

Pressemitteilung

Fraunhofer-Institut für Produktionstechnologie IPT

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Fraunhofer study report describes AI use cases and sustainable energy concepts

Which digitalization approaches are suitable for redesigning and optimizing existing production processes? In its annual study report, the International Center for Networked, Adaptive Production (ICNAP) presents the latest research findings on the digitalization of production. The free report offers insights into the integration of artificial intelligence (AI) and the implementation of digital twins in production, describes the prerequisites for plug-and-produce technologies, and looks at new sustainable concepts for monitoring and controlling the energy consumption of technical systems.

Even ten years after the introduction of the term Industry 4.0, companies are still looking for ways to modernize and digitalize their production processes. The aim of the International Center for Networked, Adaptive Production, an association of three Fraunhofer Institutes in Aachen with around 30 partners from various branches of industry, is to support the ongoing digitalization process through collaborative, practical research. In the year 2023, the partners have once again published a comprehensive study report on five one-year research projects, which is available free of charge at www.ipt.fraunhofer.de/icnap-study-report-2023-en.

Practical applications for Industry 4.0

Even today, high costs, a lack of knowledge and little experience in the practical implementation of Industry 4.0 concepts often prevent many companies from utilizing its potential. Three of the five studies in 2023 therefore deal with practical and realistic use cases for the application of technology: In one study, Fraunhofer researchers analyzed the specific challenges associated with implementing digital twins in production environments. The guidelines created as part of the study provide tangible suggestions for integrating the digital twin into any production environment and were also evaluated using a "Model Factory 4.0".

In a further study, use cases in which AI can be of great benefit were examined. To make AI easier to integrate and use throughout a company, the researchers created a technical reference architecture and an organizational framework that can serve as models for various use cases.

Under the motto "Plug and Produce", the research team in a third study focused on the simplified integration of new technologies and systems into ongoing production, prioritizing flexibility and adaptability. "Plug and Produce" describes the integration of new equipment or systems without significantly disrupting existing production processes. The three studies look at the current state of the respective technologies, highlight the challenges that stand in the way of their use in production, and examine the potential of these technologies based on specific use cases.

Sustainability through new energy concepts

Companies that want to make production processes more sustainable can reduce their energy consumption in a targeted manner by using suitable methods and tools for energy monitoring. In one of the five ICNAP studies, the researchers developed and presented guidelines for monitoring the energy consumption of industrial applications in order to increase transparency for sustainable production.

The final study in this year's report focused on converting wireless sensors, which normally rely on external energy sources, into energy self-sufficient devices. This way, high costs can be saved and time-consuming processes for producing the energy supply, such as replacing batteries, can be reduced. The study investigates various methods for realizing a self-sufficient power supply and provides comprehensive information on which sources in production can supply energy for sensors.

Working together on solutions in the ICNAP community

The International Center for Networked Adaptive Production, ICNAP, is an initiative of the three Aachen-based Fraunhofer Institutes for Production Technology IPT, for Laser Technology ILT and for Molecular Biology and Applied Ecology IME, as well as other experts from industry and research. ICNAP was founded as an open research platform and industrial test environment in which new approaches to digitalization in production are developed. This study report was presented during this year's annual meeting of the ICNAP community, an annual two-day event focusing on new approaches to Industry 4.0.

At their annual meetings, the members of the ICNAP community regularly vote on five new research topics for the following year, on which studies will be carried out in 2024:

- AI Everywhere – Generative AI for Production and Business Operations
- Seamless AI Integration through Plug and Produce Approach
- The Digital Twin Demonstrator – Bringing the Concept to Life. Better, faster, Smarter and Even More Connected
- Towards a Dark Factory – Leveraging Multidimensional Twins in a Manufacturing Metaverse
- Zero-Trust Architectures for Interconnected Industry

In cooperation with the industry and research partners of ICNAP, the Fraunhofer researchers will carry out these studies next year.

