SECAI: School of Embedded Composite AI

Annual Report 2025

SECAI School of Embedded Composite Artificial Intelligence

Dresden University of Technology

UNIVERSITÄT LEIPZIG

With funding from the:

Federal Ministry of Research, Technology and Space

DAAD Zuse Schools

Konrad Zuse Schools of Excellence in Artificial Intelligence

Dear Reader,

Markus Krötzsch, SECAI Director

Looking back on 2025, it's hard to believe that a mere twelve months were enough for everything that happened at SECAI. But we should not be surprised: with over 80 researchers and 75 students supported by the Zuse School, SECAI was buzzing with energy and fresh ideas. The school entered the year already operating at full capacity and continues to gain momentum as it expands its activities in many directions.

Highlights of 2025 span many areas. SECAI supported four international summer schools, covering topics ranging from touch processing and microelectronics to knowledge graphs and medical AI. Two SECAI-related study programmes have undergone major updates, strengthening their international profile and AI focus. 2025 also saw the launch of the first SpiNNcloud neuromorphic supercomputer, developed by SECAI's Christian Mayr – an impressive example of successful technology transfer. Further successful transfer stories include two new start-ups that were founded by SECAI alumni in 2025. Research remained a core strength, reflected in a record number of publications and numerous individual achievements.

This annual report provides an overview of these activities and many other achievements from 2025. For recent updates and announcements, visit our web portal at secai.org.

Enjoy the report!

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SECAI

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SECAI Advances Excellence in AI Research

We view AI as an interdisciplinary long-term challenge that requires experts from many areas. SECAI's foundational research brings together computer scientists, mathematicians, electrical engineers, and experts in law and society; our applied research in digital health and medical informatics ensures practical relevance.

SECAI Educates the Next Generation of AI Experts

Our structured training programs foster new AI talents from undergraduate studies to completed PhD. Studying in SECAI comes with priority access to leading AI experts and attractive funding programs.

SECAI Builds Research-Oriented AI Networks

Our extensive national and international research network creates synergies and fosters collaboration. From student exchange to joint research projects, being part of SECAI is being part of a global academic community.

SECAI is Visible

We believe that AI research is a concern to all of research and a fundamental societal concern. By taking part in the public discourse, we foster transparency and establish SECAI as a label for excellence in AI.

SECAI Makes a Lasting Impact

Our activities are designed to create lasting effects on the research and teaching at our host institutions and in German AI in general. We work closely with the universities to build sustainable structures.

SECAI Community at Off-Site Meeting 2026

SECAI AT A GLANCE

A Short Introduction to the Zuse School in AI

The School of Embedded Composite Artificial Intelligence (SECAI) is a joint project of TU Dresden and Leipzig University that fosters AI research and higher education. SECAI integrates university studies, academic research, and industrial applications by sponsoring students, improving teaching, funding researchers, and supporting exchange.

Research

SECAI is distinguished by its inclusive view on AI that encompasses foundational research – especially in symbolic and statistical AI methods – as well as applied research – especially in the medical domain. Learn more *on page 12*.

Education

SECAI educates future AI professionals and researchers on many levels. It supports AI-related MSc study programs in Dresden and Leipzig, offers scholarships to outstanding students *(see page 14)* and runs an own Graduate School for doctoral researchers *(see page 16)*.

THE DAAD KONRAD ZUSE SCHOOLS OF EXCELLENCE IN AI

SECAI is part of a targeted funding program that aims to boost AI research and education in Germany. The DAAD Konrad Zuse Schools of Excellence in AI are conceived as national centers for innovative education of outstanding young AI researchers at MSc and PhD level. Each Zuse School brings together several German universities with an excellent standing in AI research and a forward-looking concept for future university education. The three Zuse Schools ELIZA, RelAI, and SECAI have started their operations in July 2022.

More information about the Zuse School program can be found online:
www.daad.de/en/the-daad/zuse-schools/

SECAI

School of
Embedded Composite
Artificial Intelligence

SECAI Facts and Figures

Title
School of Embedded Composite AI

Participating organizations
TU Dresden (coordinator), Leipzig University, University Hospital "Carl Gustav Carus" Dresden

Current funding period
07/2022 – 12/2027

Funding volume
13.2 M EUR

Funding bodies
Federal Ministry of Research, Technology and Space (BMFTR) via German Academic Exchange Service (DAAD)

TU Dresden, Faculty of Computer Science

Leipzig University, Faculty of Computer Science

THE SECAI CONSORTIUM

Places Where the Future of AI is Shaped

TU Dresden

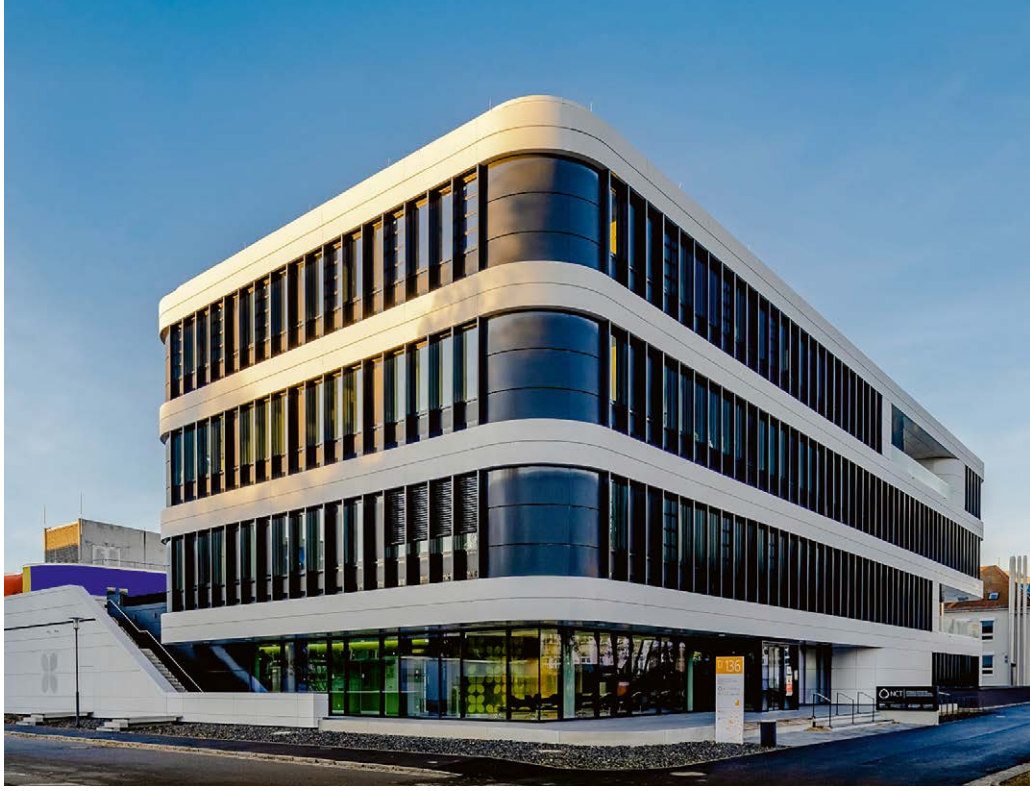
Dresden University of Technology is one of the largest Universities of Technology in Germany and is among the leading and most dynamic universities in the country. With 17 Faculties across five Schools, it offers a widespread range of 119 degree programs and covers a broad spectrum of research. Its focuses on Life Sciences, Quantum Materials, Microelectronics, Tactile Internet, Materials Science, Data-Intensive and Digital Sciences, Circular Economy and Societal Change are considered exemplary across Europe.

TU Dresden is leading the SECAI consortium, with participation of the faculties of Computer Science, Electrical and Computer Engineering, and Arts, Humanities and Social Science. Markus Krötzsch of the Chair for Knowledge-Based Systems is the project leader and current director of SECAI.

Leipzig University

Founded in 1409, Leipzig University is one of Germany's largest universities and a leader in research and medical training. With around 31,000 students and more than 5,000 members of staff across 14 faculties, it is at the heart of the vibrant and outward-looking city of Leipzig. Leipzig University offers an innovative and international working environment as well as an exciting range of career opportunities in research, teaching, knowledge and technology transfer, infrastructure, and administration.

Leipzig University is a partner in SECAI with participating fellows affiliated with the Department of Mathematics and of Computer Science, Faculty of Medicine, the Max-Plank-Institute for Mathematics in the Sciences and the Frauenhofer Institute for Cell Therapy and Immunology. The SECAI co-director in Leipzig is Peter F. Stadler, head of the Bioinformatics Research Group in the Institute for Computer Science.



University Hospital Dresden, National Center for Tumor Diseases

University Hospital Carl Gustav Carus Dresden

The University Hospital Dresden commits to excellence in medical care, medical research and training, and health services for patients throughout the region. As an internationally outstanding academic-medical center, it is playing an important role in medical AI research.

In SECAI, the University Hospital is in particular involved via the Else Kröner Fresenius Center for Digital Health (EKFZ), which has its topical focus in research areas of high relevance for AI, including robotics and coworking, sensors and medical devices, as well as connected care. SECAI co-director Stefanie Speidel is a professor at the National Center for Tumor Diseases (NCT) in Dresden and member of EKFZ.

WIDENING THE VIEW

Making the Case for a Broader Perspective on Artificial Intelligence

As with any major progress in research or technology, we like to attribute breakthroughs in AI to single causes: brilliant concepts that fundamentally enable computers to be intelligent. In reality, however, practical AI systems are the result of combining ideas and methods from many sources, making them work together through careful engineering. In all of this, the human user and the demands of the target application must be taken into account.

SECAI therefore pursues an approach that conceives AI as a broad endeavor that brings together foundational and applied research from a wide range of topics. To organize this breadth in a productive and beneficial way, SECAI research is centered around five Research Focus Areas. These areas communicate intensely, and many SECAI researchers contribute to more than one of them, but they also provide topical fields that encourage researchers to go deep into the field where they can contribute most.

Composite AI

Hybrid methods and algorithms that combine strengths of distinct AI techniques

While traditional AI was driven by the search for one single paradigm to create intelligent behavior, most modern AI success stories embody a synergistic combination of multiple paradigms, known as hybrid or composite AI. While “pure” methods achieve

a certain success, recent composite approaches accomplish similar performance at much lower cost. As widespread as hybrid approaches are in AI today, the combination of methods is often a feat of engineering, whereas a principle understanding of composite methodologies and their effective use is lacking. In SECAI, we assemble internationally recognized experts across a broad spectrum of hitherto segregated AI approaches, ranging from symbolic methods to machine learning.

AI Compute Paradigms

Fundamentally new computing hardware and its effective use in AI

The recent leaps of AI have been inextricably connected to the advancement of computing hardware. The present wave of AI breakthroughs started with the insight that graphics hardware (GPUs) can be harnessed to scale known machine learning (ML) methods to much larger data sizes, and AI has since been associated with massive computation usage. Specialization is now a major trend in microelectronics: CPUs and GPUs today compete with field-programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs). The success of innovative hardware crucially depends on embedding: (1) the physical embedding of the hardware in intelligent devices and (2) the logical embedding of AI algorithms in the computational framework of the underlying hardware. SECAI aims at dealing with both aspects by developing future AI compute paradigms.

Intelligent Medical Devices

Cyber-medical AI systems and clinical embedded AI applications

The specific needs of relevant application domains yield guidelines for the future development of AI that are at least as important as hardware and algorithms. In SECAI, a suitably concrete application scope is provided by the multitude of exciting and prospering uses of AI in life science and medicine. The field's demanding requirements for hardware (small, energy-efficient, real-time capable) and methods (robust, scalable, trustworthy) make it an ideal test bed for interdisciplinary AI solutions.

AI Methods for Health

AI for bio-medical data analysis and knowledge management

With the growing amount and complexity of data in healthcare, AI methods become increasingly prevalent in biomedical research, promising to generate new insights by revealing latent patterns hidden in the data. Applications range from computer-aided drug design and medical image analysis to diagnostic expert systems and cyber-medical systems. As the success of the such methods is very sensitive to the quality of the input data, solutions for large-scale data management are required.

Societal Framework for AI

Cross-cutting research on wider societal concerns and policies

Technological breakthroughs can only unfold their practical benefits if they are aligned with the broader frameworks that govern societal acceptance, legal approval, and economic viability. The European Commission's recent Artificial Intelligence Act has drawn attention to the formidable difficulty of regulating AI in a way that protects citizens from risks like discrimination and still fosters innovation and economic growth. Through its focus on medicine and health care, SECAI deliberately connects to a field that – like AI – is inseparable from far-reaching questions of ethics, law, and societal acceptance. SECAI builds on the partners' substantial experience in topics like data protection and regulatory affairs in medical contexts, while also taking political and philosophical aspects into account.

SECAI is training the next generation of AI experts

“WHERE CAN I STUDY AI?”

The AI Teaching Portfolio at TU Dresden and Leipzig University

The acute shortage of AI professionals is met by a huge interest among students to study “AI”. Their choice, however, is not always easy: AI is a vast area that requires many different skills, and technology often changes faster than study plans. SECAI therefore supports several MSc training programs, which cover a breadth of skills and focus on methods and concepts of lasting relevance.

