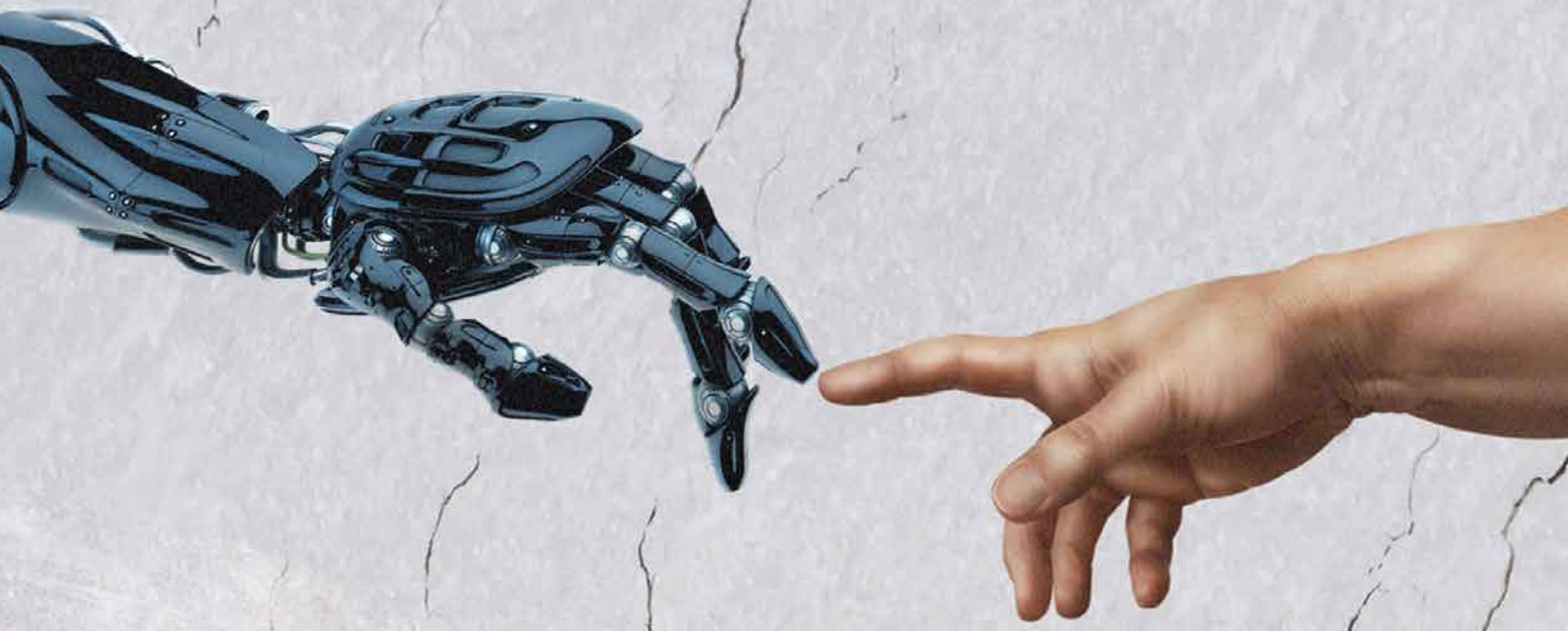
UNIVERSITÄT OSNABRÜCK

Osnabrück University

AI Campus, Osnabrück: Supporting technological change through research and the human touch



