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Fraunhofer at the IAA MOBILITY 2023

Innovative ideas for tomorrow's mobility

How are new mobility concepts changing urban life? What progress has been made with developing sustainable and efficient mobility solutions? How can self-driving vehicles be made even safer? Under the theme of "Tomorrow's mobility", eight Fraunhofer entities will be presenting their expertise, concepts and solutions for the mobility of the future at the IAA Summit in Munich from September 5 to 8, 2023. At the joint Fraunhofer Booth D11 in Hall B1 experts will be showcasing the latest developments to the professional community.

Industry and society today are more dependent than ever on sustainable logistics and mobility solutions. Tomorrow's mobility is facing radical change as a result of a number of different needs and challenges. Urbanization, climate change and demographic change necessitate technological, ecological and social transformation. Businesses, municipalities and transportation providers need to rethink mobility in a multimodal and intelligent way. "The transportation transition is a crucial lever for achieving our climate targets. What we now need in order to design future transportation to be connected, efficient and green is the rapid implementation of visionary ideas," says Prof. Holger Hanselka, president of the Fraunhofer-Gesellschaft. "From new ideas for transportation to intelligent transportation systems and connected vehicles up through automation – Fraunhofer research scientists are actively creating transportation solutions for a sustainable future with their excellent research and groundbreaking technological developments."

As a leading research alliance in the field of mobility, the Fraunhofer Transport Alliance will be presenting its latest findings and pioneering technologies. Its expertise in the fields of mobility concepts, digital transformation, intelligent transportation systems and networked vehicles, automation as well as data communication and networks place it at the forefront when it comes to the development of sustainable and efficient mobility solutions.

ALBACOPTER® Fraunhofer lighthouse project — a scalable drone concept

Moving elements of urban transportation to the air is no longer a dream of the future. The ALBACOPTER® Fraunhofer lighthouse project is developing an experimental aircraft that combines a capacity for vertical take-off and gliding and is approving it for

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test flights. At the IAA, the six Fraunhofer institutes involved will be displaying construction models and developments from the fields of materials engineering and manufacturing, drive systems, microelectronics, artificial intelligence (AI) and virtual testing.

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The Hearing Car

Tomorrow's vehicles are expected to hear bicycle bells, children playing or the sirens of approaching emergency vehicles, to name a few examples. Experts at the Fraunhofer Institute for Digital Media Technology IDMT in Oldenburg are working on "The Hearing Car" and developing AI-based system solutions for acoustic event recognition in the vicinity of vehicles. The project also includes a mobile system for in-vehicle electroencephalography (EEG) for optimizing human-machine interaction and the YourSound assistant for personalizing sound experiences.

Highly precise, modular AI algorithms for the contactless measurement of vital signs in vehicle interiors

The latest development from the Fraunhofer Institute for Microelectronic Circuits and Systems IMS in Duisburg makes it possible to integrate an AI-based software module for contactless vital signs measurement into existing systems, such as cameras and driver assistance systems. This optimizes the comfort and safety of the driver and others in the vehicle. The best part is that the algorithms are modular and easy to integrate.

Precise image capture even in harsh conditions: 3072-pixel LiDAR camera

The true solid-state 3072-pixel LiDAR camera, also by Fraunhofer IMS, takes rapid recordings and can improve safety and autonomy in vehicles and production. The SPAD-based (single photon avalanche diode) camera demo TinyOwl was further developed using 3D integration technology, is highly robust and provides high accuracy even in harsh weather or in the presence of vibrating machinery.

Bright and wide-angle holographic projection: MaMeK laser projection project

For human-machine communication, the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena has developed a micro-optic projection system that can project pictograms or symbols dynamically on a 30 x 100-centimeter surface from a distance of 30 cm. The multi-channel holographic system achieves light intensities in the kilolux range and can potentially be mounted to the floor of a vehicle. Unlike other LED systems, which are not bright enough in daylight and only produce rigid images, it is therefore well suited for communication between autonomous vehicles and their surroundings.

Miniaturized 3D camera: MinTOFKA joint research project

In automotive engineering, different safety and comfort applications require cameras to be built into the internal or external cladding of the vehicle. This severely limits the structural height of the lens. Fraunhofer IOF will be presenting a miniaturized 3D camera for different areas of application (MinTOFKA joint research project). The novel imaging principle is based on the combination of a multi-aperture lens and a time-of-flight (ToF) sensor (640x480 pixels, 850 nanometers VCSEL). A hybrid optics concept consisting of six channels was chosen to scan the extended 180-degree (diagonal) field of view with high spatial resolution while reducing the installation space (z = 10 millimeters). Adapted image processing can reconstruct the depth profile of the entire object field.

Vehicle-integrated photovoltaics

Solar modules integrated into the roof and engine hood can supply more energy than is needed by the on-board electronics. The Fraunhofer Institute for Solar Energy Systems ISE in Freiburg is researching and developing particularly lightweight, robust and aesthetic module designs but also power electronic components. With the "Smart PV Junction Box", standard photovoltaic modules can be connected safely and efficiently to a high-voltage cord and the electricity can be used for drive energy or, in the case of trucks, for refrigeration units.

Vibro-acoustic metamaterials (VAMMs): resolving the dilemma of lightweight design and vibration or noise pollution

A solution from the Fraunhofer Institute for Structural Durability and System Reliability LBF in Darmstadt adds minimal weight while reducing harmful structural vibrations and noise to an extent that was not previously possible. Fraunhofer LBF is presenting a model vehicle to impress visitors with the functionality of the vibro-acoustic metamaterials and provide information on the potential ways it can be implemented in actual products.

You can see these and many other pioneering technologies and solutions from September 5 to 8, 2023 at the IAA Summit at the Munich Exhibition Center, Hall B1, Booth D11.

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