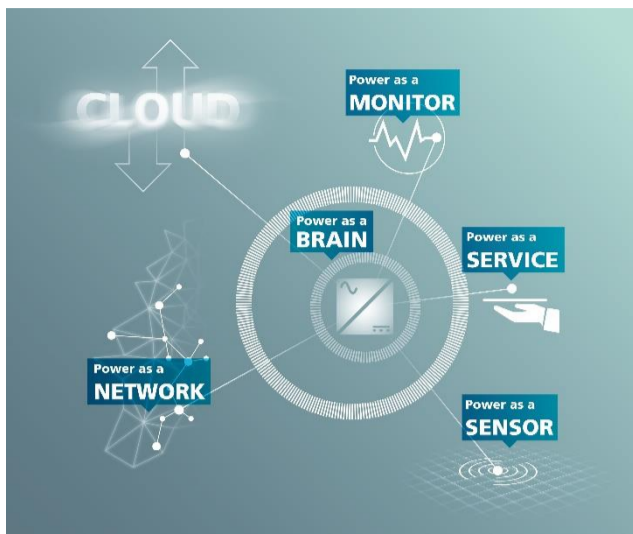


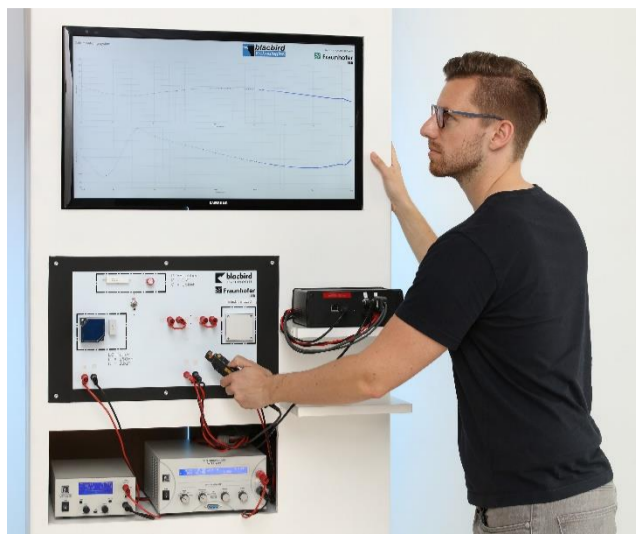
*Dt: 01.03.2023*

We are pleased to introduce you to Fraunhofer TechFlash - Fraunhofer's Flash News on latest and exciting technologies. This week's TechFlash is about **"Cognitive Power Electronics 4.0"**.

### Cognitive Power Electronics 4.0



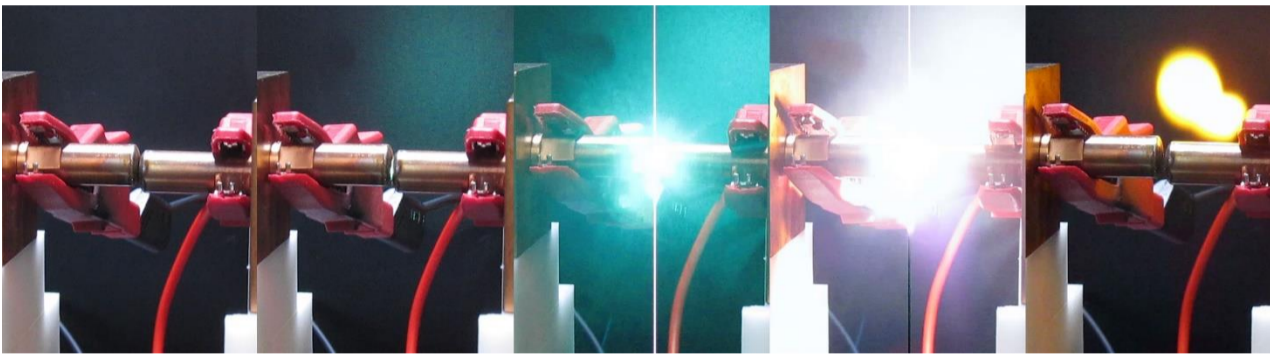
*The concept of Cognitive Power Electronics 4.0 (CPE4.0) by Fraunhofer IISB*



*Demonstrator for the dynamic real-time analysis of power electronic components using novel measuring technology based on the injection of artificially generated noise signals, consisting of test network, measurement device, load and DC source.*



*Vacuum system with 100% real-time facility state monitoring for deposition processes in semiconductor manufacturing. A machine-learning algorithm predicts the rest of useful life of the vacuum system until contamination gets critical.*



*Picture series of an arc flash created at the Fraunhofer IISB arc fault test stand*

**The Fraunhofer Institute for Integrated Systems and Device Technology (IISB)** conducts applied research and development in the field of electronic systems for application in, e.g., electric mobility, aerospace, Industry 4.0, power grids or energy technology. In this connection, the institute uniquely covers the entire value chain - from basic materials to whole power electronic systems.

**Fraunhofer IISB has revealed its ambitious activities in the area of Cognitive Power Electronics 4.0, combining its core competencies in the fields of power electronics with advanced data analytics to enable smart digital function. Actual implementations of Cognitive Power Electronics 4.0 may start modest by merely collecting and fusing data and providing it to other systems ("Power as a Sensor"). In more complex applications, Cognitive Power Electronics 4.0 analyses the collected data onboard and either monitors the overall system ("Power as a Monitor"), or takes action in system control ("Power as a Brain"). Finally, systems with embedded Cognitive Power Electronics 4.0 can be connected with each other or with cloud systems ("Power as a Network") and offer flexible and adaptive functionality ("Power as a Service").**

Power electronic devices are at the very heart of every system, application and production machine in industry, energy management, building appliances, mobility, and more. Right within the power electronic devices, electrical parameters are continuously available that indirectly characterize the current condition of an application or machine (e.g., energy grid, production machine, battery, motor). Up to now, those data are partially used to monitor the electronics in itself, but not yet for monitoring and optimization of the overall system.

With Cognitive Power Electronics 4.0, existing power electronic devices are augmented by "intelligence": additionally embedded electronics collect the electrical parameters and do a pre-processing. Where applicable, external sensors are added as additional data source. The following step is of high importance: the identification and validation of correlations between the collected data and the behaviour of the overall system or parts of it. The transfer of the found correlations into algorithms then allows the actual construction of the intelligent power electronics, capable of model-based decisions to realize smart systems.

Applications are in:

- Component analysis
- Vacuum systems
- Arc detection in Automobile

We look forward to hearing of your interest to discuss this exciting technology.

**Yes, I am interested**

#### **About Fraunhofer-Gesellschaft:**

*The Fraunhofer-Gesellschaft, headquartered in Germany, is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for ground-breaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research institutions throughout Germany. The majority of the organization's 30,000 employees are qualified scientists and engineers, who work with an annual research budget of 3 billion euros. Of this sum, 2.5 billion euros is generated through contract research. Our global footprint is very strong, with offices and research centres in the USA, Europe and Asia. Some of our renowned innovations are the MP3 software, white LED's and the smallest of cameras.*

*Fraunhofer has been a long-time trusted innovation partner in India, collaborating with some of the major players in the field of Material Science, Energy, Environment, Automotive, Electro-mobility, Production Technology and Smart Cities, working with Industry, Government and Public Sector.*

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