The following master-level programs each have a two-year curriculum and SECAI scholarships are available for students in these study programs. For broader programs that support different specializations, SECAI supports teaching offers and students with a strong focus on AI.

AI@TU Dresden

Computer Science
The MSc program in computer science offers a broad range of courses on AI methods, including fields such as computer vision, robotics, data analysis, and symbolic AI. A particular emphasis of the program is on foundational and research-oriented topics. In 2025, the CS master program of TUD switched to English as its primary teaching language, a move that is perfectly aligned to SECAI’s internationalization goals.

Computational Modeling and Simulation

This innovative, international study program spans several faculties and a range of interdisciplinary and applied topics in data science, AI, bioinformatics, and applications. Students of CMS enroll for a specific track that defines their topical focus. For those with an interest in AI, the most important tracks are Computational Life Science and Visual Computing, as well as the new track Applied Artificial Intelligence that was created as part of the SECAI teaching activities.

Nanoelectronic Systems

Dresden, the center of the European semiconductor industry, is an ideal location for studying cutting-edge electronics. The international MSc program Nanoelectronic Systems endows students with key skills related to the fundamental technologies, design, and applications of today's increasingly miniaturized computing systems. In particular, this also includes modules on AI-specific hardware accelerators and novel compute paradigms.

AI@Leipzig University

Data Science

Students of this MSc program focus on recent topics in data analytics, scalable data management, and data mining. This builds a bridge between fundamental AI methods and applications.

Bioinformatics

This program brings together computer science and biology to focus on one of the most important and successful interdisciplinary fields in AI. Students acquire knowledge in the sciences, computing, and mathematics, and learn to combine their skills in relevant application fields.

Medical Informatics

This interdisciplinary program incorporates many aspects of digital health and medical information systems. The interface of computer science and medicine defines the methodological center of the training, and also touches upon applications.

Computer Science

Students may select a limited number of AI modules from the above mentioned specialties for their studies in Computer Science.

SUPERCHARGE YOUR STUDIES IN AI

SECAI Scholarships

Talented students of AI have access to a range of financial support programs that help them to make the most of their studies, kick-start their research career, and build their professional network. SECAI offers residency scholarships, which cover living expenses in Germany, as well as mobility grants to foster international exchange. See **secai.org/students/scholarship_programs**

Yearly Application Rounds for New MSc Students

Students who plan to start in an MSc program at TU Dresden or Leipzig University can apply for SECAI scholarships in May and June of the same year and receive timely notifications. The scholarships are initially awarded for a limited time, and can be extended based on the result of intermediate reviews of study progress.

Mobility Grants

SECAI strongly encourages international exchange and offers dedicated mobility grants. Students in Dresden and Leipzig can receive grants to visit international partners and research events, and students from international sites can receive grants to visit Dresden or Leipzig. SECAI fosters sustainable travel and covers extra costs to avoid short-distance flights.

Offers for Current Students

SECAI support is not limited to students at the start of their MSc, but can be applied for at any stage of the studies. Just ask!

SECAI doctoral students working in a group at an Off-Site Meeting

STARTING A CAREER IN AI

The SECAI Graduate School is a Training Ground for Future AI Experts

The research-oriented graduate program is an integral part of the activities in SECAI. In a fully-funded 3-year training program, researchers have the opportunity of obtaining their PhDs under the guidance of renowned researchers in Dresden and Leipzig.

Researching Together

SECAI is taking in graduate researchers in yearly cohorts, starting in autumn for a smooth transition from the MSc programs. By the end of 2024, the Graduate School has grown to a total of over 30 researchers. Each doctoral student and clinician scientists is supervised by a primary supervisor and at least one second supervisor, typically a SECAI Fellow from the same research focus area. SECAI values communication and exchange, and supports researchers in widening their professional network – a highly inspiring environment. A list of Graduate School members is found *on page 44.*

PhD Students and Clinicians

Due to the specific interdisciplinary profile of the school, the graduate program includes both doctoral students and clinician scientists. The latter is a training model at university clinics that allows physicians to conduct research in parallel to their specialist training (German *Facharztausbildung*), enabled by a reduction of their medical service duties. At the end of this structured academic pathway, clinician scientists do usually not obtain an (additional) doctorate but a visible research output and have an optimal preparation for a research-oriented career in their field.

Roads to Success

The school favors three-year model for completing doctoral theses, but also understands that this plan may need adjustment due to interdisciplinary differences (e. g., clinician scientists often finish in two years), personal circumstances (e. g., family planning), and professional causes (e. g., unforeseen developments in the research area). SECAI strives to support this diversity in individual research paths and seeks out individual solutions in exchange with supervisors and researchers. Two elected graduate school representatives have voting right in the regular decisions of the SECAI Steering Group *(see page 42)*.

Fast Track to Research

A dedicated Fast-Track PhD program supports the transition from MSc student to doctoral researcher. The program blends the final MSc semester with the first half year of doctoral studies by aligning MSc topic and future PhD topic, and providing financial support. For the latter, the SECAI scholarship programs have proven to be very effective.

Mini Projects

SECAI's special program for mini projects allows graduate researchers to obtain small-scale funds for activities of their own choice, e. g., for special equipment, compensations for participants in empirical studies, or organization of own events or guest invitations. Applications follow a simple and unbureaucratic process, but will receive expert feedback to prepare candidates for own future proposals. Since the start of SECAI, 47 project grants have been awarded overall *(see table)*.

SECAI MINI PROJECTS (AS OF 2025)

- **Research stays:** 8 projects
- **Research materials:** 4 projects
- **Summer school and workshop participation / organization:** 18 projects
- **Student assistants:** 17 projects

- **TOTAL: 47 PROJECTS**

PhD students meet their supervisors regularly

The joy of interdisciplinary research experiences

Exchange at the annual meeting of the German Zuse Schools

Kick-Off Event of the SECAI.Café series of the study year 2025/26 with Christina Norkus

THE SECAI.CAFÉ

Strong Impulses for Science and Career

With a variety of events, workshops, and networking opportunities, SECAI has created an environment that fosters scientific excellence, personal development as well as cultural sensitivity. A particular milestone was the establishment of the SECAI.Cafés as a regular event series, which has quickly become a cornerstone of the community.

The SECAI.Café: Networking Made Easy

The introduction of the SECAI.Café has created a platform that offers much more than just professional training. Once a month, SECAI scholars, doctoral candidates, and Fellows gather in an open and informal atmosphere to exchange ideas, learn from each other, and build valuable connections. Each event begins with an input session covering a wide range of topics: from specialist lectures and career tips to insights into the industry and workshops on soft skills and presentation techniques.

This not only creates an inspiring learning environment but also opens the door to personal conversations and open dialogue. A strong network supports both career and personal growth, and this is precisely where the SECAI.Café comes in. It provides the perfect framework for building lifelong networks. The relaxed atmosphere and diversity of participants make it a unique meeting point that has already become an integral part of the SECAI community.

Kick-Off Event: A Successful Start to the Semester

The Kick-Off Event in October marked the start of the winter semester, especially for the new scholarship recipients. They were warmly welcomed and also introduced to the importance of networking. The impulse workshop titled "Get connected: Networking for Scientists" with Dr. Stephanie Rohac set the tone for the event. With practical tips and simple methods, participants learned how to network effectively and successfully. The result: new friendships, lively discussions, and a continuously growing SECAI community.

Industry Insights: Practical Perspectives

Another pillar of the 2025 event series was the "Industry Insight" cycle, which offered scholars and doctoral candidates the chance to explore diverse career fields related to artificial intelligence. For instance, Benedikt Läufer from Infineon Technologies provided fascinating insights into how artificial intelligence is used in chip production in his company. Fellow Roberto Calandra also shared his experiences, drawing from both his work in academic research and his role in industrial research departments. These in-depth insights not only showcased the versatility of AI applications but also gave participants valuable perspectives for their own career planning.

Career Impulses and Cultural Competence

In addition to technical and practical insights, SECAI places great importance on the development of soft skills and cultural competence. The career impulses provided through the event series deliver valuable tips for entering scientific or industrial careers and illuminate various career paths and opportunities. One outstanding example of fostering intercultural competencies was the full-day workshop "Living and Working Successfully in Germany" with Jyotika Dalal which introduced international participants to German workplace culture. The workshop clarified misunderstandings, raised awareness of cultural differences, and provided an excellent foundation for a successful career start in Germany. This aligns with SECAI's project goal of attracting international professionals to the German labor market. Especially in an international environment like the SECAI community, such offerings are vital.

Together for a Strong Community

The events of the Zuse School SECAI have long become fixed dates in the calendars of its scholars. Next to the high-quality program, the active participation and dedication of the attendees makes the events so special. The SECAI community thrives on the people who shape it. The results speak for themselves: a strong, vibrant community that supports its members and accompanies them throughout their lives.

Networking during a SECAI.Café meeting

SECAI.CAFÉS DRESDEN WINTER SEMESTER 2025/2026

- **10/2025 Kick-off:** Impulse Workshop "Get connected: Networking for Scientists"
- **11/2026 Industry Insight:** Infineon
- **12/2026 Cultural Insight:** Christmas in Dresden, Semperoper
- **01/2026 Welcome to 2026:** Informal Get-together
- **02/2026 Career:** Academia vs Industry – Choosing your Career
- **04/2026 Cultural Insight:** Workshop "Living and Working Successfully in Germany"
- **05/2026 Career:** Application Process in Germany and CV Check

SpiNNcloud supercomputer at TU Dresden

SPINNAKER2: THINKING LIKE A BRAIN

A Brain-Inspired Platform for Energy-Efficient AI

Artificial intelligence is transforming industry and academia – but at a steep and growing energy cost. At TU Dresden and Leipzig University, SECAI researchers are answering that challenge by taking inspiration from the most energy-efficient processor known: the human brain. The result is SpiNNaker2, a neuromorphic chip that consumes a fraction of the energy of conventional hardware while delivering real-time AI performance.

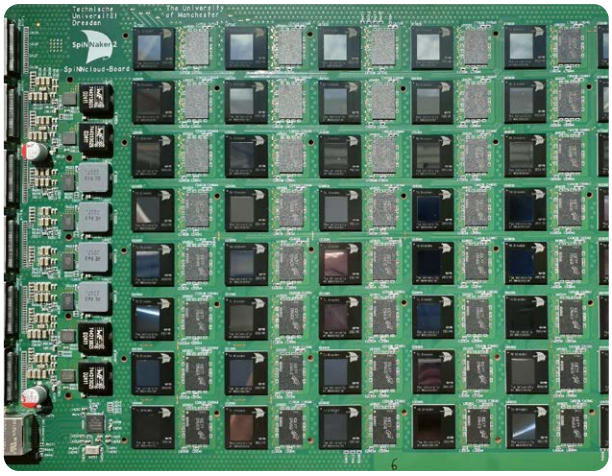
These neuromorphic computer systems are inspired by the human brain. Instead of relying solely on improvements to existing technologies, this novel approach extends the design of computer architectures to include brain-like principles: memory is distributed across a dense network of interconnected processors, and information is processed in an event-driven manner. Just as their biological counterparts, the artificial processors fire only when activity is needed. The result is a significant reduction in energy consumption combined with high performance and flexibility.

SpiNNaker2 was developed under the leadership of Fellow Christian Mayr, professor for Highly-Parallel VLSI Systems and Neuro-Microelectronics at TU Dresden, as part of the EU flagship project Human Brain Project. “SpiNNaker2 combines a high level of efficiency with real-time processing, boasting latencies of less than one millisecond,” explains Mayr. “Inspired by biological principles such as plasticity and dynamic reconfigurability, the system automatically adapts to complex, changing environments. This combination of biologically-inspired architecture and technological innovation

opens up a plethora of new possibilities for AI applications in smart cities, autonomous driving and the tactile internet."

