ICM AT HANNOVER MESSE 2025: FUTURE TECHNOLOGIES FOR CIRCULAR ECONOMY AND SUSTAINABLE MOBILITY

The InnovationCampus Future Mobility (ICM) is a research platform of the Karlsruhe Institute of Technology (KIT) and the University of Stuttgart. The shared vision is sustainable and emission-free mobility for the future – from product development to recycling. At Hannover Messe, we will present strategies for the circular economy of electronic components and a miniature vehicle for validating new mobility concepts.

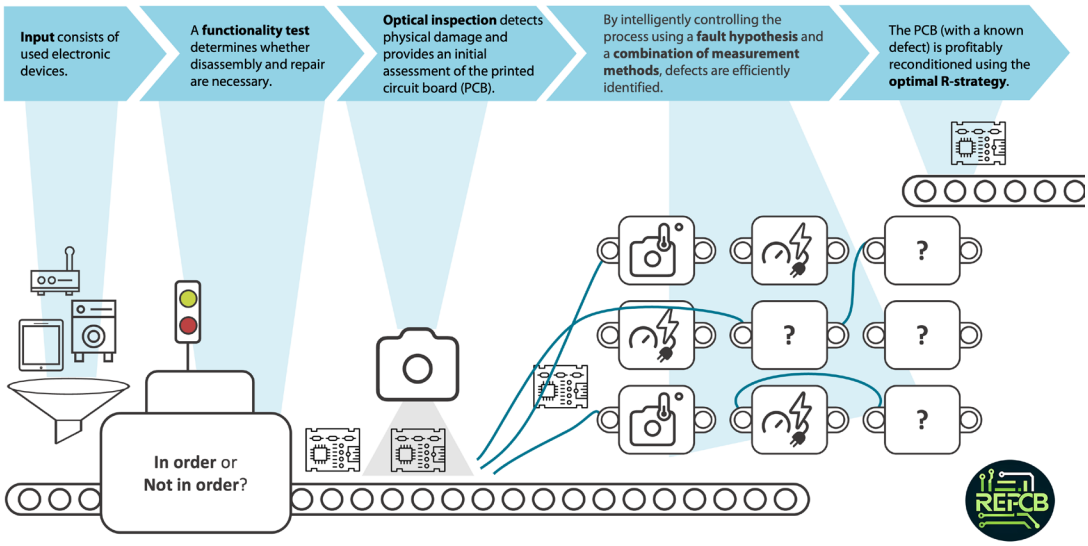
AI-Based Inspection Strategies for Sustainable Electronics Production

Technological advancements are increasingly digitizing and simplifying our daily lives, enhancing prosperity but also leading to a drastic rise in electronic waste. Each year, around 50 million tons of e-waste are generated worldwide, a significant portion of this could be avoided through targeted repair and reuse strategies. However, the reuse of electronic devices often fails due to inefficient and costly inspection processes.

The ICM junior research group „Sustainable Electronics", led by Dr. Florian Stamer at the wbk Institute of Production Science at KIT, has developed an AI-based inspection strategy to optimize the reuse of printed circuit boards (PCB). In collaboration with the startup Desoltik and supported by the ICM, a process was developed that combines optical, electrical, thermographic, and X-ray based technologies. The artificial intelligence collects and analyzes inspection data in real time and adaptively determines the required inspection depth as well as the optimal test procedures for specific assemblies. After each inspection sequence, a data-driven evaluation of the measured values is performed, after which the inspection strategy is dynamically adjusted. Once a sufficient data basis is available, the system derives the optimal "R-strategy" – based on the principles of the circular economy such as repair (Repair), reuse (Reuse), or recycling (Recycle).

A key aspect is the transfer from research to practice: The inspection method is a scalable solution for the circular economy and can be applied in both single-unit and series production. Recycling and remanufacturing companies in the electronics sector, as well as electronics manufacturers, benefit from this technology as it enables the efficient repair of used products and production scrap.

To industrialize the process, the team is collaborating with Schneider Electric, a globally operating company with extensive experience in sustainable manufacturing. The French corporation has received multiple „Sustainability Lighthouse“ awards from the World Economic Forum for its factories. The robotics and automation solutions developed and used by Schneider Electric in its own production are now also being applied in this system.



Graphic: The automated inspection line combines various measurement techniques to determine the most suitable R-strategy (Repair, Reuse, Recycle). (© Stamer, KIT)

Visitors to the trade fair can experience the inspection and repair process up close, following each step through animations and data visualizations. The automated remanufacturing line intelligently determines the optimal R-strategy before the circuit board is directed to the heating station. Depending on the selected strategy, defective components are either removed for repair, or functional components are extracted for reuse. Non-repairable components are removed, ensuring the circuit board remains usable.

Mini-eVee: A Test Platform for Future Vehicle Concepts

ICM presents an exciting highlight with the „Mini-eVee“ – a 1:4 scale miniature vehicle serving as a test platform for new mobility concepts. Thanks to the extensive use of 3D printing technologies, new ideas can be tested in early development stages.

Mini-eVee incorporates a range of advanced technologies:

- Carbon fiber-reinforced structure using Towpreg technology
- All-wheel drive with four in-wheel motors and torque vectoring
- Independent all-wheel steering for maximum agility
- Integrated push-rod mechanism for optimized stability
- Next-generation E/E architecture with a web-based interface for intelligent vehicle control and connected communication (V2X)

This versatile prototype enables the testing of new control and propulsion concepts in a realistic environment before scaling them to full-size vehicle models.

Further Information

Hannover Messe
March 31 to April 3, 2025

InnovationCampus Future Mobility at the
Baden-Württemberg joint booth "THE LÄND" in Hall 13, C78

More information:
https://www.icm-bw.de/news-und-events/events/event-detail/hannover-messe-2025

CONTACT

Contact for Media
Teresa Mittner
Marketing and Communications
Phone: +49 711 685 69738
E-Mail: medien@icm-bw.de

Contact for technical questions
Till Falco Böse
Transfer Manager
Phone: +49 173 7827082
E-Mail: transfer@icm-bw.de

About the InnovationCampus Future Mobility

The mobility and production of the future are sustainable, efficient and made in Baden-Württemberg. This requires breakthrough technologies - from innovative vehicle drives to versatile production processes. The goal of the InnovationCampus Future Mobility (ICM) is to shape this change. On the joint research platform, the University of Stuttgart and the Karlsruhe Institute of Technology (KIT) are combining their expertise in research and innovation to quickly and flexibly develop new technologies, test new approaches, and create the basis for leap innovations.