International Graduate School

Dynamic Intelligent Systems

Computer Science · Mechanical Engineering · Electrical Engineering · Mathematics · Business Computing

Universität Paderborn
International Graduate School *Dynamic Intelligent Systems*
Dr. Eckhard Steffen, Director of Graduate Studies
Warburger Straße 100
33098 Paderborn
Germany

Phone: **(+49) (0) 52 51 / 60-32 61**
Fax: **(+49) (0) 52 51 / 60-34 89**

E-Mail: **graduateschool@uni-paderborn.de**

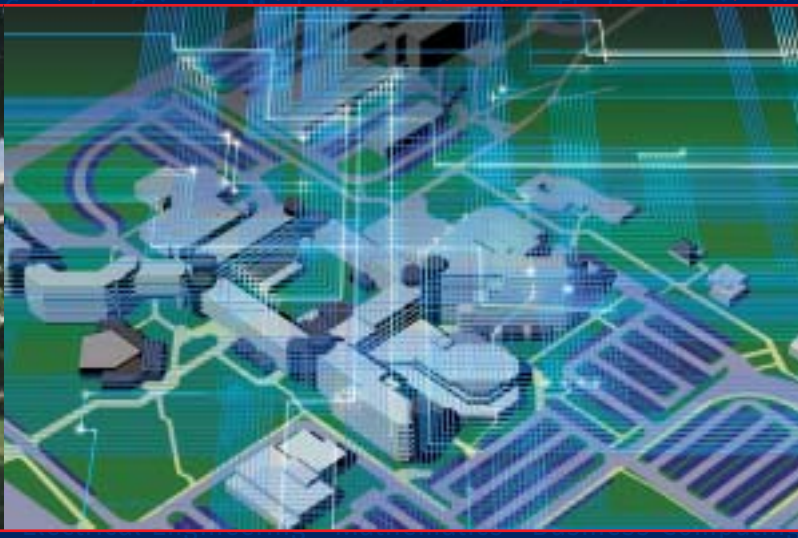
www.uni-paderborn.de/graduateschool

UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

International Graduate School

Dynamic Intelligent Systems

Computer Science · Mechanical Engineering · Electrical Engineering · Mathematics · Business Computing



Mechanical Engineering · Mathematics · Electrical Engineering · Business Computing · Computer Science

International PhD Program

Integrating Computer Science with Mechanical and Electrical Engineering and Business Applications

UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

Welcome

The International Graduate School *Dynamic Intelligent Systems* at the University of Paderborn is one of seven NRW Graduate Schools which are initiated and supported by the Ministry of Science and Research of the federal state North Rhine-Westphalia, Germany. Located in the heart of Europe, it offers a stimulating and supportive environment for research in the rapidly developing field of software, systems and network engineering. This field deals with the construction of so-called embedded or mechatronic systems, which is already a research focus of the University of Paderborn.

The Graduate School is run by the faculties of Electrical Engineering, Computer Science and Mathematics (EIM), Mechanical Engineering and Business Administration and Economics as a research center of excellence in this field. The International Graduate School offers an English-speaking program – based on a well structured curriculum – that allows excellent and motivated students to finish their doctoral work within three years. Additionally, attractive fellowships are available. Individual guidance and supervision, education in soft skills and a challenging environment prepare for leadership in academia and industry.

Highly motivated students with excellent records are encouraged to apply. Interested companies are always welcome to cooperate with us.

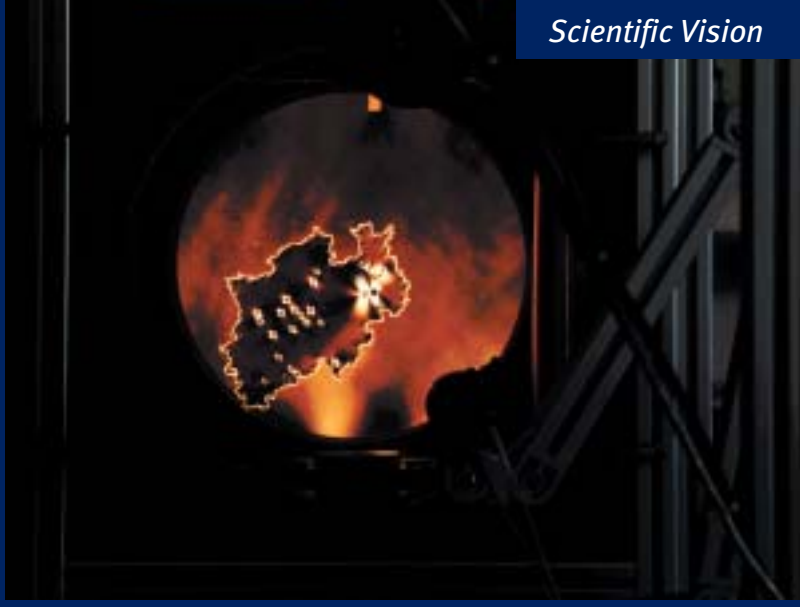
We are looking forward to getting into contact with you.