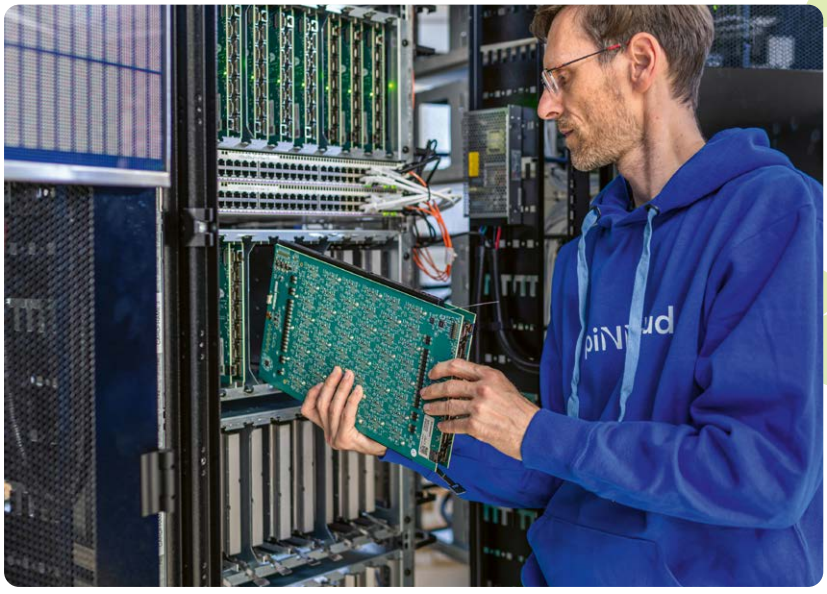
A prime example of how SECAI's interdisciplinarity bears fruit is the deployment of SpiNNaker2 at Leipzig University, where Fellow Jens Meiler and his Institute for Drug Discovery are applying it to AI-supported pharmaceutical research. Because neuromorphic systems are particularly well suited to solving the kind of complex, high-dimensional problems encountered in drug development, the platform opens up entirely new possibilities for predicting protein structures and identifying novel drug candidates. "This new AI-supported technology will help us predict protein structures and identify completely new drug candidates for pharmaceutical research. We hope to achieve a 10,000-fold acceleration in the future once our algorithms have been adapted to the new hardware. This is an important step for personalised medicine, in which short development cycles and patient-specific adaptability play a crucial role," says Meiler.

Neuromorphic hardware is also proving its worth beyond the life sciences. SECAI PhD researcher Tim Langer works with SpiNNaker2 daily, exploring the implementation of Large Language Models on the platform. This challenge quickly revealed a key insight: efficiently executing complex algorithms requires scaling across multiple chips. This is precisely what the SpiNNcloud supercomputer is built for, and it points directly to why moving from a single chip to a large-scale system is not just an engineering ambition, but a research necessity.

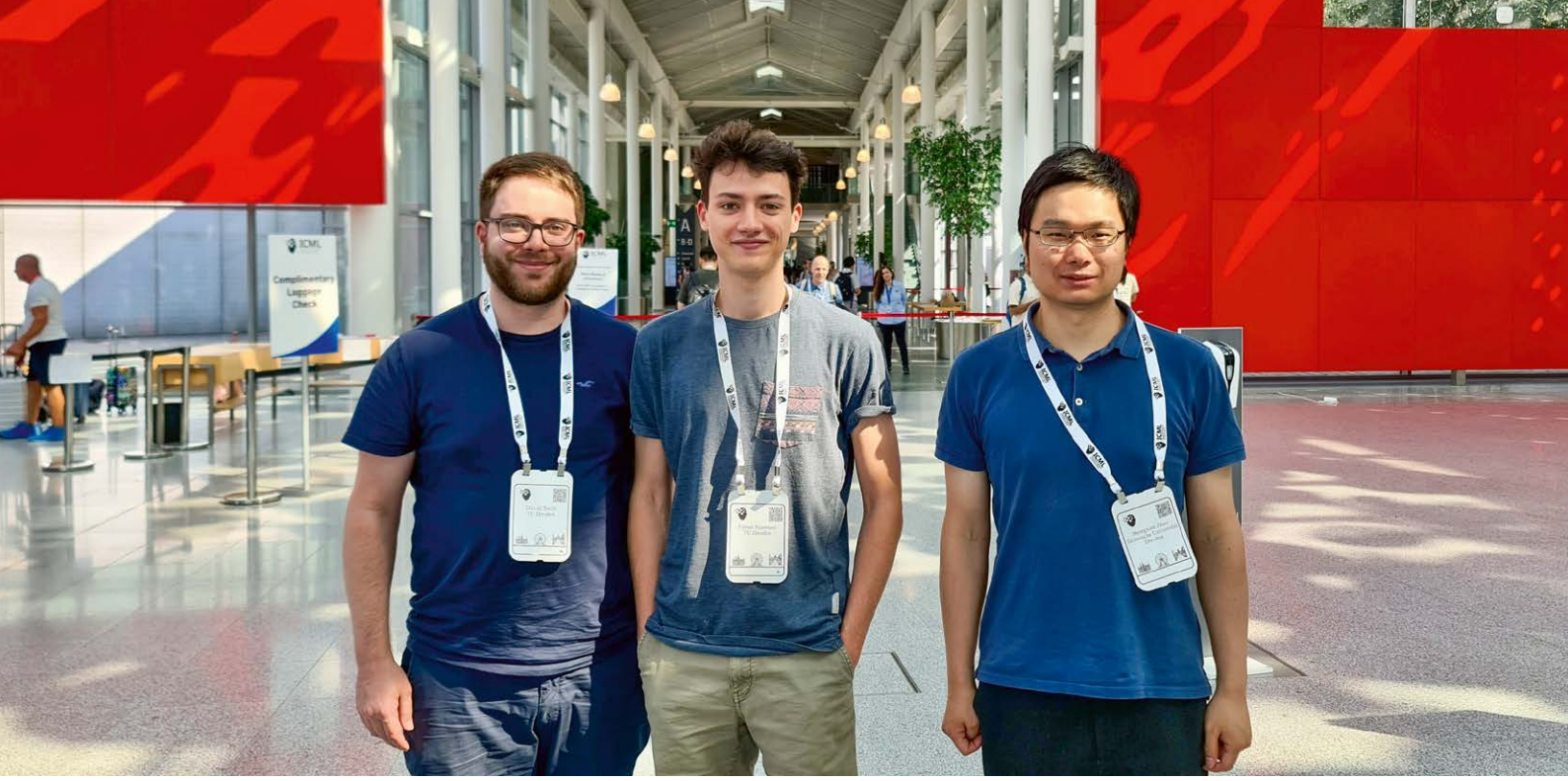


SpiNNaker2 Board

This scalability is developed by SpiNNcloud Systems GmbH, a deep-tech spin-off of Prof. Mayr's chair. The company offers the world's first commercial brain-inspired HPC platform, redefining traditional computing architectures through energy-efficient parallel processing and real-time capabilities. The platform's key strengths are its flexibility, enabled by low-power hybrid AI processors, and its energy-proportional design, achieved through event-based communication and computation that delivers 18 times higher energy efficiency than conventional GPU-based systems. The architecture scales seamlessly from a single chip to supercomputer level through its parallel topology, as demonstrated by the flagship installation at TU Dresden: 34,000 chips, five million cores, 720 boards and eight racks – making it the most energy-efficient computing infrastructure for next-generation AI inference.



Installation of a SpiNNaker2 Board



Lucas Fabian Naumann (center) with colleagues at ICML 2024

FROM SCHOLARSHIP TO RESEARCH

An Interview with Lucas Fabian Naumann about his Path into Academia

Lucas Fabian Naumann studied Physics and Computer Science at Friedrich Schiller University Jena, earning bachelor's degrees in both fields. He then pursued a Master's in Computer Science at TU Dresden, where he was awarded a SECAI scholarship from February 2024 onwards. He graduated in May 2025 and was honored by TU Dresden as best graduate of his academic year. He subsequently joined the research group of SECAI Fellow Björn Andres to start his PhD. During his time as a scholarship holder, he already published two papers at the International Conference on Machine Learning (ICML). His research focuses on combinatorial optimization problems, with applications ranging from image segmentation to particle physics.

Your research is on combinatorial optimization. What does that actually mean?
When solving combinatorial optimization problems, you are given a number of interdependent decisions, and your task is to find a combination of decisions that yields an optimal outcome – or at least one that is good enough. The usually large number of decisions and their interdependence is what makes such problems (NP-)hard, and interesting to solve.

A concrete example of a combinatorial optimization problem I am working on is correlation clustering. In this problem, you are given a number of objects and pairwise similarities between them, and the task is to cluster the objects such that similar ones are in the same cluster and dissimilar ones are in distinct clusters. A simple use case is the segmentation of an image by considering its pixels as the objects to be clustered and

measuring pairwise similarity based on the pixel colours. However, there are various more sophisticated applications, such as object tracking, mapping neurites in 3D electron microscopy, and analyzing particle interactions at the Large Hadron Collider. This general applicability is what makes this field so interesting to me: By studying one abstract mathematical problem, we obtain tools that can be used for a variety of downstream tasks.

How did being part of SECAI shape your time as a Master's student?

Throughout my time with SECAI, I have encountered only incredibly welcoming people and surprisingly unbureaucratic processes. I am very glad that this programme exists, and I am grateful for all the support that I have received. Thanks to the scholarship, I could focus fully on my studies and my own research interests during my Master's. In particular, it gave me the freedom to engage deeply with research projects under the supervision of Prof. Andres and his team, which directly led to two publications at ICML.

Beyond the financial support, joint activities such as the SECAI.Café and guest talks provided a great opportunity to connect with other scholarship holders, PhD students, and SECAI Fellows across Dresden and Leipzig. In fact, I am still benefiting from these events today. Since starting my PhD, I have connected with current scholarship holders there and ultimately supervised two of them on their course projects, in which they produced excellent results.

The SECAI scholarship aims to bring talented students into academia. How did that play out in your case?

Ironically enough, I originally switched my major from physics to computer science specifically because I didn't want to do a PhD, which is so often required for industry roles in physics. Obviously, this did not go as originally intended. I realized during the research projects in my Master's how much fun it is to solve open mathematical problems and to conduct research within an open, collaborative group. When I graduated, it was thus an easy decision to stay in the group of Prof. Andres, where I conducted most of my research, and continue working on these projects I had already started and found so rewarding.

What has been your most memorable academic moment so far?

Attending my first big conference, ICML 2024 in Vienna, was definitely a major highlight. It was particularly memorable because I was still a Master's student at that time. The scale of the conference exceeded my expectations: there were over 9,000 attendees, and more papers than you could read in a year. It was also a surreal experience to suddenly stand in front of researchers I had previously only known through their papers. Overall, it was a really inspiring and sometimes overwhelming experience that I will certainly remember for life.

Lucas Fabian Naumann (3rd from left) receives the Wilhelm Gotthelf Lohrmann Medal as best graduate of TU Dresden's Faculty of Computer Science for the study year 2024/25

Join Science cohort 2025 at closing ceremony in December 2025

JOIN SCIENCE

Mentoring Program for Female Students and Scientists at TUD

Join Science creates a framework for reflection, orientation, and personal development for female students and early-career scientists, contributing sustainably to the visibility and promotion of female talent in science.

"With *Join Science* we aim to encourage research-enthusiastic female students early on to find their place in science and confidently shape their own academic path. The personal exchange of experiences between students and female scientists provides valuable career orientation, sustainable networks, and new perspectives for a diverse research landscape."

Sophia Trotzer,
Coordinator of *Join Science*

The mentoring program *Join Science* at TU Dresden supports female students and early-career scientists in STEM fields at various stages of their academic careers, thereby making an important contribution to promoting diversity and equal opportunities in the scientific system. The goal of the program is to inspire women to pursue an academic career at an early stage, strengthen their professional orientation, and build sustainable networks within the research community. Participants gain valuable insights into the workings of the scientific field and receive guidance regarding their further academic development, particularly with respect to pursuing their own doctorate.

At the heart of the program are around 10 mentoring tandems, in which early-career scientists at TU Dresden provide individual support to female students (7 scientists and 19 students in 2025). The mentors come from the university's Excellence Clusters as well as from research areas funded by the DFG (German Research Foundation) and DAAD (German Academic Exchange Service). Through personal interaction, they offer practical insights into their scientific work, share experiences regarding career paths, and provide guidance on topics such as pursuing a doctorate, research organization, and scientific work structures. *Join Science* views mentoring as a trusting, equal partnership in which both professional and personal questions can be discussed in a safe and supportive environment. In addition to providing financial support, SECAI also backs the program with womanpower: Haadia Amjad – doctoral student at the Chair of Fundamentals of Electronics – served as a mentor again in 2025. Her research focuses on the real-life applications and evaluation of Explainable Artificial Intelligence methods, with a special focus on Surgical Skill Assesments.

Furthermore, coordinator Sophia Trotzer organizes a great variety of workshops during the 9-month program, e. g., self-positioning and orientation, career planning for women, career development in Germany, digital tools and empowerment, as well as seasonal parties for networking and exchange. These trainings aline directly with SECAI's project objectives, making the support of young professionals a natural fit for SECAI.

"As a mentor, my role is to give my mentees an open platform to communicate, lean on their strengths and help them navigate through their professional milestones. Together, we focus on activities and interactions that help them develop useful skills, and develop a sense of what their professional life could look like. This program is personally very important to me, as this gives me an opportunity to help encourage and support more women in STEM and help contribute to the community. At one stage in the program, we go over career prospects by looking at potential job descriptions and align them with the mentees profile. I often introduce mentees to other professionals in their respective fields so they have more exposure."

Haadia Amjad,
Mentor and doctoral student of SECAI

Tea plantation in Kerala

SPICES, DATA, AND DEEP LEARNING

SECAI's International Research Exchange Programs for Students

Binsa Muhammed Iqbal (left), Sreelekshmi Prasannakumari Amma (center), Aswani Krishna Vijaya Kumar (right)

Attracting talents at early career stages is a top priority for the Zuse Schools, and a key factor in their lasting impact on AI in Germany. The Kerala exchange marks the next chapter in SECAI's growing portfolio of international student programs, complementing ongoing exchanges such as the collaboration with the University of Cape Town. SECAI's scholarship programs for students at bachelor and master level have proven highly effective, and the international exchange programs with SECAI's academic partners worldwide remain among the most exciting opportunities for outstanding individual students.

