. For many years now, they have been committed to researching ways to better prevent accidents in the future. In doing so, they primarily focus on children and teenagers as an especially vulnerable group of road users.

The basic idea of FAPS: making accidents experientable without any risks. Current accident numbers show that children and teenagers are often involved in pedestrian or bike accidents. About 50 percent of these accidents are not caused by them, but by other, motorized road users. It is therefore imperative to raise the awareness among children and teenagers of the potential for others to behave inappropriately, as this can save lives.



In the field of traffic education, particularly few programs are offered for the »forgotten age group« of 13 to 17 years. FAPS closes this gap and makes accident risks visible where they occur: in the immediate vicinity of schools. For their accident prevention work, the FAPS project uses the accident databases of public authorities and extracts accurate data based on the geographic location of the participating schools. The teenagers then work with this data within the FAPS software tool. Based on anonymized accident descriptions and accompanying parameters, they can analyze accidents' specific causes and characteristics, as well as accident clusters in their immediate school environment. With the help of VR glasses, the participants can safely and interactively experience critical traffic situations from the points of view of all parties involved. They learn how to identify and internalize the typical risks of pedestrians and bicyclists in road traffic, how to avoid inappropriate behavior themselves, and that they should always factor in the potential inappropriate behavior of others.



The project's interdisciplinary approach combines engineering, data analysis, and psychology to create awareness of the behavior of other road users. In collaboration with the project partners, ADAC Saxony, Wildstyle Network, and VP-Service, and thanks to the support of the Saxony State Prevention Council, the Fundación MAPFRE, as well as the SenMVKU Berlin as main supporter, around 20,000 school students have already benefited from participating in the interactive workshop for safe behavior in road traffic.

Editorial notes

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The Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, headquartered in Germany, is a leading organization for applied research. It plays a pivotal role in innovation by focusing on cutting-edge technologies and transferring research results to industry in order to strengthen Germany as a business location and benefit society. Since its founding as a nonprofit in 1949, Fraunhofer has held a unique position in the German research and innovation ecosystem.

With more than 30,000 employees at 74 institutes and independent research units in Germany, Fraunhofer operates with an annual budget of 3.6 billion euros. Contract research, Fraunhofer's mainstay, generates 3.2 billion of this budget. Unlike other public research organizations, institutional funding from federal and state governments accounts for no more than one-third of Fraunhofer's contract research budget. Institutional funding is thus merely the base of Fraunhofer's main business model and serves as the foundation for groundbreaking pre-competitive research that will become important for industry and society in the years ahead.

What truly sets Fraunhofer apart is its high share of industrial revenue, which ensures close collaboration with the private sector while keeping Fraunhofer's research focused on the market. Fraunhofer raises at least two-thirds of its contract research budget competitively from private-sector contracts and public project funding. In 2025, industrial revenue alone accounted for 966 million euros.

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