www.uni-osnabrueck.de

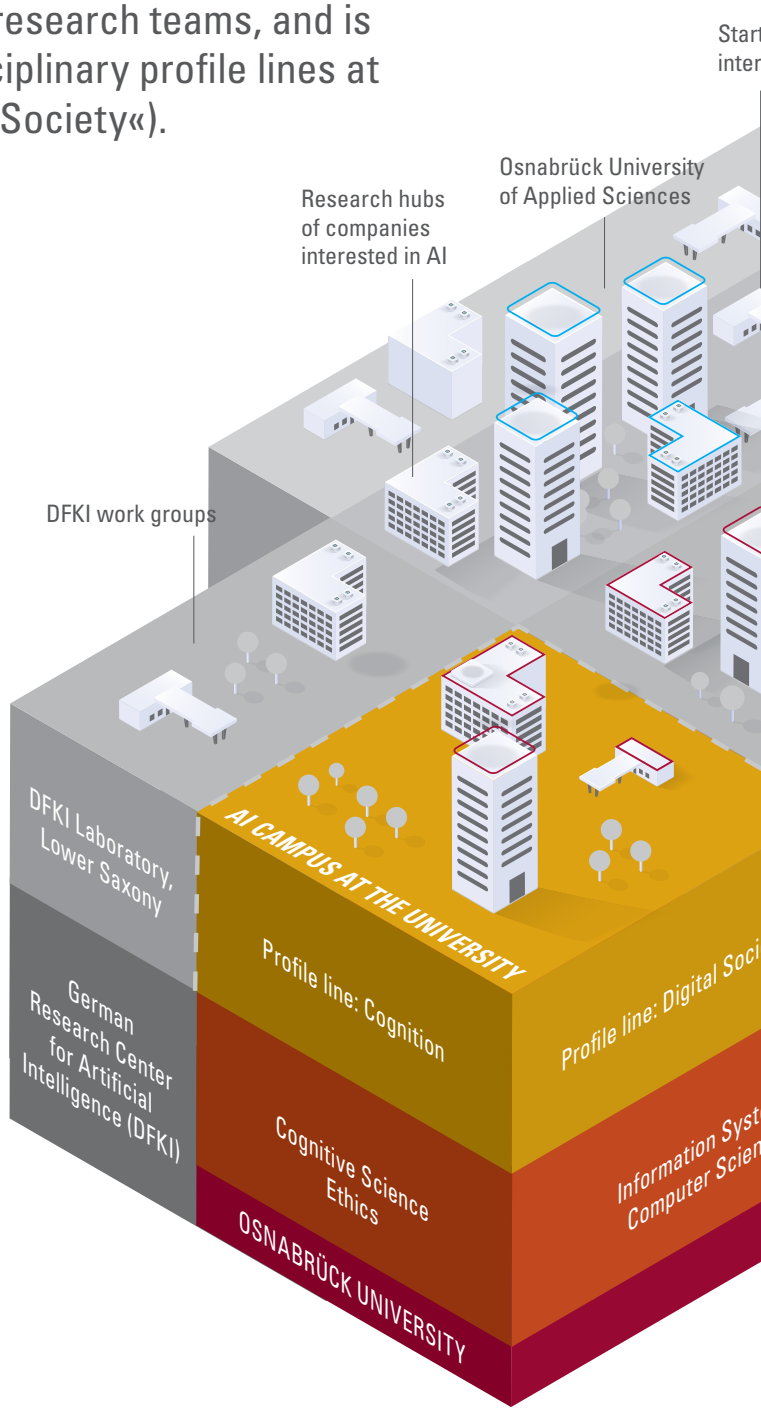
AI Campus at Osnabrück University: Supporting technological change through research and the human touch

The **AI Campus at Osnabrück University** is the result of several years of profile building in the field of Artificial Intelligence (AI). It combines the intensively researched but at the same time application-oriented subjects of Computer Science, Cognitive Science, Information Systems and Mathematics research teams, and is supported by two out of the six interdisciplinary profile lines at the University (»Cognition« and »Digital Society«).

Alongside the information technology- and cognitive science-related aspects, the legal, sociological and ethical implications of the increasing use of AI play a key role in the relevant **research activities**.

Currently, approximately 20 professors work on the AI Campus, along with around 80 research associates and fellows. These include four endowed professorships from the relevant field financed by industry and/or the city and district of Osnabrück. Staffing is being increased in the field on a long-term basis by securing funding for additional professorships from the current federal/regional programs for Artificial Intelligence and/or digitalization. For example, the University was extremely successful when it came to the call for tenders for new digitalization professorships by the Federal State of Lower Saxony – in the form of the approval of up to six additional professorships. It is thereby simultaneously consolidating its recognized reputation as a Lower Saxony hotspot in the field of AI.