When three students from the University of Kerala arrived in Leipzig in March this year, they became the first participants in this new exchange, built on an already long-standing academic partnership. For over a decade, Professor Manoj Changat from the University of Kerala in Thiruvananthapuram and SECAI Fellow Peter Stadler from the Bioinformatics Group at Leipzig University have maintained close scientific ties. On this foundation, a formal

Studying together at Leipzig University

student exchange program has now been built, with SECAI providing the scholarship funding to make it a reality.

The three students – Binsa Muhammed Iqbal, Sreelekshmi Prasannakumari Amma, and Aswani Krishna Vijaya Kumar – arrived well-prepared and eager to expand both their research skills and their professional horizons. Their backgrounds in data science, mathematics, and computer science made them well-suited to engage with SECAI's research themes, and each found her own path into the academic life of Leipzig University.

Aswani Krishna Vijaya Kumar was drawn to SECAI through its research focus on AI in life sciences, which matches her long-standing interest in applying machine learning to healthcare challenges. With experience spanning deep learning, image processing, and natural language processing, she extended this expertise into bioinformatics during her stay. "The opportunity to study and do research in Germany with the support of SECAI has been invaluable," she reflects. "It's helped me deepen my expertise while also broadening my academic exposure."

Binsa Muhammed Iqbal's project on RNA Secondary Structure Prediction through Deep Learning sat at the intersection of computational biology and machine learning. "The opportunity to collaborate internationally and engage with cutting-edge research at Leipzig University is a major driving factor for me," she says. "I saw it as a chance to grow both academically and personally while contributing to a wider research network." Looking ahead, she hopes to deepen her work in computational biology and build global connections to support future PhD studies or joint research projects.

Sreelekshmi Prasannakumari Amma brought a similar data science background, with prior project experience in image recognition and language processing. At Leipzig University, she took courses in Artificial Intelligence, Deep Learning, and Machine Learning, expanding her toolkit with an eye toward applying AI to real-world challenges, particularly in healthcare. She is keen to encourage others to follow suit: "SECAI gives you great support, a chance to meet people from different backgrounds, and work on important, meaningful topics. If you're interested in using AI to make a difference, this is a great opportunity."

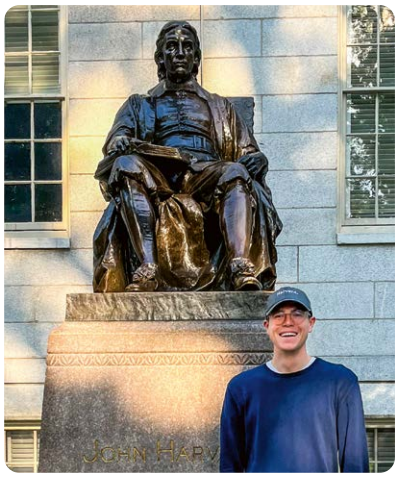
All three students were fully immersed in the academic life of Leipzig University from March to May, attending courses, engaging with SECAI researchers, and contributing to a growing network of international scientific exchange. SECAI's role was to provide both the financial support through its exchange scholarships and the professional environment to make such stays as substantive and rewarding as possible.

The longer-term aim of the exchange goes beyond the individual visits, fostering deeper scientific cooperation in data science and ideally attracting talented students to pursue doctoral degrees through jointly supervised theses. What began as collegial ties between two research groups is now becoming something more structured – a promising next step for both institutions and a growing bridge between Thiruvananthapuram and Leipzig.

SECAI Alumni Moritz Hehl

FINDING THE SHAPE OF KNOWLEDGE

An Interview with SECAI Alumni Moritz Hehl



Having received his Diploma in Mathematics from Leipzig University, Moritz Hehl joined the SECAI Graduate School in October 2024. Under the supervision of Max von Renesse and Guido Montúfar, he researched discrete Ricci curvature and its applications across pure mathematics, machine learning, and chemistry. Within just one year, Moritz Hehl wrote three publications (Mathematische Annalen, Calculus of Variations and PDE, Proceedings of ICML), and a fourth is under review at Discrete Analysis. During his PhD, he visited Harvard University from July to September 2025. Since November 2025, he has been working at LakeEight, an investment boutique based in Berlin.

Moritz, what is the essence of your research?

The core thread running through all my research is discrete Ricci curvature, a way to translate a classical concept from Riemannian geometry into the broader world of metric spaces, such as graphs, networks, or CW complexes. I started in pure mathematics, studying discrete Ricci curvature on graphs and CW complexes, providing a new formula for discrete Ollivier-Ricci curvature on regular graphs, and generalizing a classical theorem from Bochner for manifolds to the discrete setting of CW complexes.

What excited me about SECAI was the chance to take these mathematical tools and apply them to different fields, e. g., we used tools from differential geometry to understand how neural networks organize information internally as they learn in our ICML spotlight paper "Neural Feature Geometry Evolves as Discrete Ricci Flow". Another example is a still ongoing project with Melanie Weber, Guillermo Restrepo and Jürgen Joost, where we study the geometry of the

entire space of known chemical reactions from the Reaxys database, essentially asking what shape chemistry itself has and how the field grows.

What I am most passionate about, is the chance to work in various fields – pure math, ML, chemistry. Especially in the age of AI, where knowledge becomes more and more accessible, I want to use these tools to learn about as many fields as possible.

So your research kept expanding into new territory – and you along with it. Where has that journey taken you now?
Since November 2025, I have been working at LakeEight, a small three-person investment boutique in Berlin that invests across a wide variety of industries and works operationally with portfolio companies. The role echoes the spirit of my PhD: every day I work myself into new topics, currently AI applications for real estate and AI in industrial production. For me, it's my dream job because of the constant intellectual variety and the steep daily learning curve. Just like during my PhD, I'm exposed to new topics and am learning about new things every day.

Was leaving academia a difficult decision?
It was not a move away from academia; rather, the specific opportunity was exactly what I was looking for: a role that lets me keep learning across many fields, just as I did during my PhD. My supervisor Max von Renesse introduced me to the team, so the connection that led to this job came directly through SECAI. The interdisciplinary culture of SECAI prepared me well: working across pure math, ML, and chemistry made the transition to a role that demands rapid context-switching feel natural.

What moments from your PhD stand out most?
The first thing that comes to my mind is working with my supervisor Max von Renesse, who supported me at every step: he encouraged me to start a PhD, made my stay at Harvard possible, and helped me with the move into industry.

My absolute highlight was visiting Melanie Weber's work group at Harvard in 2025, something I had dreamed of for years. I met impressive people, learned a lot about mathematics and adjacent fields like AI and chemistry, and made close friends – who actually recently came to Berlin to visit me. I also got the chance to attend talks by remarkable speakers such as Yann LeCun and Jascha Sohl-Dickstein.

Finally, what are you passionate about?
Beyond science, sports are my main passion, especially road biking. I find it teaches lessons that transfer well to research and work: discipline, patience, and sacrifice. Furthermore, since I quite miss academic work, I try to read at least one math or AI paper each weekend to stay somewhat connected to the progress of the research community. Finally, my new team at LakeEight: the people I work with are a big part of what makes the new job so rewarding.

Moritz Hehl during his research stay at Harvard University

A REVIEW OF 2025

A Year of Excellence in AI

January

A New Start-Up: AI-Driven Therapeutics

Supported by Fellow Jens Meiler, his four graduates from the Institute for Drug Development at Leipzig University, Fabian Liessmann, Ivan Ivanikov, Paul Eisenhuth, and Felipe Engelberger, founded a start-up in AI-driven therapeutics. Their focus is an AI-based protein design assistant capable of generating customized proteins with defined properties in a fraction of the usual time, accelerating the path toward novel therapies and medicines.

February

Cape-KR: Deepening Ties with the University of Cape Town

SECAI's partnership with Associate Fellow Tommie Meyer and the University of Cape Town continued as Cape-KR took place again, bringing together junior and senior researchers in Knowledge Representation and Reasoning. By supporting events like *Cape-KR*, SECAI fosters research exchange and increases its international visibility, thereby helping to turn promising connections into lasting partnerships. The UCT collaboration is a good example, with student exchanges now happening every second half of the year.

March

Getting Together at the SECAI Retreat

SECAI's annual off-site meeting brought doctoral students and Fellows together at Bildungsgut Schmochtitz Sankt Benno for a three-day program of exchange and inspiration. Alongside a workshop on Good Scientific Practice and a tutorial on using large language models in everyday research, an input session run in cooperation with start-up incubator LaunchHub42 further fostered the growing start-up culture in SECAI. A keynote by Simon Razniewski on large language models and knowledge bases rounded out the program.

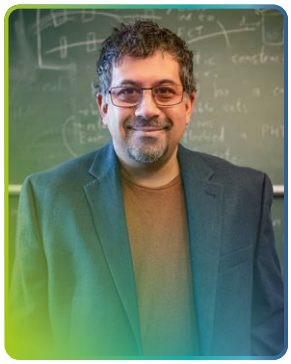
Group Picture at Bildungsgut Schmochtitz Sankt Benno

Another Leap From Research to Start-Up: Soron Systems

SECAI doctoral candidate Christian Vielhaus, together with colleagues Dr. Justus Rischke and Johannes Hofer from the Deutsche Telekom Chair of Communication Networks at TU Dresden, founded Soron Systems GmbH, supported by Fellow Frank H. P. Fitzek. The three electrical engineers are building on their research in machine learning and simultaneous localization and mapping (SLAM) – a technology that enables robots and other mobile systems to map their surroundings and navigate autonomously. Their work targets industrial applications, with a focus on 3D mapping and precise navigation in complex environments.

Visiting Students From India
Building on over a decade of scientific ties between Fellow Peter Stadler and Professor Manoj Changat from the University of Kerala, SECAI welcomed three students from Thiruvananthapuram – Binsa Muhammed Iqbal, Sreelekshmi Prasannakumari Amma, and Aswani Krishna Vijaya Kumar – for a three-month research stay at Leipzig University. The exchange strengthens the collaboration between SECAI and its partner in Kerala *(see page 26)*.

In Memoriam: Sayan Mukherjee



SECAI Fellow and Alexander von Humboldt Professor at Leipzig University, Sayan Mukherjee passed away unexpectedly on March 31, 2025, at the age of 54.
A mathematician of rare brilliance, his work in topological data analysis and mathematical statistics left a lasting mark on machine learning and its applications in medicine and bioinformatics. He is remembered equally for his contributions and his warmth. Our thoughts remain with his family, friends, and colleagues.

April

Milestone for Energy-Efficient AI Systems
TU Dresden launched SpiNNcloud, a neuromorphic supercomputer developed by Fellow Christian Mayr and his team. Neuromorphic systems are inspired by the human brain, distributing memory and processing information in an event-driven manner. The result is a significant reduction in energy consumption combined with high performance, thereby opening up new possibilities for applications in drug discovery, autonomous driving, and real-time AI *(see page 20)*.

A DFG Priority Program for AI-Driven Protein Design
The German Research Foundation (DFG) selected Leipzig University to coordinate one of eight new Priority Programs, chosen from 53 submitted initiatives. Led by Fellow Jens Meiler, the program *Artificial Intelligence for the Design of Functional Proteins* addresses a remaining key challenge in protein science: while AI has made structure prediction highly accurate, designing entirely new proteins with tailored functions remains complex. The program will develop novel AI methods that account for the chemical and biophysical properties of polypeptide chains.

Kick-off *Join Science*
The mentoring program *Join Science* at TU Dresden entered its third round, and mentor and SECAI doctoral student Haadia Amjad welcomed her mentees at the kick-off event for an eventful year-long program. *Join Science* supports female master's students in STEM fields in preparing for their academic careers through reflection, training, and networking. Regular mentoring meetings provide personal insights into the career paths and workplaces of scientists. Workshops strengthen the development of soft skills. Moreover, peer talks among the students foster networking and the sharing of experiences *(see page 24)*.

The Mittelerde Meeting Returns to Leipzig
Around 200 researchers gathered in Leipzig for the 6th Central German Bioinformatics Meeting – known as the *Mittelerde Meeting* after the region it brings together – to exchange ideas at the intersection of computational biology and AI. Fellows Peter Stadler and Jens Meiler opened the two-day event, which featured 25 presentations across seven thematic sessions, two keynote lectures, and nearly 70 posters. The meeting strengthened SECAI's ties with the broader regional bioinformatics community across Saxony, Saxony-Anhalt, and Thuringia.

SECAI and relAI Join Forces in *gAIn*
The opening ceremony of *gAIn – Next Generation AI Computing* took place at LMU Munich, marking the official launch of a flagship cooperation between Bavaria and Saxony, uniting TUM, LMU, and TU Dresden. Bavarian and Saxon state ministers joined university leaders to celebrate the initiative, which is co-directed by Zuse Schools directors Stefanie Speidel (SECAI) and Gitta Kutyniok (relAI). The cooperation brings together two of Germany's leading AI ecosystems, thereby deepening the collaboration between SECAI and its Bavarian counterpart relAI as well as strengthening AI research across both states.