Yours sincerely

Prof. Dr. Wilhelm Schäfer
(Chair)

PD Dr. Eckhard Steffen
(Director of Graduate Studies)

Scientific Vision



Due to the enormous progress in computer science – in particular in software engineering – software plays a central and security relevant role in the design, manufacture and operation of virtually engineered artifacts from bridges and buildings to automobiles and aircraft, all of which have to be dependable.

One main field deals with the construction of so-called embedded or dynamic intelligent systems. They are based on the interconnection of technical systems which are controlled by the technical exchange and handling of information. The rapid progress in the development of new technologies for wireless communication and the continuing progress in microelectronics, optoelectronics, electrical actors and sensor technology deliver great chances to improve the functionality of technical systems significantly by means of embedding them into dynamically linked systems.
The rapid technological progress, which is faster than the development of a comprehensive theory for the field of embedded systems, causes the lack of methodologically sound concepts to accomplish the described challenges. Intelligent systems in mechatronic and production/logistics have quite different structures in detail. But there are many similarities in the design and development of these large systems so that the basic research for adequate methods and theoretical concepts has to be done in cooperation of researchers from different fields like computer science, mechanical engineering, electrical engineering, mathematics and business computing.

Convinced that the above mentioned progress will continue, the research program of the International Graduate School is focussed on the challenging topics in the field of dynamic intelligent systems.

The overall goal of the School is to provide a stimulating and supportive environment for research in the rapidly developing field of software, systems and network engineering. The field deals with the construction of so-called embedded or mechatronic systems. Such systems are already in daily use and the social and economic welfare of the modern information society increasingly depends on them. Examples are simple systems like electronic teller machines and complex life critical systems like a modern aircraft or a railway system.

Mechanical elements are substituted by sensor-actor-chains in the control units. Systems in production and logistics can be considered as large networks which dynamically adapt to varying needs, and in which the exchange of information initiates new actions. Combined with the trend to distributed solutions it is necessary to interconnect the components of such systems which are realized either as a piece of hard- or software. These systems only function correctly if the often complex interplay between mechanical, electrical and software components is carefully defined and works well. Complexity is further increased when the systems are connected in networks. Challenges for future research in the area are particularly due to the fact that these systems must increasingly become dynamically reconfigurable, so that their components (software and hardware) can be replaced or upgraded during runtime. Such changes can only be contemplated if their success is assured in advance. Not only must the new component work properly, but it also must operate in its new environment without causing any bad side effects. In addition, the evolution of such systems and the implant of components into different, evolving environments require that components become more and more intelligent, i. e. that they adapt automatically to their new or changing environment. Such changing, adaptive systems we call dynamic intelligent systems. They are the focus of the School's research program.

PhD projects could be in areas like

- Reconfigurable Hardware and Software Components
- Ressource and Communication Management in Dynamic Networks
- Organization of Large Dynamic Networks
- Interdisciplinary Design Processes
- Performance-oriented Modelling and Specification Techniques
- Intelligent Systems in Production and Logistics
- Intelligent Mechatronic Systems

Faculty Members and Research Areas

Science and research, projects and good ideas are always depending on dynamic people.

Scientists from five different areas, namely Computer Science, Mechanical Engineering, Electrical Engineering, Mathematics and Business Computing have come together to form the International Graduate School Dynamic Intelligent Systems and reflect the interdisciplinary nature of research in dynamic intelligent systems.

Computer Science

Prof. Dr. Gregor Engels	*Database and Information Systems*
Prof. Dr. Uwe Kastens	*Programming Languages and Compilers*
Prof. Dr. Hans Kleine Büning	*Knowledge-based Systems*
Prof. Dr. Friedhelm Meyer auf der Heide	*Algorithms and Complexity*
Prof. Dr. Burkhard Monien	*Algorithms, Architectures, Applications for Parallel and Distributed Computer Systems*
Prof. Dr. Franz Rammig	*Design of Parallel Systems*
Prof. Dr. Wilhelm Schäfer	*Software Engineering*

Mechanical Engineering

Prof. Dr. Jürgen Gausemeier	*Computer Integrated Manufacturing*
Prof. Dr. Joachim Lückel	*Mechatronics Laboratory*
Prof. Dr. Jörg Wallaschek	*Mechatronics and Dynamics*
Prof. Dr. Ansgar Trächtler	*Control Engineering and Mechatronics*