The status of the AI Campus at the University is becoming evident in the plans for a new building at the University's Westerberg site, in which pertinent subjects and institutes are being merged. But at the governance level, too, two well-known computer scientists and cognitive scientists are contributing their expertise, firstly as Vice President in the President's Cabinet and secondly as a member of the Board of Governors.



One of the current focal themes at the AI Campus relates for example to the cross-linking and integration – in data terms – of machines, processes and key players in agricultural production. Chaired by Osnabrück University and with numerous partners from academia, industry and agricultural enterprises, the intention is, for example, to set up – with this in mind – a »Zukunftslabor Agrar (ZLA)« [Future laboratory for agriculture] as one of six Lower Saxony-based »Future laboratories for Digitalization«; it will be funded with significant resources.

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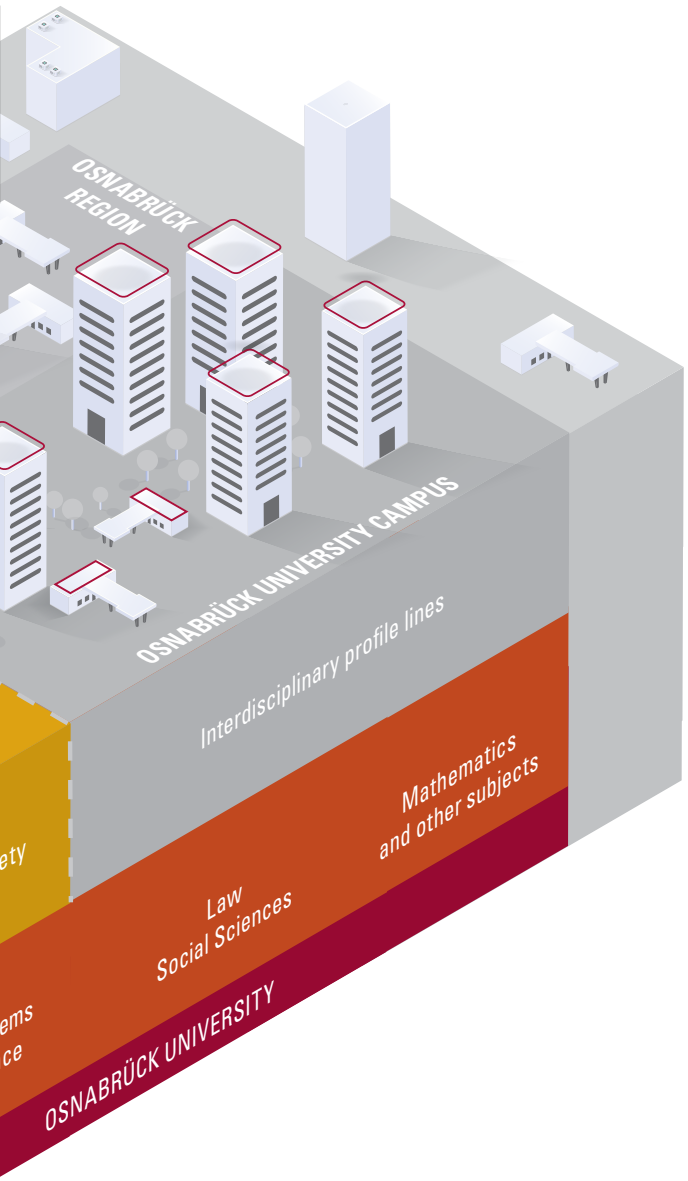

The second pillar of the AI Campus alongside research is **academic education** as well as the advancement of young academics. This means, for example, that alongside the preeminent Bachelor's, Master's and PhD programs in Cognitive Science available at the Institute of Cognitive Science as well as the Bachelor's, Master's and doctoral programs in Computer Science, a part-time Master's course in »Cognitive Computing« is also being offered. The largely international graduates of these programs are very much in demand in times of increasing skill shortages in regional and supra-regional industry which is keen to use AI. Supported by the Federal State of Lower Saxony through the approval of the additional AI professorships, the relevant capacities in terms of university places are being considerably expanded.