May

Jakob N. Kather Wins the Felix Burda Award
Fellow Jakob N. Kather and his research team at TU Dresden received the prestigious *Felix Burda Award* in the Medicine and Science category for their work on AI-driven colorectal cancer diagnostics. The team developed a deep learning model that automatically analyses tissue samples, classifies patients into risk groups, and predicts survival chances more accurately than previous methods. Crucially, the model works independently of where an examination is performed and is freely available as open source, thereby enabling researchers worldwide to build on it.

Center: Jakob N. Kather

Celebrating five Clusters of Excellence at TU Dresden

Clusters of Excellence for TU Dresden and Leipzig University

In a landmark decision for the Saxon research landscape, TU Dresden secured five Clusters of Excellence, making it one of Germany's top five universities and its best-performing technical university, while Leipzig University won its first-ever Cluster of Excellence, the *Leipzig Center of Metabolism*, dedicated to researching widespread metabolic diseases such as obesity and diabetes. Both results strengthen the environment in which SECAI operates, creating new synergies as SECAI researchers contribute to and benefit from world-class research at their home institutions.

June

Playing Snake at OUTPUT.DD

OUTPUT.DD, the annual project showcase of TU Dresden's Faculty of Computer Science, once again opened its doors to the public, offering installations, workshops, talks, and exhibitions. SECAI contributed to this year's event with a demonstrator showcasing a logic-based agent for the classic video game Snake, a playful but instructive demonstration of how logic programming can be applied to decision-making, bringing AI research to a broad and curious audience.

Snake console at OUTPUT.DD

SECAI at the Long Night of Sciences

During the *Long Night of Sciences* in Dresden and Leipzig, SECAI presented its research to a broad public audience. At the Science Slam in Dresden, jointly organized with the EKFZ for Digital Health and the DKFZ Patient Advisory Council Dresden, four young researchers presented work spanning AI-driven cancer risk detection, microrobotics, and autonomous surgical systems. In Leipzig, Fellow Jens Meiler's group engaged visitors with interactive stations on protein folding and drug design, including a challenge to develop a coronavirus binder.

Puzzle to develop a binder for the coronavirus

MOCAST 2025 Comes to Dresden

SECAI Fellow Ronald Tetzlaff chaired the 14th International Conference on Modern Circuit and System Technologies (*MOCAST 2025*) in Dresden together with Prof. Spyridon Nikolaidis from Aristotle University of Thessaloniki. The event brought together around 120 academics, industry experts, and early-career researchers in electronics, circuits, and systems, supported by industry partners Global Foundries, Infineon Technologies, and ESMC.

Sponsoring ISWS 2025

Beyond its own programs, SECAI supports established initiatives like the *International Semantic Web Research Summer School (ISWS)* in Bertinoro, Italy, to help train the next generation of AI researchers. The one-week intensive school brings together up to 60 students and leading scientists for lectures and collaborative research. Fellow Sebastian Rudolph regularly contributes as a tutor, illustrating how SECAI's support translates into direct engagement with the research community.

July

Three Years of SECAI: Celebration and Introspection

SECAI's third anniversary on 1 July set the stage for a formal review by the IMAP agency and external evaluators to assess the effectiveness and sustainability of the Zuse Schools Program. The day was both a celebration of what has been achieved and a chance to gain insights for the course ahead. Fellows, doctoral researchers, and students came together to present and discuss life in SECAI and its impact on each of them.

A Strategic Alliance Between TU Dresden and AIIMS New Delhi

A three-day workshop on artificial intelligence, extended reality, and robotics in healthcare, held at TU Dresden under the aegis of the Indo-German Science & Technology Center, brought together over 50 clinicians, scientists, and industry leaders from both countries. Spearheaded by Fellow Stefanie Speidel and with Fellow Ronald Tetzlaff among the key participants, the event culminated in a Letter of Intent signed between TU Dresden and AIIMS New Delhi – one of the world's top 100 hospitals – laying the groundwork for a strategic research partnership.

August

TSPSS Returns to Pirna

After its successful launch the previous year, the *Touch Sensing and Processing Summer School (TSPSS)* returned to Pirna near Dresden, again organized by Fellow Roberto Calandra and sponsored by SECAI. About 40 scientists from 16 countries gathered for the five-day event, which brought together researchers working at the intersection of haptics, materials science, and robotics. Alongside keynotes, tutorials, and a poster session, a hike through the picturesque Saxon Switzerland fostered the informal exchanges that often spark new collaborations.

Hiking in Saxon Switzerland during TSPSS

Deniz Kucukahmetler Wins Third Place at the Algonauts Challenge

SECAI doctoral researcher Deniz Kucukahmetler, together with Semih Eren, achieved third place among more than 60 teams in the *Algonauts Challenge*, a competition where participants use machine learning models to predict brain activations as subjects watch naturalistic movies. Their lightweight recurrent neural network approach, combining multimodal visual, audio, and text features, matched the performance of far larger transformer-based systems. The results were presented at the Cognitive Computational Neuroscience Conference in Amsterdam.

September

Sponsorship of Two Major Research Conferences

Almost 200 scientists gathered at Hamburg University of Technology for the *Conference on Mathematics of Machine Learning*, co-organized by Fellow Guido Montúfar and sponsored by SECAI. Continuing a series initiated in 2021, the four-day event brought together researchers to explore the interplay between mathematical theory and practical application in machine learning, particularly focusing on the current gaps between them. Central topics included diffusion models in generative AI and large language models. SECAI also sponsored *Highlights* in Saarbrücken, an annual conference integrating the community of researchers working on logic, games, and automata.

Guido Montúfar (right) with the other organizers of *Mathematics of Machine Learning*

Research Exchange With Cape Town Enters Its Next Chapter

Building on the established exchange with the University of Cape Town, SECAI welcomed four students for three-month research stays in Dresden. Racquel Dennison and Ruvarashe Madzime joined for the first time, while Lucas Carr and Nicholas Leisegang returned for another stay; their previous visits already bearing fruit in joint publications on Formal Concept Analysis with Fellows Sebastian Rudolph and Markus Krötzsch's groups, demonstrating the depth of collaboration this exchange has fostered.

◂ Racquel Dennison and Ruvarashe Madzime at a SECAI.Café

Participants of the Dresden Microelectronics Academy

Dresden Microelectronics Academy Summer School

Every year in September, TU Dresden, together with Dresden's semiconductor industry, invites students from around the world to explore the semiconductor research and industry in Dresden. Over the course of five days, the 50 participants receive expert talks and presentations on current topics in microelectronics research and industry, lab tours with participating industry partners (Bosch, GlobalFoundries, Infineon, X-FAB), information on career opportunities, and more. Exploring the city of Dresden as a place to live and work is also an integral part of the program. The event concludes with a networking dinner, where senior company representatives discuss career paths in a panel discussion and share insights into their own professional journeys.

EKFZ Summer School Brings AI in Medicine to Dresden

The EKFZ for Digital Health hosted its one-week Summer School *AI in Medicine* at the University Hospital Dresden, bringing together young researchers from a wide range of disciplines and institutions to explore AI applications in radiology, pathology, and precision medicine. The program combined keynote lectures by leading international experts with hands-on exercises designed to turn theory into practice. Fellow Jakob N. Kather opened the school and later delivered a keynote on AI-driven precision medicine.

October

SECAI.Café: Kick-off

We kicked off the SECAI.Café event series at the start of the winter semester by welcoming our new merit scholars. In addition to offering valuable input, the event provides an excellent opportunity for networking – bringing the SECAI community together. The participants began exploring the importance of networking with the interactive workshop *Get-connected: Networking for Scientists*. Following this, a wonderful evening of exchange and getting to know one another unfolded during the get-together, lasting late into the night *(see page 18)*.

Get Together at the Zuse Schools Event Darmstadt

The annual meeting of the Konrad Zuse Schools of Excellence in AI – ELIZA, SECAI, and relAI – was hosted this year by ELIZA in Darmstadt. Master's and doctoral students from all three schools presented their research in poster sessions and talks. An industry keynote on end-to-end automated driving by Bosch Research and a guided tour through a robotics lab offered broader perspectives on AI in practice. A panel discussion brought together leading researchers from TU Darmstadt, TU Berlin, LMU Munich, and Aleph Alpha to explore what AI can learn from human reasoning.

Guided tour through the robotics lab of TU Darmstadt during the Zuse Schools event

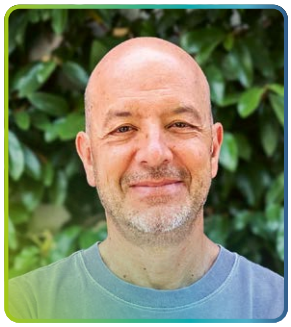
Haadia Amjad Wins Best Paper Award at EXPLAINABILITY

SECAI doctoral researcher Haadia Amjad received the Best Paper Award at the *EXPLAINABILITY 2025* conference in Barcelona, held from 26 – 30 October. Her paper examined concept-based explainable AI to identify and analyze confusion patterns in deep neural networks for multi-label image classification, showing that low concept distinctiveness and reliance on non-target concepts were key contributors to misclassification. The work demonstrates how explainable AI can diagnose learning weaknesses and dataset-induced biases invisible to standard performance metrics.

Setting the Standards for AI Language Models in Cancer Care

Under the leadership of Fellow Jakob N. Kather, an international panel of 20 experts developed ELCAP, the first structured guidelines for the safe use of large language models in oncology, published in the *Annals of Oncology* and presented at the *ESMO Congress* in Berlin. The framework distinguishes between patient-facing, clinician-facing, and institutional applications, translating high-level principles into 23 consensus statements to help patients, clinicians, and institutions adopt AI language tools responsibly.

Associate Fellow Tommie Meyer Elected as TWAS Fellow



Associate Fellow Tommie Meyer has been elected as a Fellow of *The World Academy of Sciences (TWAS)* in recognition of his outstanding contributions to symbolic AI and its promotion in the developing world. Founded in 1982 and based in Trieste, TWAS counts more than 1,400 fellows from 112 countries – including 13 Nobel laureates – among its ranks. The election recognizes Meyer's sustained impact on Knowledge Representation and Reasoning research in South Africa and internationally.

Two New Study Pathways Into AI at TU Dresden

TU Dresden expanded its AI-related study offerings with two new study options: the Master's program in *Computer Science* switched to English as its primary teaching language, aligning with SECAI's internationalization goals, and the interdisciplinary program Computational Modeling and Simulation introduced the new track *Applied Artificial Intelligence*, created as part of SECAI's teaching activities. For details about the AI study portfolio at TU Dresden and Leipzig University, *see page 14*.

November

SECAI On-Site Meeting in Leipzig

The SECAI Community gathered this month in Leipzig. The newly launched cohort of doctoral students introduced themselves, while the advanced cohorts presented their research progress through posters. Two keynote speakers were invited for the event: Prof. Thomas Gärtner from TU Vienna (Interactive Machine Learning for Structured Data) and Prof. Alexander Binder from Leipzig University (Value Bounds and Convergence Properties of LRP Attributions). An open discussion with the founders of the Leipzig-based startup *AI-Driven Therapeutics GmbH*, which brings AI into the pharmaceutical and biotechnology industries, provided young researchers with insights into topics related to company founding and management. As with every meeting, networking and exchange within the community remained a top priority.

SECAI.Café: Industry Insights

The second *SECAI.Café* Dresden of the winter semester 2025/2026 focused on the theme *Industry Insight*. We invited Benedikt Läufer – Senior Specialist Yield & Production Engineering at Infineon Technologies Dresden – who explained to our scholars how AI is being integrated into the production process at the semiconductor site in Dresden and how this will develop in the future. Interestingly, most of the processes were derived from student work, such as master's or diploma theses, project work, and similar assignments. Talent Attraction Manager Rahel Tews presented potential career paths within the company. The audience's technical and organizational questions revealed their interest in gaining insight into potential roles in the industry and preparing themselves well for life after graduation. This evening also concluded with an extended get-together, fostering networking and exchange among participants *(see page 18)*.

Simon Hosemann Wins Best Video Award at KR 2025

SECAI doctoral researcher Simon Hosemann and five colleagues from the Foundations of Knowledge Representation group at Leipzig University claimed a double victory at the 22nd International Conference on Knowledge Representation and Reasoning in Melbourne: their video on the chase algorithm – a fundamental technique in database theory and knowledge representation – won both the jury's Best Video Award and the People's Choice Award. The video made the complex topic accessible through a creative narrative featuring a magic shop owner and his apprentice brewing potions.

A Prestigious American Physical Society Prize for Thomas Mikolajick

Fellow Thomas Mikolajick, Chair of Nanoelectronics at TU Dresden and Academic Director of NaMlab gGmbH, has been awarded the 2026 James C. McGroddy Prize for New Materials by the American Physical Society, together with Sayeef Salahuddin from UC Berkeley. The prize recognizes his research on ferroelectricity in hafnium oxide, a discovery that has opened new possibilities for non-volatile memory and AI chips, and has become closely associated with NaMlab gGmbH in both industry and academia.

