



ECOMAI

USE CASE ELECTRIC DRIVE SYSTEMS

AI FOR ELECTRIC TRACTION DRIVES

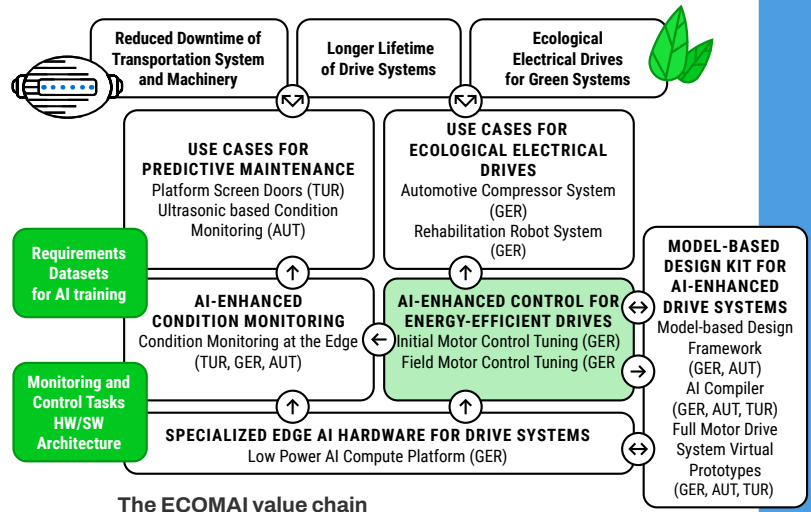
Electric traction drives power modern transportation such as electric cars, bikes, and trams, requiring a balance between power output and energy consumption for efficiency and sustainability. In the ECOMAI project, FEAM explores the potential of AI to optimize this balance. By integrating AI into the control systems of electric traction drives, we aim to enhance efficiency and reduce operational costs. AI dynamically adjusts dq frame currents, enhancing efficiency and extending lifespan by reducing mechanical stress. Additionally, by reducing reliance on large and resource-intensive Lookup Tables (LUTs), FEAM aims to decrease system costs and complexity, supporting ECOMAI's goals to innovate motor drive systems and advance eco-friendly transportation solutions.

CONSORTIUM PARTNER – INDUSTRY



Founded in 2006, FEAM originated from innovative doctoral research at Bundeswehr University Munich and bridges academic research and practical industrial applications. Collaboration with the university's Chair of Electrical

Ecological Motor Control and Predictive Maintenance with AI



MARKET NEEDS ADRESSED

- Demand for electric drives with higher efficiency and performance to support various applications from automotive to industrial sectors.
- Need for cost-effective solutions that reduce the overall expenditure on hardware and maintenance, especially reducing reliance on extensive hardware such as LUTs which can be costly and complex.
- Compliance with evolving global energy efficiency and environmental regulations, ensuring technologies are sustainable and market-relevant.

GOAL: INNOVATING SMART ELECTRIC DRIVE SOLUTIONS

FEAM is committed to pioneering smart electric drive solutions by leveraging AI to streamline control systems. This involves replacing traditional LUTs with dynamic, AI-driven models that not only enhance performance and efficiency but also significantly cut down on the costs and complexity associated with hardware implementation. This innovation aims to make advanced electric traction solutions more accessible and economically viable, aligning with global sustainability goals.



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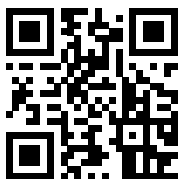
Drives and Actuators gives access to advanced laboratories, turning academic insights into real-world applications. Specializing in electric mobility, FEAAM focuses on creating compact, cost-effective systems that do not compromise performance. With our patented technologies and access to well-equipped laboratories, we emphasize rigorous testing and continuous optimization, ensuring that every project meets the highest standards.

COMMERCIAL VIEWPONT

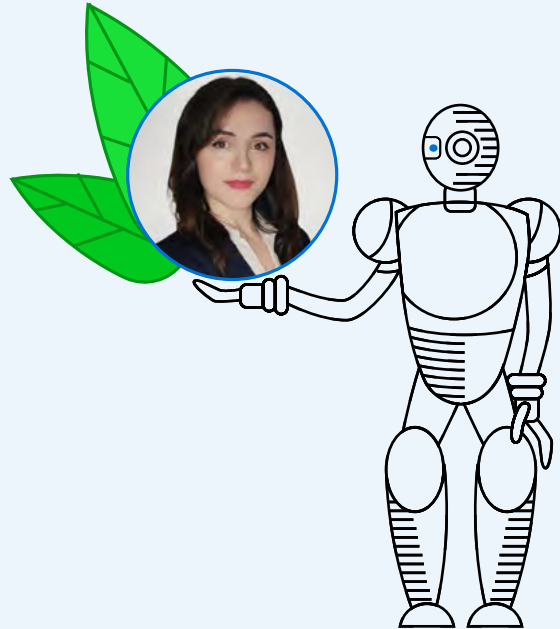
At FEAAM, our AI-driven approach enhances the operational efficiency of electric traction drives beyond conventional methods. While the industry already uses established control techniques for high energy efficiency, FEAAM's AI-driven strategy seeks to optimize this even further by dynamically adjusting control parameters in real time, targeting high iron losses at increased speeds for potential efficiency gains.

Electric drives traditionally rely on complex LUTs for control, which become resource-intensive and costly as they expand to accommodate varied operational parameters. FEAAM's strategy replaces these LUTs with neural networks (NNs), which efficiently handle multi-dimensional data, reducing hardware needs and system costs. This shift enhances flexibility and allows continuous optimization without the manual updates traditional methods require. Aligning with ECOMAI's goals, FEAAM enhances ecological and sustainable technologies setting new cost-efficiency and sustainability standards in electric traction drives. This approach positions FEAAM at the market forefront, ensuring our technologies are innovative, commercially viable, and significantly reduce costs while advancing sustainable solutions.

[Read more about ECOMAI](#)

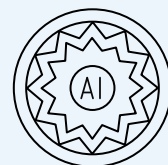


Reflections from the Personal Perspective on the Project



“ At FEAAM, our participation in ECOMAI allows us to explore AI alternatives to traditional control methods. We're focused on reducing the complexity and costs associated with large LUTs by developing more efficient, AI-driven solutions. This shift is crucial for advancing our technology and making high-performance electric drives more accessible and sustainable. ”

Ebru Avci
**Embedded Systems Engineer/
Project Coordinator**



<https://feaam.de/en/feaam-design-development-and-testing-of-electric-drives>