The study report is available to download for free at:

www.ipt.fraunhofer.de/icnap-study-report-2023-en

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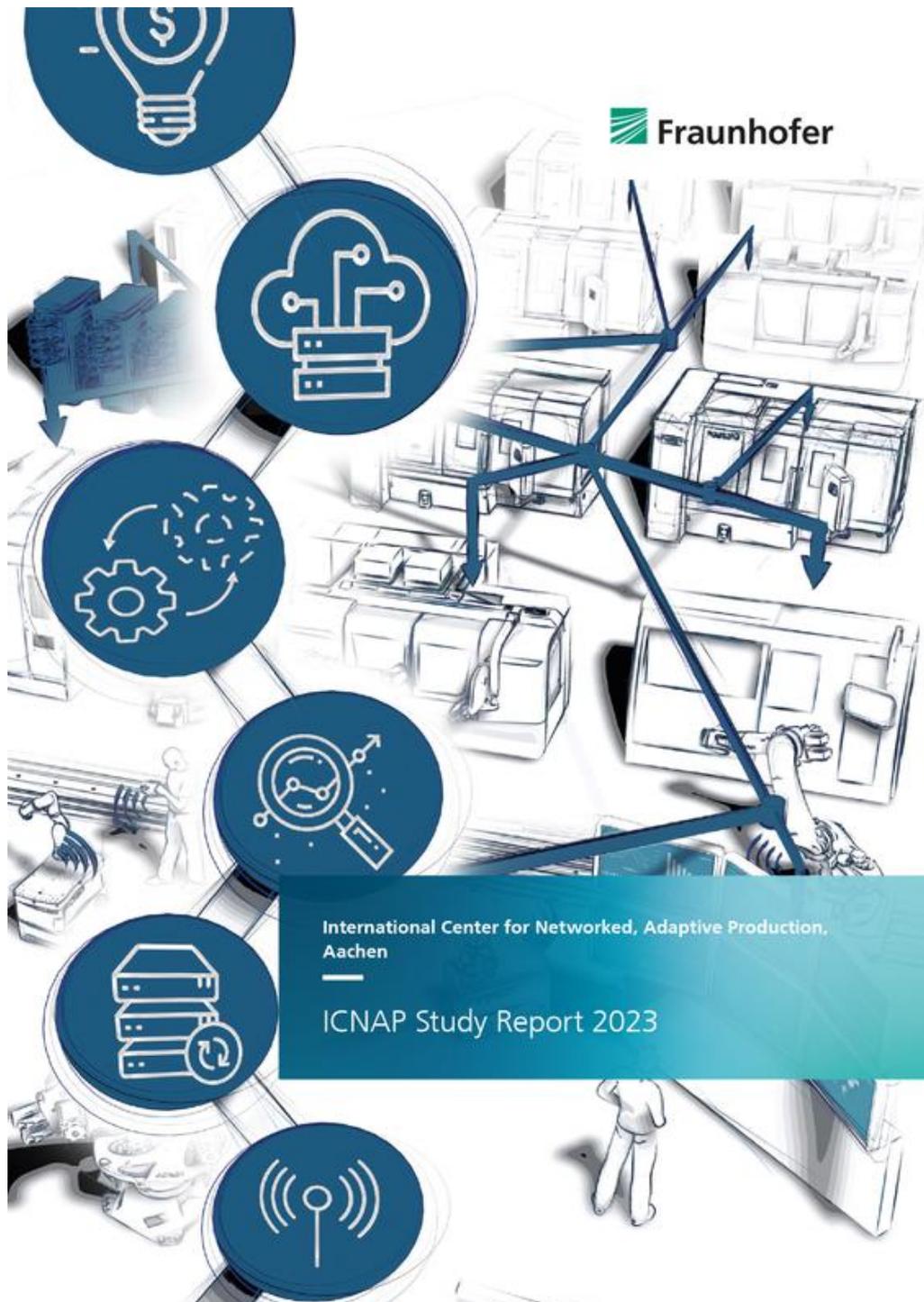
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URL zur Pressemitteilung: <https://www.ipt.fraunhofer.de/en/Press/Pressreleases/240116-fraunhofer-study-report-describes-ai-use-cases-and-sustainable-energy-concepts.html>



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