

Dr. Wilhelmy VDE Prize 2025: Turbochargers for fuel cells, secure computer networks, and optical chips for fiber optic communication

Creating greater visibility for young female engineers in electrical engineering and information technology: That is the goal of the Dr. Wilhelmy VDE Prize, which in 2025 once again honored three female candidates for their outstanding dissertations: Dr. Miriam Schüttoff (University of Ulm), Dr. Arezoo Zarif (Dresden University of Technology), and Dr. Lisa Maile (Friedrich-Alexander University Erlangen-Nuremberg). The award ceremony, with prizes of €3,000 each, took place on November 26, 2025, as part of the VDE Capital Forum in Berlin.

(Frankfurt am Main, December 2, 2025) Young talent is urgently sought after in electrical engineering, which means that initiatives such as the Dr. Wilhelmy VDE Prize are becoming increasingly important. On the one hand, this raises overall awareness of the importance of electrical engineering for modern society. On the other hand, the award winners serve as role models, demonstrating how successfully women are making their way in this still male-dominated discipline and working on key issues for the future. The prize is awarded once a year by the Dr. Wilhelmy Foundation and the VDE at a VDE event. In 2025, the Dr. Wilhelmy VDE Prize was presented at the VDE Capital Forum in Berlin, where the winners of the [VDE ITG Prizes](#) were also honored.

Accelerating the development of fuel cells

Dr. Miriam Schüttoff, who originally comes from environmental engineering, says she came to electrical engineering via a roundabout route. Her interest in renewable energies quickly brought energy technology into focus. "At the time, I was fascinated by hydrogen," says Schüttoff. "If you use it in the right places and organize production intelligently, it is the answer to many problems. That's why I wanted to solve one of the central challenges in my doctoral thesis at the University of Ulm."

In the development of polymer electrolyte membrane fuel cells (PEMFC), a key issue is the reliable prediction of service life. Until now, realistic service life tests lasting several years have been carried out in industry for this purpose. In research, on the other hand, individual materials or components are tested, which reduces the significance for system applications. "I combined key aspects from both worlds, developed accelerated service life tests on large stacks at the Center for Solar Energy and Hydrogen Research Baden-Württemberg, and compared them with a reference test lasting one and a half years," explains Schüttoff.

This showed that her approach works and significantly accelerates reliable life cycle tests for various applications. It also became clear that operating conditions such as temperature or humidity are much more decisive for the cell's service life than the load profile of the application. "The process is so close to practical application that my approach is already being used by a leading OEM." Schüttoff himself is now involved in setting up the new Institute for Hydrogen Technology at the University of Applied Sciences in Kempten, where he will continue to advance the topic.

Designing computer networks securely and efficiently

Computer networks fascinated Dr. Lisa Maile early on because they enable a wide range of applications, from industrial automation to automotive engineering. "A good example is the electronic brake assist system for emergency braking," explains Maile. "We assume that it will work in an emergency. However, complex processes are at work behind the scenes, for which reliable real-time communication in the computer network is essential." Separate networks are traditionally used to transmit different data streams, resulting in high costs and inefficient use of resources. The IEEE 802.1 Task Group therefore developed TSN (Time Sensitive Networking), a standard designed to enable the transmission of different types of information within a single network.

In her dissertation, Maile addressed the question of how such real-time networks can be designed to be secure and flexible with minimal hardware requirements. "The key issue is that data in the system must not remain in the queue – the so-called buffer – for too long, otherwise it will be lost," explains Maile. "The key questions are: What delays can we guarantee? How should redundant data transmissions be organized? What changes to the system should be possible in the future? If you consider these points right from the start in terms of safety by design, data loss can be reliably avoided."

Based on her research, Maile developed a tool that makes it easy to determine the necessary parameters for a network and compared the specifications in the industrial TSN () standards with formal scientific methods. In doing so, she identified several ambiguities in the calculation models that could pose a security risk in practice. The TSN Task Group has now invited her to

serve as editor to revise the standard in the working group. "That's great, of course. As an assistant professor at Eindhoven University of Technology, I will also continue to work on computer networks. My goal is to make formal methods applicable in practice in order to bring science and industry closer together," says Maile happily.

Integrating lasers into optical chips for fiber optic communication

The physical principles behind the propagation of light were already an exciting phenomenon for Dr. Arezoo Zarif during her school days. She therefore decided to study electrical engineering with a focus on optical communications at Sharif University of Technology in Tehran, where she completed her master's degree. For her dissertation at Dresden University of Technology, she focused on a key aspect of optical chip architecture: "The goal of my research was to achieve optical isolation on the silicon chip. This is a prerequisite for integrating the laser, i.e., the light source, on the silicon chip, because the laser must not be affected by back reflections," explains Zarif. "This is the central challenge on the way to the next big step in research in the field of silicon photonics."

The optics expert sought a way to incorporate an optical isolator into the silicon chip that would allow light to pass in only one direction, thereby protecting the laser. This solution eliminates the need for external isolators, which saves space, energy, and costs in the overall system and increases performance. "Mainframe computers in industry or telecommunications networks require very high data rates. It was important to me in my research that the chip developed would deliver the necessary performance and could ultimately be mass-produced."

Zarif achieved this by using a so-called microring modulator, which she integrated into a chip produced on a silicon substrate. To bring the development from her dissertation even closer to application, Zarif plans to apply for research projects and file a patent. She is currently working as a postdoctoral researcher at the Technical University of Dresden in the Department of Electrical Engineering and Information Technology in the field of quantum communication. "This is a very exciting field, and of course, the goal here is also to develop a powerful optical chip."

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