Particularly relevant options for academic qualifications for the **advancement of young academics** are being offered by the German Research Foundation-funded Research Training Groups »Situated Cognition« and »Computational Cognition« for research into human and machine intelligence. Young academics in another Research Training Group deal with research questions on »Acceptance and trust in expanded and virtual working environments«.

Closely linked discipline-wise to the University's AI Campus is the newly founded DFKI Laboratory, Lower Saxony, of the **German Research Center for Artificial Intelligence (DFKI)**. A non-university research institution with branches in both, Osnabrück and Oldenburg, its research focuses particularly on the expanded perception of complex environments or situations. For this purpose, the two DFKI work groups at the Osnabrück site are being expanded in the next few years to a total of at least 40 scientists. In 2021, the Osnabrück branch of the DFKI will move into a historic building that has been specially renovated for this purpose, namely the centrally located, former »roundhouse«. The plan is also to house startups interested in AI alongside research projects connected to the subject in a futuristic setting.

The close thematic link between the AI Campus and the **DFKI Laboratory, Lower Saxony** is also reflected in the fact that both Osnabrück work group leaders research and teach as professors at Osnabrück University. Other relevant work groups are planned in connection with the expansion of the DFKI Laboratory, Lower Saxony at the Osnabrück site.

While the two institutions, »AI Campus« of Osnabrück University and the »DFKI Laboratory, Lower Saxony«, are primarily characterized by highly competitive academic achievements, other »AI buildings« at the Osnabrück site are dedicated to the transfer of research results into practice. Specifically, we are talking about the **research departments of regional and supra-regional medium-sized companies** that are in close proximity to the AI Campus. Here it was recognized early on how much value added chains can be improved through the use of AI and also how much the outstandingly well-trained graduates from the relevant Bachelor's, Master's, PhD and doctoral programs are highly welcomed by these companies. On the basis of the »research hubs« already set up by companies on site and dedicated to the topic of AI, here too, it is realistic to assume that staff numbers in terms of AI experts will be similar to those at the AI Campus and DFKI Laboratory.

In summary, alongside the large number of AI scientists, it is the strong interdependency between the AI Campus, the DFKI Laboratory and AI research departments of companies which contributes significantly to the strengthening of this location for business and science. This gives Osnabrück the prospect of becoming one of Germany's »AI capitals«. At the same time, the DFKI Laboratory, Lower Saxony as a non-university research institution and the industry which is keen on AI complement the AI Campus of the University and round off the comprehensive **AI expertise at the Osnabrück site.**

For the University, focusing on the key area of »Artificial Intelligence« has produced not only excellent prospects for research and the advancement of young academics, but also gives answers to the questions which in the next decades will be of huge scientific, technological and social relevance.

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Futuristic setting: from 2021, a former roundhouse is intended to house the Osnabrück branch of the DFKI Laboratory, Lower Saxony along with startups interested in AI.

Further information and video at:
www.uni-osnabrueck.de/ai-campus

»If data is the oil of the 21st century, then AI is the engine that can use this fuel. Together, they form the 'power source' for digitalization.«

(Stefan Wess)

Artificial Intelligence and Digitalization

AI technologies are dependent on huge quantities of data by means of which, for example, neural networks can be trained. This data comes, above all, from advancing macrosocial digitalization. At the same time, digitalization needs and technologies are dependent on AI technologies which are what actually enable the collection, linking and automated, mechanical analysis of large quantities of data. AI (understood to mean »weak AI«, which is simultaneously the basis for the »Artificial Intelligence Strategy of the German Federal Government«) and digitalization are in this sense inseparably connected to each other like two sides of a coin.