From Leipzig to Chile: Teaching AI for Protein Design

SECAI doctoral researcher Max Beining travelled to Puerto Varas, Chile, to teach at the *EMBO Practical Course on AI for Protein Design* – his third such teaching engagement after previous workshops in Ljubljana and Copenhagen. Invited by César A. Ramírez-Sarmiento of the Pontificia Universidad Católica de Chile, Max Beining led hands-on tutorials and lectures on state-of-the-art AI tools alongside an international team from LMU Munich, Harvard University, and the University of Washington, helping to strengthen the protein design community in Latin America.

The Revolution of Data Medicine: Stefanie Speidel on nanoTalk

Fellow Stefanie Speidel was invited as a guest on nanoTalk, a science discussion program on 3sat, hosted by bioethicist Alena Buyx. The episode explored the revolution of data medicine: how AI and statistical methods are transforming diagnosis, treatment, and personalized therapy. Alongside fellow guests from the Charité Berlin and the Institute for Digital Transformation in Healthcare, Speidel discussed how AI and robotics are making complex tumor surgeries safer and more precise.

Stefanie Speidel (left) on nanoTalk

Children's University: Little Scientists Meet Surgical Robots

Fellow Stefanie Speidel brought AI and surgical robotics to a young audience at the Children's University of TU Dresden, held in collaboration with the Deutsches Hygiene-Museum. Under the title "High-tech instead of band-aids – What will the operating room of the future look like?", she explained in a playful and accessible way how surgical robots work and how AI can help them learn tasks independently, inspiring the next generation to think about the future of medicine.

December

Adnan Haidar Wins Best Student Paper Award at IEEE ICM 2025

SECAI doctoral researcher Adnan Haidar received the Best Student Paper Award at the *37th IEEE International Conference on Microelectronics* in Cairo. His paper addresses a key challenge in analog in-memory computing: the temporal drift of phase-change memory devices, which degrades neural network accuracy over time. The proposed drift-aware training framework maintains robust performance despite long-term hardware-induced variations.

Lucas Fabian Naumann Receives the Wilhelm Gotthelf Lohrmann Medal

SECAI scholarship holder Lucas Fabian Naumann was awarded the Wilhelm Gotthelf Lohrmann Medal as the best graduate of TU Dresden's Faculty of Computer Science for the 2024/2025 academic year. During his Master's, he already published two papers at the *International Conference on Machine Learning*, working on combinatorial optimization under Fellow Björn Andres, whose group he subsequently joined as a doctoral researcher. Read his interview *on page 22*.

SECAI.Café: Cultural Insights

What could be more fitting in December than discovering Saxon Christmas traditions and, with them, our culture? During this time of year, the Dresden Christmas City shines in a special glow, making the city both charming and livable.
We began by taking our group to one of Dresden's most iconic landmarks – the Semper Opera House – and explored the venue where great operas have been performed. A stroll through the famous Striezelmarkt revealed many culinary specialties, and the evening concluded with a traditional Saxon roast dinner at a local inn. It was a valuable experience for everyone and brought the diverse cultures of our community even closer together *(see page 18)*.

Closing Celebration *Join Science*

Nine months of the *Join Science* mentoring program passed with exciting workplace visits, insightful workshops, and, above all, the development of a strong network among the participants.
The graduates and mentors marked the end of the program in a ceremony held in the prestigious ceremonial hall of the TU Dresden Rectorate, ready to embark on their career paths. The evening made clear that the bonds formed among participants will endure well beyond the program *(see page 24)*.

A LOOK AHEAD

Objectives and Plans for 2026

By the end of 2025, SECAI has become a mature Zuse School of Excellence in AI: its programs are in place, its community has grown, its research contributions are internationally acknowledged, and spin-offs bring its research to industry. 2026 is therefore not a year of new beginnings, but of purposeful continuation – consolidating what is working well, intensifying what has proven its value, and recalibrating where experience has taught us to do better. Together, this work paves the path toward making SECAI's achievements permanent.

Workshop on networking with Stephanie Rohac at the SECAI.Café in October 2025

Keeping the Momentum

With all essential building blocks firmly in place – the Graduate School, the scholarship program, teaching and research activities, and the accompanying support program for Master and PhD students – SECAI enters 2026 with a clear and proven operational foundation. The focus here will be on keeping these programs running at full scale while refining them where experience suggests improvements. The growing visibility of SECAI and its host universities TU Dresden and Leipzig University naturally brings new demands, not least a significant increase in applications.

Growing Industry Partnerships

In 2025, SECAI revised the SECAI.Café series as a structured program to support Master and PhD students – in collaboration with industry partners. In 2026, the aim is to extend this collaboration further, engaging new partners while strengthening existing ties. Events such as SECAI.Live and the Silicon Saxony Days offer prime opportunities to showcase SECAI's research and talent, and to cultivate these connections. These partnerships naturally open doors for students entering industry while bringing SECAI's research closer to real-world application.

Accelerating Technology Transfer

Having created the first start-ups and patents, the objective for the coming year is to solidify SECAI as an environment where knowledge transfer and entrepreneurship thrive. To achieve this, SECAI will deepen its collaboration with local initiatives such as *LaunchHub42*, *dresden|exists*, and *SMILE – die Gründungsinitiative* at Leipzig University. Through these partnerships, SECAI enables researchers and students to take their ideas beyond the lab.

Supporting Students for a Career in Germany

SECAI has built a broad portfolio of support activities for its students beyond teaching: networking events, language courses, soft skills training, and mentoring. These offerings have each proven their value, and together they form a strong foundation on which international students can build a career in Germany. In 2026, SECAI will consolidate them into a holistic, refined concept that draws on the experience gained and places particular emphasis on German language skills as an essential stepping stone into industry.

A Growing Alumni Community

SECAI now has a substantial number of alumni – both Master and PhD graduates – and their numbers will continue to grow in 2026. First steps toward an alumni network are already in place: staying in touch through LinkedIn, email, and local gatherings. The next step is to forge these connections into a sustainable alumni network and strategy – one from which SECAI, its partner universities, industry, and the alumni themselves can all draw lasting benefit.

Lucas Fabian Naumann, Simon Hosemann, Markus Krötzsch (f. l. t. r.) at Zuse Schools Event Darmstadt

Sharpening the Brand

SECAI has developed a set of flagship activities that shape its identity and reputation, such as award-winning publications, the Touch Sensing and Processing Summer Schools, student exchange programs, and a scholarship program that attracts students from around the world. Together they define SECAI as a School of Excellence in Artificial Intelligence – a brand that is built gradually, through consistent effort and visible achievement. SECAI will continue to invest in these activities: maintaining what has been established and expanding the School's portfolio further, thereby contributing to the national and international recognition of the DAAD Konrad Zuse Schools of Excellence in AI.

Securing SECAI's Future Beyond 2027

With 2027 approaching, securing SECAI's long-term impact shifts focus from planning to action. The structures, programs, and culture that SECAI has built should not depend on a single funding phase to endure. SECAI will therefore pursue concrete results: an actionable sustainability plan, identifiable pathways for its key programs, and active engagement with universities, industry, and politics on the future of the Zuse School model. Turning first agreements into sustainable partnerships will be central to this effort, ensuring that SECAI's activities continue beyond 2027.

GOVERNANCE

Decision Making in a DAAD Zuse School of Excellence in AI

The SECAI Board

The SECAI Board is responsible for the operational management of the School and is elected by the Fellows at the General Assembly. The Board consists of a director and two deputy directors, with at least one person from Dresden and one from Leipzig. Currently, the Board consists of the director Markus Krötzsch and the two deputy directors Stefanie Speidel and Peter F. Stadler. The Board makes operational decisions, organizes meetings, and develops proposals for action.

Contact: secai-board@groups.tu-dresden.de

Markus Krötzsch
Chair of Knowledge-Based Systems, TU Dresden

Stefanie Speidel
Chair of Translational Surgical Oncology, National Center for Tumor Diseases Dresden

Peter F. Stadler
Chair of Bioinformatics, Leipzig University

The SECAI Steering Group

The Steering Group makes decisions on the practical implementation of the School and planned measures. In addition to the members of the Board, the group consists of four more Fellows and two Graduate Representatives. Other Fellows, Associated Fellows and further guests may be involved in decision-making processes.

Martin Bogdan
Chair of Neuromorphic Information Processing, Leipzig University

Christian Mayr
Chair of Highly-Parallel VLSI Systems and Neuro-Microelectronics, TU Dresden

Sebastian Rudolph
Chair of Computational Logic, TU Dresden

Stephanie Schiedermair
Chair of European Law, Public International Law and German Public Law, Leipzig University

Deianira Fejzaj
Student Representative, TU Dresden

Max Beining
Student Representative, Leipzig University

ACADEMIC FELLOWS

The Researchers and Teachers Behind SECAI

SECAI is the effort of a group of Academic Fellows, who are jointly responsible for the research goals and educational activities of the School. In addition to the members of the SECAI Board and Steering Group, the following researchers were Academic Fellows in 2025.

Bjoern Andres
Chair of Machine Learning for Computer Vision, TU Dresden

Christel Baier
Chair of Algebraic and Logical Foundations of Computer Science, TU Dresden

Roberto Calandra
Chair of Machine Learning for Robotics, TU Dresden

Frank H. P. Fitzek
Deutsche Telekom Chair of Communication Networks, TU Dresden

Jochen Hampe
Chair of Internal Medicine and Gastroenterology, TU Dresden

Jakob Kather
Chair of Clinical Artificial Intelligence, TU Dresden

Anne Lauber-Rönsberg
Chair of Civil Law, Intellectual Property, Media and Data Protection Law, TU Dresden

Jens Lehmann
Principle Scientist Amazon Alexa AI, Amazon

Carsten Lutz
Chair of Knowledge Representation, Leipzig University

Jens Meiler
Humboldt Professor and Director of the Institute for Drug Discovery, Leipzig University

Thomas Mikolajick
Chair of Nanoelectronics, TU Dresden

Guido Montúfar
ERC Group Leader for Mathematical Machine Learning, MPI of Mathematics in the Sciences

Kristin Reiche
Deputy Head Department of Diagnostics, Fraunhofer Institute for Cell Therapy and Immunology IZI

Ivo Sbalzarini
Chair of Scientific Computing for Systems Biology, TU Dresden

Ronald Tetzlaff
Chair of Fundamentals of Electrical Engineering, TU Dresden

Max von Renesse
Chair of Stochastics, Leipzig University

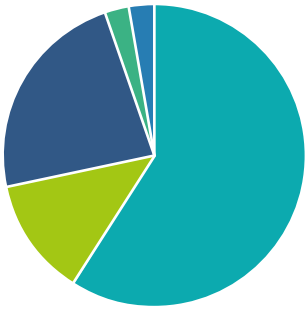
SECAI GRADUATE SCHOOL

The PhD Students and Clinician Scientists of SECAI

The following doctoral students and clinician scientists were member of the SECAI graduate school in 2025.

