

## Inspired by biological neurons – New VDE SPEC on neuromorphic computing

- **In neuromorphic computing, the properties of neuronal biological systems serve as a model for the development of computer hardware and software**
- **The advantage: broadband data processing, higher performance, greater energy efficiency – however, the transfer into practice is faltering**
- **With the VDE SPECs, the VDE offers a useful standardization of neuromorphic computing technologies to pave the way from research to development**

(Frankfurt a. M., 01.11.2024) Due to increasing digitalization, energy requirements are increasing – with corresponding consequences for our climate. Generative artificial intelligence (AI) in particular is anything but green. This is because processing the huge amounts of data requires computing power that causes energy consumption to skyrocket, both when training AI models and during operation. Neuromorphic computing (NMC) is intended to provide a remedy here. The concept: computers that are based on the principles of biological neuronal systems and therefore function in a comparably energy-efficient manner. Although there are currently many research approaches, there is a lack of standardization. This hinders the transfer from research to practice. In order to change this, experts from academia and industry from various disciplines have developed a VDE SPEC. Their aim: to bring innovations and technologies from the field of electrical engineering and information technology to the market more quickly in times of rapid technical progress.

### Overcoming boundaries: Computing power with brains

“From nature to theory to practice – and then onto the shop shelf as quickly as possible. This is our vision for neuromorphic computing,” says Dr. Damian Dudek, Managing Director of the VDE Information Technology Society (VDE ITG). He emphasizes: “Completely new technologies are

needed, as today's computers are gradually reaching their limits, especially when it comes to applications of generative AI.”

The problem: in conventional computer systems, computing and storage units are separate (so-called von Neumann architecture). The resulting need to exchange data between processor and memory costs energy and time.

In order to change this and develop the next generation of computers, researchers are looking to the human brain, for example. The reason: neurons in the brain can process and store signals locally. Due to the parallelism of data processing that this enables, the brain manages with a tiny fraction of the energy that today's AI systems consume. Information processing in other biological neuronal systems in nature is similar.

### **Transfer from research to product development**

However, while scientists are conducting research in various directions, only those approaches that are technologically robust, validated and, above all, reproducible can be transferred into products and services for the further development process. Users of neuromorphic components and systems should therefore be able to test and evaluate the advantages and performance of different concepts on a neutral basis. This requires previously defined framework parameters, which have now been developed for the first time by the expert group set up by the VDE.

In the VDE SPEC on neuromorphic computing published in November, the team of experts defined standardized terms for this area of research and development. It has also developed an NMC layer model that classifies the different technology levels from material composition to components, architecture and algorithms through to specific applications.

### **VDE SPEC: Sprinting towards a market standard**

The aim of a VDE SPEC – i.e. a standardization proposal – is to place innovations and technologies on the market as quickly as possible. A VDE SPEC is developed much faster than a VDE standard and is therefore available to the market more quickly. It can be produced within ten days and its use is free of charge. Through process support, project management, standardization expertise and the involvement of its network of experts, the VDE ensures a high quality of results.

VDE SPEC 90033 V1.0 (de) “Neuromorphic computing based on novel devices – a layer model for the development of AI hardware” is available free of charge at: [www.vde.com/spec](http://www.vde.com/spec).

### **About the Information Technology Society within VDE (VDE ITG)**

The Information Technology Society within VDE (VDE ITG) is the national association of all people working in the field of information technology in business, administration, teaching and research and science. Its objectives are to promote the scientific and technical development and evaluation of information technology in theory and practice. Founded in 1954 as the Nachrichtentechnische Gesellschaft, it is the oldest professional association in the VDE. Its nine technical divisions, to which more than 80 technical committees are assigned, represent the entire spectrum of information technology. About 10,000 VDE members have assigned themselves to the ITG and more than 1,000 experts work voluntarily in the committees.

For more information, visit [www.vde.com/itg](http://www.vde.com/itg)

### **About VDE:**

VDE, one of the largest technology organizations in Europe, has been regarded as a synonym for innovation and technological progress for more than 130 years. VDE is the only organization in the world that combines science, standardization, testing, certification, and application consulting under one umbrella. The VDE mark has been synonymous with the highest safety standards and consumer protection for more than 100 years.

Our passion is the advancement of technology, the next generation of engineers and technologists, and lifelong learning and career development “on the job”. Within the VDE network more than 2,000 employees at over 60 locations worldwide, more than 100,000 honorary experts, and around 1,500 companies are dedicated to ensuring a future worth living: networked, digital, electrical. Shaping the e-dialistic future.

The VDE (VDE Association for Electrical, Electronic & Information Technologies) is headquartered in Frankfurt am Main. For more information, visit [www.vde.com](http://www.vde.com)

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