AI Campus and DFKI Laboratory, Lower Saxony: a summary

Profile lines relevant to AI

Electronic patient files or self-driving vehicles: these are just two of several practical examples which play a part in the **»Digital Society – Innovation – Regulation«** profile line. Over and above this, the scope of this innovative research association covers topics such as Connected Home, Smart Health Services, Crowdsourcing, Usability and Know-How Protection. At the heart of the research in the **»Cognition: Humans – Technology – Interaction«** profile line are new AI methods along with the use of »big data« to improve societal and social structures. Examples of this are: the analysis of social networks to obtain data for predicting epidemics, development of smart e-learning systems and social aspects of AI in the field of autonomous driving. Added to these are the social, ethical and also legal implications accompanying increasing digitalization and the use of AI.

Research Training Groups in AI

The excellence in cognition research in Osnabrück is demonstrated among other things by the existence of – currently two – German Research Foundation-funded Research Training Groups (»Computational Cognition« and »Situated Cognition«). The **Computational Cognition** Research Training Group, for example, is designed to contribute towards a better understanding of intelligence in people and machines. At the center of this is the understanding of the connections between lower and higher cognitive planes; the Research Training Group thus brings together Cognitive Science and Artificial Intelligence. A further Research Training Group, financed by the university and based at the Institute of Information Systems, is concerned with interdisciplinary research into **acceptance and trust in augmented and virtual work environments** – on the way to Industry 4.0, knowledge about this is extremely important.

Degree programs with connections to AI

The Bachelor's, Master's and PhD programs in Cognitive Science primarily deal with the scientific study of brain and mind. The corresponding Bachelor's and Master's programs and doctoral study opportunities in Computer Science also offer AI as a focal area of study. A new addition is the part-time Master's program in **»Cognitive Computing«**, which is all about simulating human thought processes with the aid of Artificial Intelligence. At the Institute of Computer Science there is also an innovative course option in the form of the Bachelor's program **»Embedded Software systems«**, which deals in particular with the interplay of computer systems and surrounding technical systems. These study programs likewise incorporate a wide discussion of the ethical and social dimensions of digitalization.

DFKI Laboratory, Lower Saxony

How can autonomous, mobile robots operate in a target-oriented, safe manner around people? And how can the technology developed for this be transferred to areas of application such as agricultural engineering or intralogistics? Answers to these and other questions belong to the research domain of the Osnabrück branch »Plan-based robot control« – in existence since 2011 – of the Bremen Robotics Innovation Center (RIC) of the DFKI. This research group is continuing its work in the DFKI Laboratory, Lower Saxony, newly founded in 2019, with branches in Osnabrück and Oldenburg. Both research and development focus on the topic of »Advanced Perception«, and are directed primarily at medium-sized companies. Alongside the existing group **»Plan-based robot control«**, there is also the Osnabrück-based group **»Smart Enterprise Engineering«**. The purpose of this group is to systematically develop innovation potential, such as Industry 4.0 and Smart Services, and transform this into digital training and professional development scenarios for companies.

Osnabrück University: an overview (as of winter semester 2019/2020)

1974	Year founded (teaching commenced in the summer semester of 1974)
13.903	Students (as of 15.11.2019)
181	Degree programs (including the degree programs in cooperation with Osnabrück University of Applied Sciences)
1.750	Staff (one of the biggest employers in Osnabrück) (as of 31.12.2018) 213 professorships (31% female professors) 788 research associates and research fellows 749 non-academic staff
9	Schools
5	Research centers
16	Research stations
2	University-affiliated institutions (German Research Center for Artificial Intelligence / DFKI Laboratory, Lower Saxony, Institute for Interdisciplinary Dermatological Prevention and Rehabilitation iDerm)
6	Research Training Groups (two of which are funded by the German Research Foundation)
1	Research team (Physics »German Research Foundation research team FOR 2692, Fundamental Aspects of Statistical Mechanics and the Emergence of Thermodynamics in Non-Equilibrium Systems«)
1	Collaborative Research Center (Biology »Collaborative Research Center 944, Physiology and Dynamics of Cellular Microcompartments«)

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