Gender

- female: 12
- male: 27



Provenance

- Germany: 23
- Europe (without Germany): 5
- Asia: 9
- Africa: 1
- South America: 1

1st Cohort

Alumni:

Rajab Aghamov
Supervisor: Christel Baier
Co-Supervisor: Markus Krötzsch

Max Beining
Supervisor: Jens Meiler
Co-Supervisor: Peter F. Stadler

Max Braungardt
Supervisor: Martin Bogdan
Co-Supervisor: Thomas Mikolajick

Deianira Fejzaj
Supervisor: Thomas Mikolajick
Co-Supervisor: Martin Bogdan

Adnan Haidar
Supervisor: Ronald Tetzlaff
Co-Supervisor: Thomas Mikolajick

Simon Hosemann
Supervisor: Carsten Lutz
Co-Supervisor: Sebastian Rudolph

Johnny Alexander Jimenez Siegert
Supervisor: Jens Meiler
Co-Supervisor: Christian Mayr

Radhika Juglan
Supervisor: Jakob Kather
Co-Supervisor: Sayan Mukherjee

Tim Langer
Supervisor: Christian Mayr
Co-Supervisor: Stefanie Speidel

Carolin Schimmelpfennig
Supervisor: Kristin Reiche

Gregory Veldhuizen
Supervisor: Jakob Kather

Danush Kumar Venkatesh
Supervisor: Stefanie Speidel
Co-Supervisor: Bjoern Andres

2nd Cohort

Haadia Amjad
Supervisor: Ronald Tetzlaff
Co-Supervisor: Stefanie Speidel

Julia Belyaeva
Supervisor: Jens Meiler

Zdravko Dugojic
Supervisor: Roberto Calandra
Co-Supervisor: Stefanie Speidel

Minh Hoang Dao
Supervisor: Ivo Sbalzarini
Co-Supervisor: Peter F. Stadler

Susu Hu
Supervisor: Stefanie Speidel
Co-Supervisor: Guido Montúfar

Charvi Jain
Supervisor: Jens Lehmann
Co-Supervisor: Ivo Sbalzarini

Johannes Klier
Supervisor: Kristin Reiche
Co-Supervisor: Jens Meiler

Charlotte Langer
Supervisor: Stephanie Schiedermair
Co-Supervisor: Sabine Müller-Mall

Lidia Roszko
Supervisor: Jochen Hampe
Co-Supervisor: Jakob Kather

Patrick Schöfer
Supervisor: Martin Bogdan

Jonas Schulz
Supervisor: Frank H. P. Fitzek

Christian Vielhaus
Supervisor: Frank H. P. Fitzek

3rd Cohort

Tom Friese
Supervisor: Bjoern Andres
Co-Supervisor: Markus Krötzsch

Moritz Hehl
Supervisor: Guido Montúfar
Co-Supervisor:
Max von Renesse

Alex Ivliev
Supervisor: Markus Krötzsch
Co-Supervisor: Sebastian Rudolph

Jonas Karge
Supervisor: Sebastian Rudolph
Co-Supervisor: Markus Krötzsch

Deniz Kucukahmetier
Supervisor: Peter F. Stadler
Co-Supervisor: Ivo Sbalzarini

Maximilian Salomon
Supervisor: Peter F. Stadler

Dominik Rusovac
Supervisor: Markus Krötzsch

4rd Cohort

Lukas Böhm
Supervisor: Peter F. Stadler
Co-Supervisor: Carsten Lutz

Nils Küchenmeister
Supervisor: Markus Krötzsch
Co-Supervisor: Carsten Lutz

Max Haufe
Supervisor: Christian Mayr
Co-Supervisor: Roberto Calandra

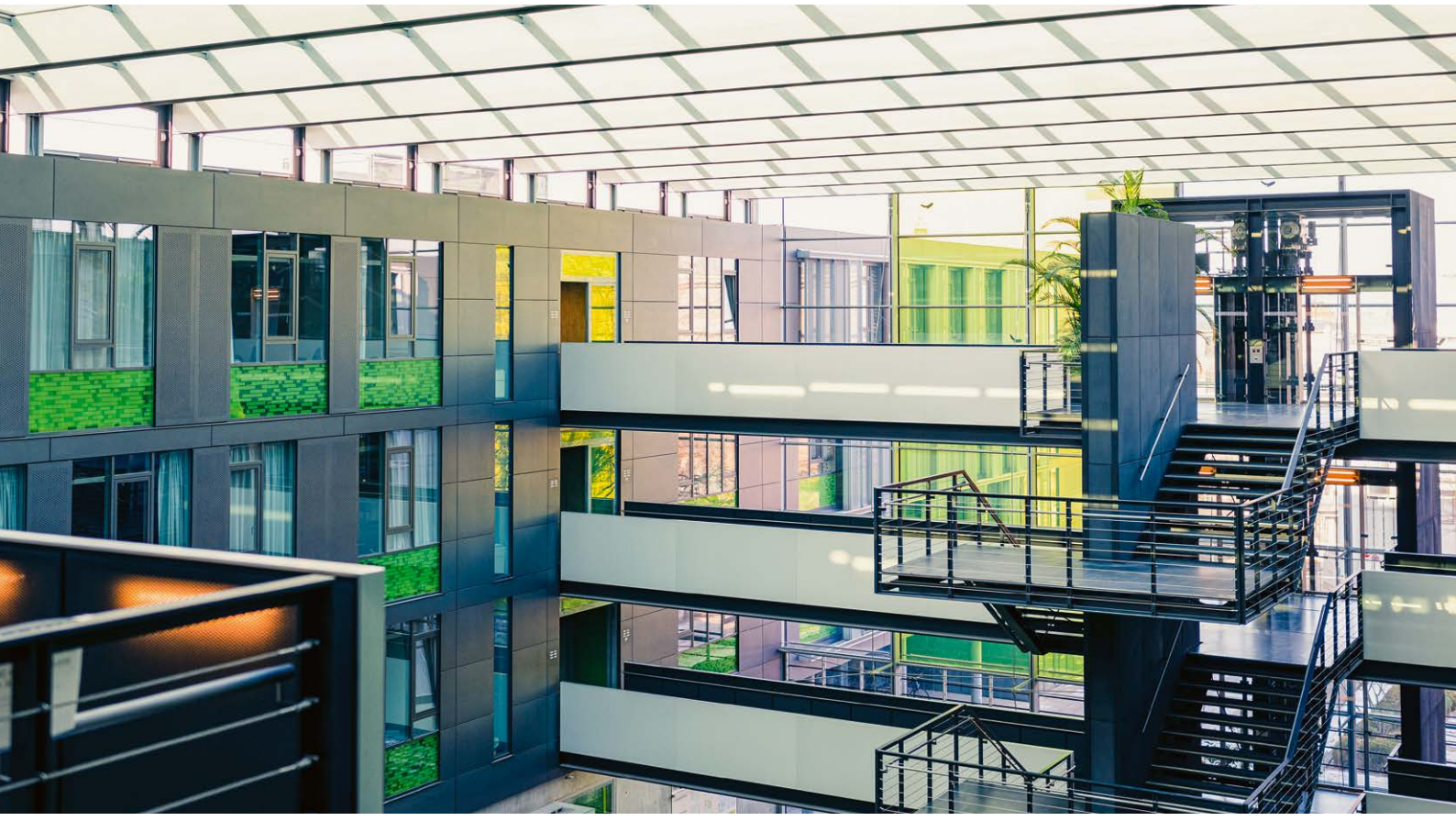
Toni Oesterreich
Supervisor: Jens Meiler
Co-Supervisor: Christian Mayr

Anneli Hummel
Supervisor: Stefanie Speidel
Co-Supervisor: Bjoern Andres

Giulio Pacciarotti
Supervisor: Kristin Reiche
Co-Supervisor: Jens Lehmann

Pascal Kettmann
Supervisor: Sebastian Rudolph
Co-Supervisor: Carsten Lutz,
Markus Krötzsch

Fatima Rani
Supervisor: Frank H. P. Fitzek
Co-Supervisor: Stefanie Speidel



Associated

The following doctoral students and clinician scientists were associated with the SECAI Graduate School in 2025.

Ella Cassidy
Supervisor: Peter F. Stadler

Piotr Gorczyca
Supervisor: Sebastian Rudolph

Ali Kanso
Supervisor: Jens Meiler

Max Kirchner
Supervisor: Stefanie Speidel

Moritz Schönherr
Supervisor: Carsten Lutz

Martín Schottlender
Supervisor: Frank H. P. Fitzek

Steffen Seitz
Supervisor: Ronald Tetzlaff

Arina Shelashen
Supervisor: Peter F. Stadler

Fabian Naumann
Supervisor: Björn Andres

Sinha Roy Rajarshi
Supervisor: Jens Meiler

Jinjing Xu
Supervisor: Stefanie Speidel

Sophie Adama
Supervisor: Martin Bogdan

Hiba Bensalem
Supervisor: Ivo Sbalzarini

Johannes Busch
Supervisor: Roberto Calandra

Lukas Gerlach
Supervisor: Markus Krötzsch

Richard Golnik
Supervisor: Peter F. Stadler

Ken Nakahara
Supervisor: Roberto Calandra

Vasileios Ntinas
Supervisor: Ronald Tetzlaff

Elaldi Onur
Supervisor: Jens Meiler

Paulo von Petersen
Supervisor: Ivo Sbalzarini

SECAI COORDINATION OFFICE

The Administrative People of SECAI

The Coordination Offices in Dresden and Leipzig support the Board and the Steering Group and coordinate the implementation of activities and measures within the School.

Contact: secai-office@tu-dresden.de

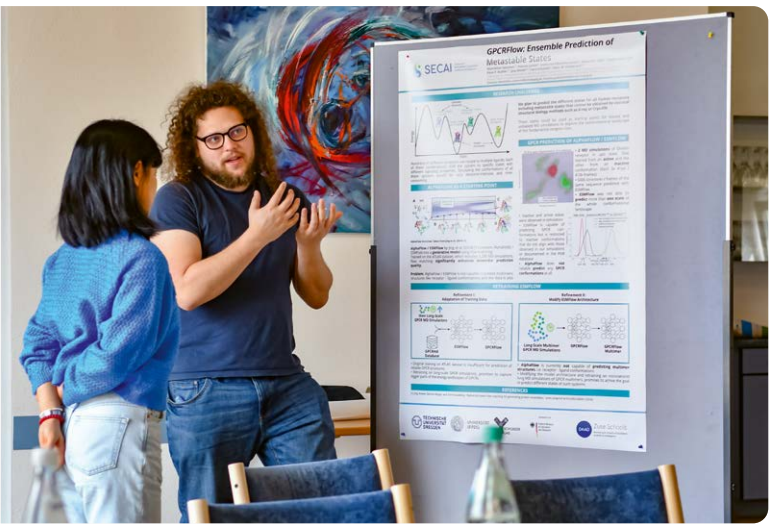
Kati Domann
Secretary, TU Dresden

Christina Norkus
Project Coordinator, TU Dresden

Philipp Hanisch
Scientific Coordinator, TU Dresden

Ludwig Chan Steiger
Student Assistant Public Relations, TU Dresden

Irina Klesch
Administrative Coordinator, Leipzig University


SECAI
GPCRFlow: Ensemble Prediction of
Metastable States


SECAI
ADVANCING AI TOGETHER
SECAI
ADVANCING AI TOGETHER

SECAI SCHOLARSHIP HOLDERS

Residency Scholarships for Students of TU Dresden and Leipzig University

	Call 2025	Active Scholarships	Overall Scholarships
Female	11	30	46
Male	16	46	64
Total	**27**	**76**	**110**

	Call 2025	Active Scholarships	Overall Scholarships
Germany	10	30	44
Europe (without Germany)	1	4	8
Asia	14	32	48
Africa	1	8	8
America	1	2	2

Overview of merit-based residency scholarships for students of TU Dresden and Leipzig University; column Call 2025 lists the number of scholarships awarded during the regular call in 2025; column Active Scholarship lists the number of scholarships in 2025; column Overall Scholarship lists the number of scholarships.

The SECAI Scholarship Program Fosters Research Exchange

In addition to the regular merit-based scholarships, SECAI awards scholarships for research exchange, as part of the program Research Experience for Undergraduates (REU), where undergraduate students visit TU Dresden or Leipzig for a shorter period of time, and the program Research in Academic Projects for Students (RAPS), where international MSc or PhD students visit a research group of SECAI or students from TU Dresden or Leipzig University visit a partner research group abroad *(see world map)*.

- Brasília to Leipzig: **1**
- Cape Town to Dresden: **7**
- Dresden to Boston: **1**
- Dresden to Leipzig: **1**
- Dresden to Madrid: **1**
- Dresden to Prag: **1**
- Dresden to Taipeh: **3**
- Irapuato (Mexiko) to Leipzig: **1**
- Kolkata (Indien) to Leipzig: **1**
- Leipzig to Guadalajara (Mexiko): **1**
- Leipzig to New York: **1**
- Leipzig to Padua: **1**
- Leipzig to Santiago de Chile: **2**
- Leipzig to Toronto: **1**
- Los Angeles to Leipzig: **1**
- Madrid to Dresden: **1**
- Mumbai to Dresden: **1**
- Paris to Dresden: **1**
- Thiruvananthapuram (Indien) to Leipzig: **3**
- Vienna to Dresden: **1**
- Berlin to Leipzig University: **1**
- Paris to Dresden University of Technology: **1**

SECAI PARTNERS

Academic Partners

The following international universities and research institutions are part of the SECAI network.

- École normale supérieure, PSL, France
- TU Wien, Austria
- Uniwersytet Wroclawski, Poland
- King's College London, United Kingdom
- University of Cape Town, South Africa
- Centre for Artificial Intelligence Research (CAIR), South Africa
- Carnegie Mellon University, USA

Industry Partners

The following industry partners are part of the SECAI network.

