

Interview with Jens Trommer, Senior Scientist at NaMLab



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Question: Could you tell us about your academic and professional journey that led to your current role as a Senior Scientist at NaMLab?

Jens Trommer: Certainly. I have a background in material science, having studied in Freiberg, Germany. After completing my studies, I pursued a Ph.D. at NaMLab, focusing on reconfigurable nanowire electronics. Once my Ph.D. was completed, I faced the decision of either exploring opportunities elsewhere or continuing my work at NaMLab. I chose to stay and gradually moved into industry-related projects while taking on more management responsibilities within the lab. Over time, I became responsible for the electrical measurement tools and eventually took over a research group related to my Ph.D. topic. I've now held the role of Senior Scientist for four years.

Question: What are your main responsibilities at NaMLab, particularly in the development of emerging electronic devices?

Jens Trommer: My primary responsibilities include the supervision of junior researchers,

many of whom are Ph.D. students, as well as overseeing technical staff. Additionally, I am responsible for managing our lab facilities, particularly in electron microscopy and lithography. Beyond that, I contribute to self-management of the institution, align our work with external partners, and engaging with the scientific community.

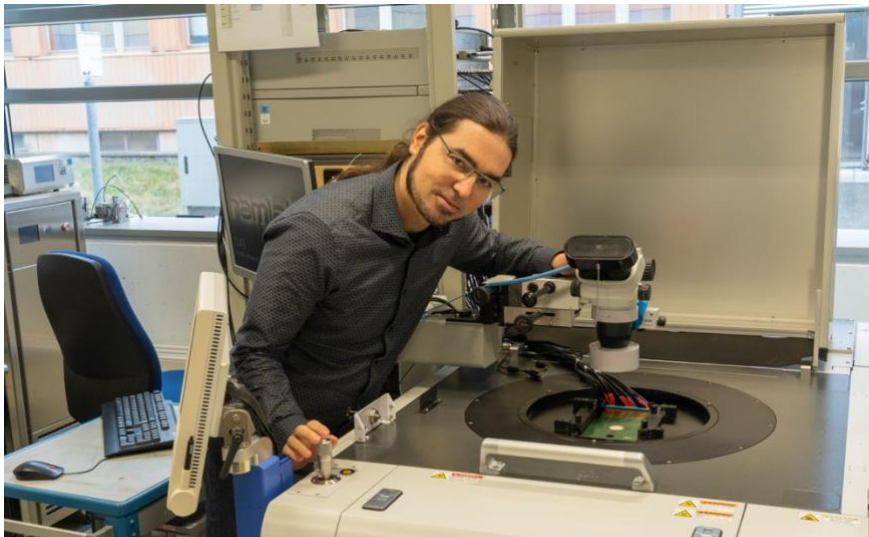
Question: You work on reconfigurable transistors with selectable p- and n-type functionalities. What are the potential benefits of these devices for future electronics?

Jens Trommer: Over the past decades, advancements in electronics have been driven primarily by scaling—reducing the size of transistors to fit more components onto a single chip. However, as we approach atomic limits, further miniaturization becomes increasingly challenging. Reconfigurable transistors offer an alternative path forward by introducing additional functionalities without increasing the transistor count. These devices can

enhance hardware security, support neural network applications, and improve analog signal processing.

Question: Could you elaborate on the concept of polymorphic circuits for hardware security applications and how they enhance the security of electronic systems?

Jens Trommer: Hardware security is crucial for protecting both the data being processed



'By transitioning to a 3D structure with vertical transistors, we can significantly shorten the data pathways, increasing processing speed and energy efficiency.'

and the integrity of the systems themselves. Traditional CMOS circuits are inherently vulnerable to attacks due to their physical predefined structures. With reconfigurable transistors, polymorphic circuits can be designed to obscure their functions from attackers. These circuits allow the same physical layout to perform different tasks based on electrical programming, making it significantly harder to reverse-engineer their functions and enhancing security by safeguarding

intellectual property.

Question: As the leader of Work Package 6 on communication, what are your main responsibilities and objectives within the FVLLMONTI project?

Jens Trommer: One of our key goals is to share our scientific findings with various communities. This is done through publications, conference presentations, and workshops to facilitate knowledge exchange. Additionally, we aim to engage with the public via our website and social media, particularly LinkedIn. Lastly, we strive to ensure our research has real-world impact by connecting with companies and policymakers, advocating for the integration of our technologies into future products.

Question: How does the FVLLMONTI project aim to integrate vertical nanowire ferroelectric transistors (VNWFETs) into embedded voice translation devices, and what advantages do these devices offer compared to current solutions?

Jens Trommer: Voice translation relies on neural networks, which function more efficiently when multiple computational nodes are closely interconnected. In 2D architectures, these interconnections become longer and less efficient when the system size scales up. By transitioning to a 3D structure with vertical transistors, we can significantly shorten the data

pathways, increasing processing speed and energy efficiency. These transistors also have a smaller footprint, allowing for higher-density integration, which is crucial for compact, high-performance systems.

Question: FVLLMONTI is an international collaboration involving multiple partners. How does this collaboration enrich the project, and what challenges have you faced in managing this kind of partnership?

Jens Trommer: Collaboration across different fields and countries brings together diverse perspectives, enriching our research. FVLLMONTI is unique in that it integrates expertise from material scientists, electronics engineers, and computer scientists, allowing us to approach problems holistically. However, one of the biggest challenges is overcoming communication barriers. Different disciplines often use distinct terminologies, which can lead to misunderstandings. Bridging these communication gaps is crucial for an effective collaboration.

Question: How do you see the evolution of reconfigurable nanoelectronic devices in the coming years, particularly regarding their potential applications in artificial intelligence?

Jens Trommer: Reconfigurable transistors enable to build arbitrary logic circuits with a very regular design. As the function is determined only by the applied electrical signals, this regularity enables to stack multiple computational layers on-top of each other and thus truly take advantage of the three-dimensional system for logic, analog to what is already pursued in industry for memory technologies.

Question: What advice would you give to young researchers interested in the field of emerging devices and nanoelectronics?

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Jens Trommer: My advice is to not be discouraged by failure or rejection. Science is about tackling unsolved problems, so setbacks are a natural part of the process. Experiments may not work initially, and papers may be rejected, but persistence is key. There are statistics, that the most successful scientists are often the ones who have also encountered the most failures but are not afraid to try again.

Question: Finally, do you have any closing thoughts?

Jens Trommer: I believe that collaborative research across borders is invaluable, both scientifically and socially. Working with people from different backgrounds not only advances technology but also fosters mutual understanding. I am grateful to be part of such a collaboration here in FVLLMONTI. And I hope we continue to prioritize shared opportunities over competition in the European research landscape.