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Regional Partner

"Transport enabling sustainable economy". This year's motto of the ITF summit is aimed at a number of important, current issues in Saxony's transport sector. Sustainable economy means considering all branches, all areas of society in context. The challenges - not only in environmental protection - are enormous.

The different conditions in cities and rural areas require different and at the same time closely networked transport systems. What they all have in common is the challenge of minimizing greenhouse gases, i.e. getting away from fossil fuels. Solutions are being researched across all areas of traffic with the help of digital test fields. The Saxon state government supports many projects in this area.

At the summit, among other things, the Smart Rail Connectivity Campus will be presenting elements of the Annaberg-Buchholz-Schwarzenberg railway test track. In order to make rail traffic more effective, 5G-supported control systems for trains are being developed here.

Flexible and user-friendly operating concepts for public transport in rural areas are being developed in Zwönitz, Ore Mountains. Innovative fuel cell technology is being developed at the Fraunhofer Institute in Saxony.

Sustainability is environmental protection, but goes far beyond that. It also means economical use of resources for our children and grandchildren, fair globalization, social development, education and culture. Saxony is being a co-designer and pioneer here.

www.smwa.sachsen.de

SAXONY

Remote Train Operation Workstation by DLR

Automatic Train Operation (ATO) is envisioned to significantly increase transport capacity on existing networks, but a safe and efficient operational fallback-layer in cases of non-routine disruptions or a non-fitted infrastructure side is yet to be established. Remote diagnosis, control and recovery of malfunctioning automated and unmanned trains are considered as key components for such a fallback-layer for automatic train operation along the Grades of Automation taxonomy. The German Aerospace Center (DLR) is showing its research results on this topic with a Remote Train Operation (RTO) workstation and a recorded live demonstration.

As part of the 5G-Reallabor project, a rolling testbed from GTS Germany, the German entity of the Ground Transportation Systems business within Thales group, is normally used in the field. This testbed had already been operated before as remotely controlled railcar over a physical distance, using a 5G mobile network connection during a test run. The Thales-owned, commercial railcar is equipped with own GTS ETCS Level2 technology, consisting of onboard systems for obstacle detection, remote processing of control inputs and full motion supervision under operational rules and requirements of Deutsche Bahn.

To realize remote driving, a RTO workplace, equipped with all necessary functionalities to attain remote control of a connected train in real-world, employing 5G mobile network technology was developed and implemented.

Significant available knowledge from the prior development and setup of a RTO simulator, called the Train Operator Workplace, served as a starting point for this current research topic.

The successful technical demonstration of remote control via 5G was accomplished in November 2022 as part of a collaboration between German Aerospace Center (DLR), Thales Ground Transportation Systems Germany (GTS), Smart Rail Connectivity Campus (SRCC) and other partners using this very workstation. Based on 5G mobile communication technology, the GTS train has been remotely operated on the Erzgebirgsbahn in Schlettau (Saxony) from 300 km far away located DLR's premises in Braunschweig. DLR now focus on further increasing the functionality and usability of the workstation, to the end of enabling optimal operator performance. Using these project experiences, DLR contributes to related projects such as ATO-Cargo, ARTE or R2DATO.

Deutsches Zentrum

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German Aerospace Cente



SMART RAIL CONNECTIVITY CAMPUS

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ERZmobil – the innovative gamechanger of public transport in rural areas

Small townships are faced with challenges in citizen mobility. The service level of the public transport system often does not reach the qualitative characteristics of comparable offers in cities. Both the travel time and the accessibility of stops often lead to less acceptance and usage of traditional public transport among the population. Also for the administration of municipalities, the costs for providing these services request a high capacity in the municipal budget. Digital solutions can improve service-quality to cost-ratio by providing a reduction of necessary resources like staff and vehicles. However, the technological aspects are not as challenging as the socio-economic aspects.

As one of 73 smart cities in Germany, the city of Zwönitz face these challenges by having implemented a sustainable public mobility service, called ERZmobil, that meets the needs of citizens and municipality in suburban and rural regions. Zwönitz is a city with about 12,000 people living there. Since January 2022 the ERZmobil provides a new type of public transport services to all people living in the seven districts of the city. This all-appbased service closes a large gap in suburban public transport. The ERZmobil provides an on-demand service that is fully integrated into the public transport system and is driven by an all-electric mobile.

Driving tomorrow: Fuel Cell Technology as Future of Clean Mobility

Hydrogen is one of the high potentials for the mobility and energy turnaround demanded by society and politics. Particularly, in the transport sector the hydrogen drive based on fuel cell technology is a key element for CO2 reduction. So far, however, there is a lack of technologies for an economic series production of fuel cells. The German National Fuel Cell Production Action Plan aims at:

- enabling cost-optimized, demand-oriented series production of fuel cells on a scalable basis.
- improving the technological and economic potential of fuel cells
- accelerating and increasing the structured rollout in industry and society.

Research at Fraunhofer IWU focusses at the heart of the fuel cell: high-rate technologies for the production of stack components and their assembling. Low quantities, no supply chains and immense costs characterize the currently prevailing manual production of fuel cells. The

goal is to produce fuel cells at comparable costs to conventional drives. In this field, scale-up is the biggest driver of cost reduction at the moment.

The research knowhow at Fraunhofer IWU is made available for industry in the so called "Referenzfabrik.H2" (Reference Factory.H2) which is a production technology toolbox with real and virtual machines and plants that are necessary for the production of hydrogen systems. It allows companies involved in the value chain for hydrogen technologies to progress their products, services and processes in individual test set-ups with the experts from Fraunhofer.





FUTURE.

Together with the mobility engineering specialist IAV GmbH, the ERZmobil was developed by conducting participatory approach, which included citizens in every phase of development. Citizens were involved from the outset during the conceptualization phase through design-thinking workshops, a major survey and an early test phase. There is also continuous feedback from passengers during the operation in order to continue to improve the ERZmobil together with the users. Additionally, courses in social facilities improve the integration of the project in the community of the city. For example, based on the feedback of seniors, a voice-bot for using the ERZmobil is to be developed. Beside the technological progress of the solution

a sustainable business model for intermunicipal cooperations is conceived. This business model adapts the costs of traditional public transport systems and therefore eases the transformation process from traditional public transport to digitalized mobility services. As a consequence, several small towns and districts, also beyond Saxony, are currently planning to adapt the ERZmobil in intermunicpal projects with Zwönitz.

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Demonstrator for the Fuel Cell Research Topics at Fraunhofer IWU/©Fraunhofer IWU

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