Companies

- Global Foundries, Dresden
- IBM Deutschland, Research & Development, Böblingen
- IBM Deutschland, AI & Analytics, München
- Infineon, Dresden
- Siemens, RDA Business Analytics and Monitoring, München
- Siemens Healthcare, Technology and Innovation Management, Erlangen
- Unite Network SE, Leipzig
- Zeiss, Innovation Hub, Dresden

Start-Ups

- CampusGenius, Dresden
- Cell.Copedia, Leipzig
- CO.DON, Leipzig
- MediaInterface, Dresden
- Meshmerize, Dresden
- Mimetic, Dresden
- Navigo Proteins, Halle
- SpiNNcloud Systems, Dresden
- Wandelbots, Dresden

Industrial Federations

- Silicon Saxony, Dresden
- Smart Systems Hub, Dresden


SECAI
School of Embedded Composite Artificial Intelligence


SECAI
School of Embedded Composite Artificial Intelligence
ADVANCING AI TOGETHER

SECAI supports students early on in their research career

STUDY PROGRAMS

SECAI's Master-level Programs Cover a Broad Range of AI Topics

SECAI creates a vibrant study environment

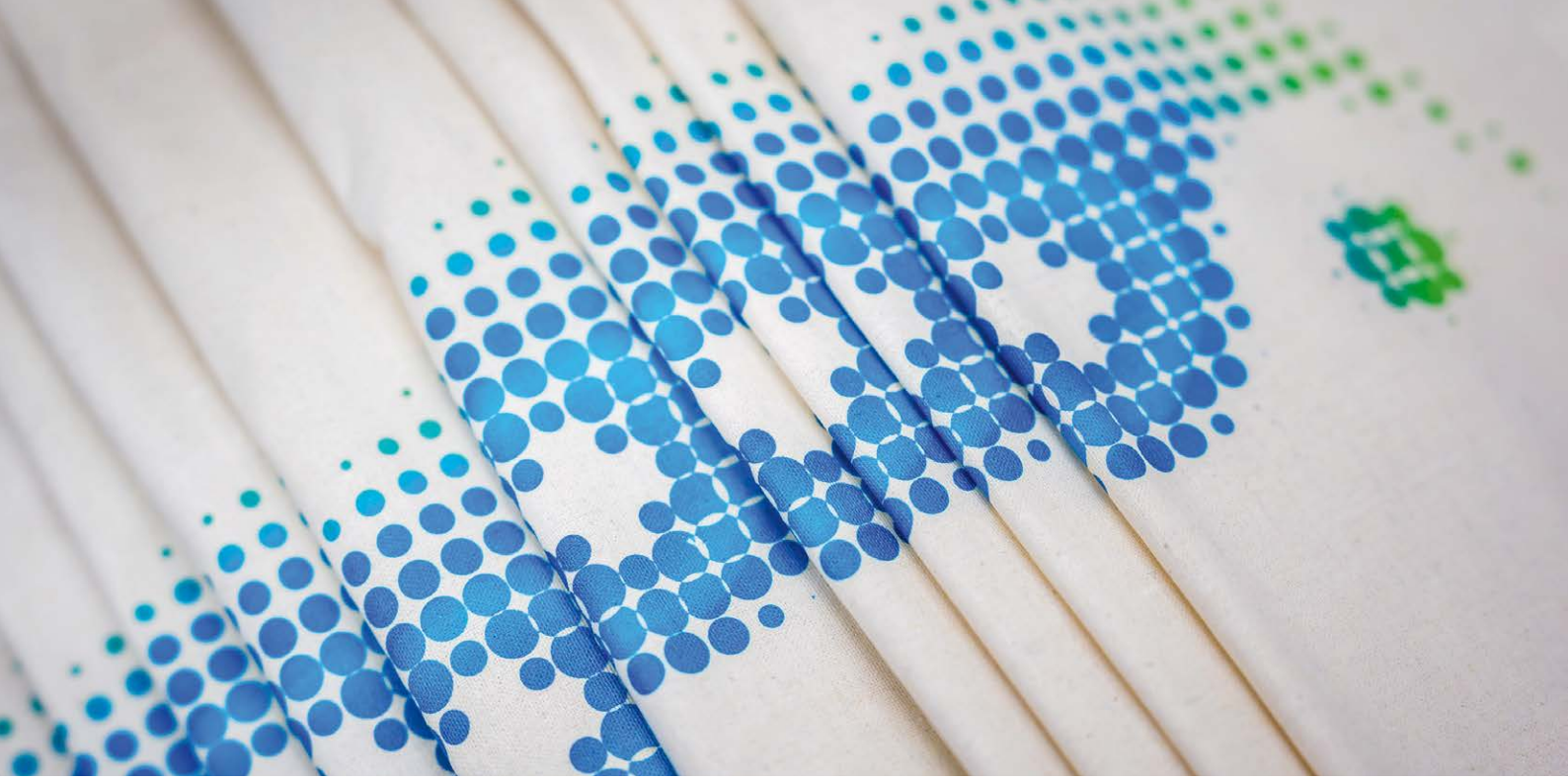
SECAI fosters higher education in AI by supporting a strong Master education on a high technical level at both TU Dresden and Leipzig University. The School enhances the already existing teaching offers and research activities, creates new opportunities for both current and future students, supports Master students with a scholarship program, enables research exchanges, provides an environment for research discussions and knowledge transfer, and kick-starts the students' paths in both academia and industry.

SECAI therefore increases the international visibility and attractiveness of the study programs at TU Dresden and Leipzig University, thereby improving the applications to those programs both quantitatively and qualitatively. A detailed description of the study programs in SECAI can be found *on page 14*.

Site	Study Program	Applications (female ratio, international ratio)	Registrations (female ratio, international ratio)
TU Dresden	Nanoelectronics Systems	562 (28 %, 99 %)	70 (24 %, 97 %)
	Computer Science	932 (25 %, 96 %)	117 (22 %, 60 %)
	Applied AI (CMS Track)	399 (23 %, 99%)	64 (23 %, 95 %)
	Computational Life Science (CMS Track)	68 (49 %, 96 %)	21 (43 %, 90 %)
	Visual Computing (CMS Track)	68 (34 %, 99 %)	31 (29 %, 100 %)
	TU Dresden Total	**2,029 (26 %, 96 %)**	**303 (25 %, 82 %)**
Leipzig University	Computer Science	106 (11 %, 18 %)	45 (7 %, 2 %)
	Data Science	129 (18 %, 35 %)	36 (17 %, 17 %)
	Bioinformatics	69 (49 %, 19 %)	19 (42 %, 5 %)
	Medical Informatics	56 (55 %, 18 %)	25 (52 %, 8 %)
	Leipzig University Total	**360 (28 %, 24 %)**	**125 (24 %, 8 %)**
	Total	**2,389 (27 %, 85 %)**	**428 (25 %, 61 %)**

CMS stands for Computational Modeling and Simulation. We only specify statistics for the study tracks that have a close relationship to AI. Students in CMS must select a single track when applying to the program. The track is part of their registration and will be shown on the final certificates. Changing the track is possible at most once, pending approval by the responsible teachers and commissions.

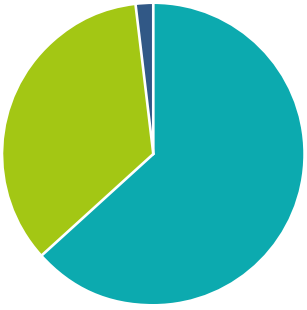
The column Registrations specifies the total number of students who have eventually registered as students in the respective programme. This number is typically lower than the number of admissions, since not all accepted students will always decide for the programme, and since international students may also be prevented from doing so because of delays in obtaining their visa.



PUBLICATIONS

The Research in SECAI

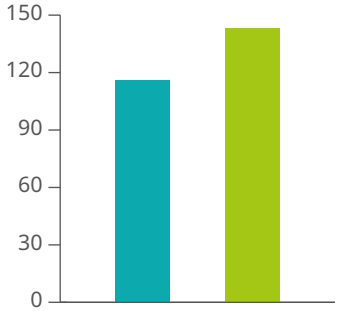
Publications



- Journal: 150
- Conference: 82
- Other: 4

Total: 236

Collaborations



- National: 116
- International: 143

Publications per year

2022 Publications: 7

2023 Publications: 45

2024 Publications: 76

2025 Publications: 108

2022

Martin Bogdan (2022): **Learning Algorithms for Spiking Neural Networks: Should One Use Learning Algorithms from ANN/DL or Neurological Plausible Learning?** – A Thought-Provoking Impulse. In XLIII Jornadas de Automática: libro de actas, Universidade da Coruña. Servizo de Publicacións. 10.17979/spudc.9788497498418.0201.

Ali Elhalawati, Markus Krötzsch, Stephan Mennicke (2022): **An Existential Rule Framework for Computing Why-Provenance On-Demand for Datalog.** In Proceedings of 6th International Joint Conference on Rules and Reasoning, RuleML+RR 2022, Springer. 10.1007/978-3-031-21541-4_10.

Larry González, Alex Ivliev, Markus Krötzsch, Stephan Mennicke (2022): **Efficient Dependency Analysis for Rule-Based Ontologies.** In Proceedings of 21st International Semantic Web Conference, ISWC 2022, Springer. 10.1007/978-3-031-19433-7_16.

Grover E.C. Guzman, Peter F. Stadler, André Fujita (2022): **Efficient Eigenvalue Counts for Tree-Like Networks.** In Journal of Complex Networks, Oxford University Press. 10.1093/comnet/cnac040.

Maximilian Marx, Markus Krötzsch (2022): **Tuple-Generating Dependencies Capture Complex Values.** In Proceedings of 4th International Workshop on the Resurgence of Datalog in Academia and Industry, Datalog-2.0 2022, CEUR-WS.

Stephanie Schiedermair, Mark Cole, Eva Wagner (2022): **Das Phänomen der Fake News im Spiegel der Judikatur des EGMR.** In Die Entfaltung von Freiheit im Rahmen des Rechts, Festschrift für Dieter Dörr zum 70. Geburtstag.

Stephanie Schiedermair, Johannes Weil (2022): **Online-Intermediäre als Träger der Meinungsfreiheit. In DÖV.**

2023

Dörthe Arndt, Stephan Mennicke (2023): **Notation3 as an Existential Rule Language.** In Proceedings of 7th International Joint Conference on Rules and Reasoning, RuleML+RR 2023, Springer. 10.1007/978-3-031-45072-3_5.

Martin Bogdan (2023): **Is Boredom an Indicator on the Way to Singularity of Artificial Intelligence?** Hypotheses as Thought-Provoking Impulse. In Proceedings of ESANN 2023, European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning. 10.14428/esann/2023.ES2023-89.

Pierre Bréchet, Katerina Papagiannouli, Jing An, Guido Montúfar (2023): **Critical Points and Convergence Analysis of Generative Deep Linear Networks Trained with Bures-Wasserstein Loss.** In Proceedings of 40th International Conference on Machine Learning, ICML 2023, ML Research Press.

Julien Calderaro, Narmin Ghaffari Laleh, Qinghe Zeng, Pascale Maille, Loëtitia Favre, Anaïs Pujals, Christophe Klein, Céline Bazille, Lara R. Heij, Arnaud Uguen, Tom Luedde, Luca Di Tommaso, Aurélie Beaufrère, Augustin Chatain, Delphine Gastineau, Cong Trung Nguyen, Hiep Nguyen-Canh, Khuyen Nguyen Thi, Viviane Gnemmi, Rondell P. Graham, Frédéric Charlotte, Dominique Wendum, Mukul Vij, Daniela S. Allende, Federico Aucejo, Alba Diaz, Benjamin Rivière, Astrid Herrero, Katja Evert, Diego Francesco Calvisi, Jérémy Augustin, Wei Qiang Leow, Howard Ho Wai Leung, Emmanuel Boleslawski, Mohamed Rela, Arnaud François, Anthony Wing-Hung Cha, Alejandro Forner, Maria Reig, Manon Allaire, Olivier Scatton, Denis Chatelain, Camille Boulagnon-Rombi, Nathalie Sturm, Benjamin Menahem, Eric Frouin, David Tougeron, Christophe Tournigand, Emmanuelle Kempf, Haeryoung Kim, Massih Ningarhari, Sophie Michalak-Provost, Purva Gopal, Raffaele Brustia, Eric Vibert, Kornelius Schulze, Darius F. Rüther, Sören A. Weidemann, Rami Rhaiem, Jean-Michel Pawlotsky, Xuchen Zhang, Alain Luciani, Sébastien Mulé, Alexis Laurent, Giuliana Amaddeo, Hélène Regnault, Eleonora De Martin, Christine Sempoux, Pooja Navale, Maria Westerhoff, Regina Cheuk-Lam Lo, Jan Bednarsch, Annette Gouw, Catherine Guettier, Marie Lequoy, Kenichi Harada, Pimsiri Sripongpun, Poowadon Wetwittayaklang, Nicolas Loménie, Jarukit Tantipisit, Apichat Kaewdech, Jeanne Shen, Valérie Paradis, Stefano Caruso, Jakob Nikolas Kather (2023): **Deep Learning-Based Phenotyping Reclassifies Combined Hepatocellular-Cholangiocarcinoma.** In Nature Communications, Nature Research. 10.1038/s41467-023-43749-3.

Balder ten Cate, Maurice Funk, Jean Christoph Jung, Carsten Lutz (2023): **SAT-Based PAC Learning of Description Logic Concepts.** In Proceedings of 32nd International Joint Conference on Artificial Intelligence, IJCAI 2023, International Joint Conferences on Artificial Intelligence. 10.24963/ijcai.2023/373.

Jan Clusmann, Fiona R. Kolbinger, Hannah S. Muti, Zunamys I. Carrero, Jan-Niklas Eckardt, Narmin Ghaffari Laleh, Chiara Maria Lavinia Löffler, Sophie-Caroline Schwarzkopf, Michaela Unger, Gregory P. Veldhuizen, Sophia J. Wagner, Jakob Nikolas Kather (2023): **The Future Landscape of Large Language Models in Medicine.** In Communications Medicine, Springer Nature. 10.1038/s43856-023-00370-1.

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