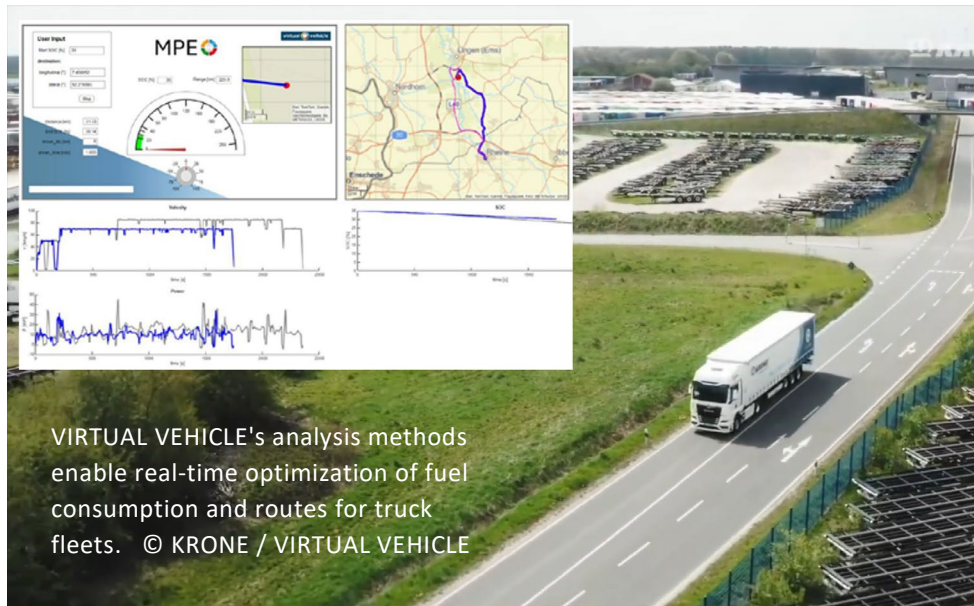


FFG Funding Project

Program „Digitale Technologien – Edge-Datenwirtschaft“

EDNA - Edge-Datenwirtschaft in der automatisierten Fertigungswirtschaft

Duration:
01.10.2022 – 30.09.2025



EDNA: EDGE COMPUTING AND DIGITAL TWINS FOR TRUCK TRAILER OPTIMIZATION

IN THE EDNA PROJECT, VIRTUAL VEHICLE RESEARCH GMBH WORKED WITH INDUSTRY PARTNER KRONE TO DEVELOP EDGE COMPUTING METHODS AND TECHNOLOGIES FOR TRUCK TRAILERS. DIGITAL TWINS AND AI-SUPPORTED ANALYSIS PROCESSES ENABLE REAL-TIME EMISSION ASSESSMENTS, PREDICTIVE ROUTE OPTIMIZATION, AND DATA-SUPPORTED FLEET ANALYSIS. EDNA SHOWS HOW COMET CENTERS SUPPORT COMPANIES IN THE DEVELOPMENT AND VALIDATION OF INNOVATIVE, PRACTICAL TECHNOLOGIES.

As a COMET center, Virtual Vehicle Research GmbH has researched and developed innovative edge computing solutions for truck trailers in collaboration with its industry partner KRONE as part of the bilateral research project EDNA (Edge Data Management in Automated Manufacturing). EDNA aimed to combine digital twins, AI-based analytics, and edge computing to process vehicle data directly on board and enable real-time operational optimisations. Key technical achievements include:

- Digital Twins for Trailers: Development and integration of simulation models for conventional and electric trailers, enabling

precise emission assessment and analysis of trailer usage.

- Machine Learning based on Telemetry Data: Analysis of data from around 10,000 truck trailers, development of algorithms for detecting consumption-related events, and training of models for classifying usage behavior.
- Edge Computing Environment: Integration of the digital twin into an on-board edge computing environment, including real-time emission assessment and predictive route optimization, validated in a proof-of-concept.

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- Visual Analytics and Web-based Dashboard: Interactive exploration of operational and emission data to visualize optimization potential.

The technologies developed have been successfully demonstrated and tested in validation trials and show great potential for future applications. In particular, they open up opportunities for:

- Efficiency improvements through data-driven fleet management and predictive maintenance
- Emission-optimized vehicle operation and route planning
- New data-driven business models in fleet management and digital services

EDNA clearly illustrates how companies can collaborate with a COMET centre like Virtual Vehicle Research to develop, validate, and prepare highly innovative technologies for future practical use.

Impact and effects

EDNA delivers significant ecological, economic, and societal benefits:

- Environmental Impact: Real-time emission assessment and predictive optimisation enable significant reductions in CO₂ emissions and fuel consumption.
- Economic effects: Creation of new value-added potential through digital services, increased innovation capacity, and strengthened international competitiveness.
- Skills Development and Knowledge Transfer: Training of highly qualified experts in edge computing, digital twins, and AI; promotion of knowledge transfer, professional mobility, and technological competence.
- Sustainable Mobility Solutions: Foundations for more efficient, digitally connected, and resource-saving transport processes.

Overall, EDNA illustrates how COMET centers support companies through applied research, helping them to launch innovations, evaluate their ecological and economic potential, and lay the foundation for future applications.

Project coordination (Story)

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- Hochschule Osnabrück, Deutschland
- Jade Hochschule, Deutschland
- OFFIS e.V. – Institut für Informatik, Deutschland
- moduco GmbH, Deutschland


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