Electrical Engineering and Information Technology

Prof. Dr. Reinhold Noé	*Optical Communication and High-Frequency Engineering*
Prof. Dr. Ulrich Rückert	*System and Circuit Technology*
Prof. Dr. Andreas Thiede	*High-Frequency Electronics*

Mathematics

Prof. Dr. Michael Dellnitz	*Applied Mathematics – Numerical Mathematics and Dynamical Systems*

Business Computing

Prof. Dr. Wilhelm Dangelmaier	*Business Computing, especially CIM*
Prof. Dr. Leena Suhl	*Decision Support & Operations Research Lab*

Paderborn can look back on a history of more than 1,200 years. In 799, Charlemagne and Pope Leo III convened in Paderborn's Imperial Palace to negotiate the formalities for the founding of the Carolingian Empire. Here in Paderborn the first Westphalian university was established in 1614, which is still in existence today as the Faculty of Theology.

Besides the old city of Paderborn, the surrounding countryside and a wide range of cultural attractions, the city's appeal is also shaped by business and industry. A number of global industrial corporations in the computer, electrical, machine tool and structural steel engineering industry have their head offices in Paderborn. The nearby international airport is of great importance.

Paderborn offers generous sports and leisure opportunities. The city's cultural highlights include a theatre, a vibrant art scene, plenty of music and, among other museums, the Heinz Nixdorf Museums Forum (HNF), the world's largest computer museum, located in the immediate vincinity of the university's Fürstenallee facility.

In the early 1990s the new Heinz Nixdorf Institute advanced Paderborn into one of Germany's leading universities in the field of computer science and applications in mechanical and electrical engineering and business computing.

SIEMENS

The International Graduate School delivers a challenging, international environment for excellent and highly motivated students. Our benefit of the cooperation is that we can integrate some of these high potentials in our human resources development programs to prepare them for challenging functions – hopefully in our company.

Günther Goth, Corporate Vice President
Siemens AG

HELLA®

The research focus „Dynamic Intelligent Systems" perfectly fits to our basic research activities in lighting and driver assistance systems. The excellent supervision and tough management of the PhD-projects guarantees high quality results in time. With this experience the alumni of the International Graduate School have a high potential in industry and so we already hired some.

Prof. Dr. Erik Woldt,
Head of Corporate Research Materials
Hella KGaA Hueck & Co.

UNITY AG

UNITY AG is an international technology-oriented consultancy for Innovation & Product Development, IT-Management & Cost Reduction and Outputoptimization & Controlling. We cooperate with the International Graduate School which is an attractive place for the best students in mechanical engineering and computer science from all over the world. The International Graduate School is part of our strategic human resource development.

Tomas Pfänder, Member of the Board
Unity AG

There are many ways to cooperate with the International Graduate School:

- donation of fellowships
- financial support
- realization of soft-skill-trainings
- realization of visits to the company
- . . .

The International Graduate School provides an excellent environment for advanced studies and efficient research by combining interdisciplinary exchange and integration into the existing working groups! Moreover, the administration team and the professors support us in case of any problem.

Selwan K. Ibrahim, Iraq, IGS-student

More than an excellent and challenging environment for research – the opportunity to build up an international network, that will definitely persist longer than the three years of my doctorate!

Johannes Leßmann, Germany, IGS-student

At the International Graduate School the students concentrate on their scientific work. I attended international conferences and could cooperate with scientists from all over the world already during my studies. Now, I pursue an academic career.

Biljana Milivojevic, Serbia and Montenegro, Alumna

I like the interdisciplinary work. As one of the company fellowship-holders I am in close contact with my industry partner. Furthermore I profit from the participation in soft-skill trainings, which prepare me for my future challenging tasks.

André Luiz de Freitas Francisco, Brazil, IGS-student

Applications from qualified and highly motivated students are always welcome.

Candidates must hold a Master Degree (or equivalent) in Computer Science, Mechanical Engineering, Electrical Engineering, Mathematics or related fields, and preferentially be under 28 years of age.

An application should contain:

- certified copies of relevant grades
- TOEFL Examinee's Score Record (Requirement: 550 pbt or 218 cbt)
- a completed application form (to be downloaded from our website)

Please make sure that your application allows us to ascertain your knowledge and experience in the areas relevant to the Graduate School.

For details concerning the application deadline please refer to our website.

Applications and related queries should be directed to:

Universität Paderborn
International Graduate School *Dynamic Intelligent Systems*
Warburger Straße 100
33098 Paderborn, Germany

E-Mail: graduateschool@uni-paderborn.de
www.uni-paderborn.de/graduateschool