

EMBEDDED SYSTEMS



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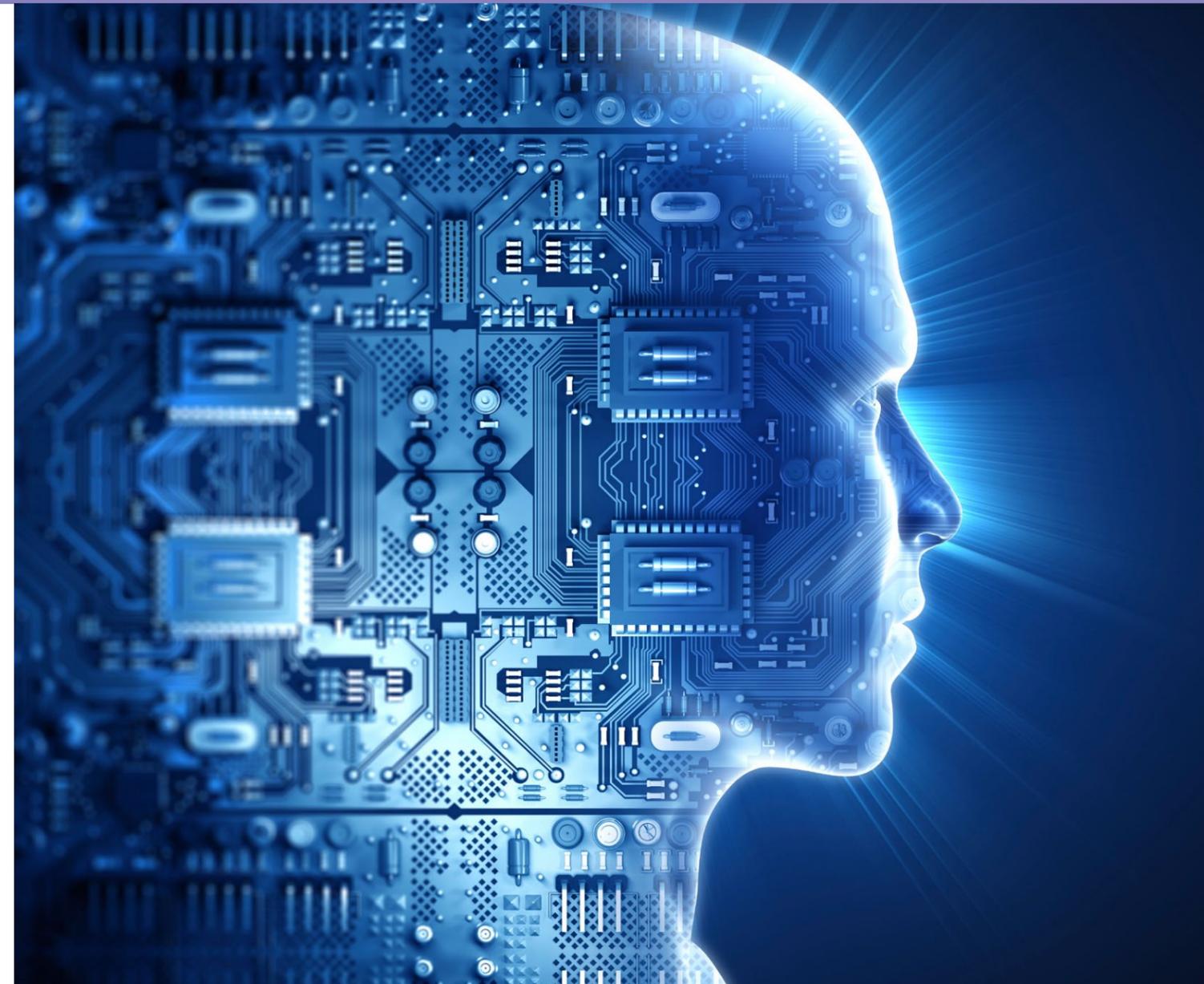
Fraunhofer Institute for Experimental Software Engineering IESE

Software is a part of our lives. Embedded into everyday equipment, into living and working environments or modern means of transportation, countless processors and controllers make our lives simpler, safer, and more pleasant. We help organizations to develop software systems that are dependable in every aspect, and empirically validate the necessary processes, methods, and techniques, emphasizing engineering-style principles such as measurability and transparency.

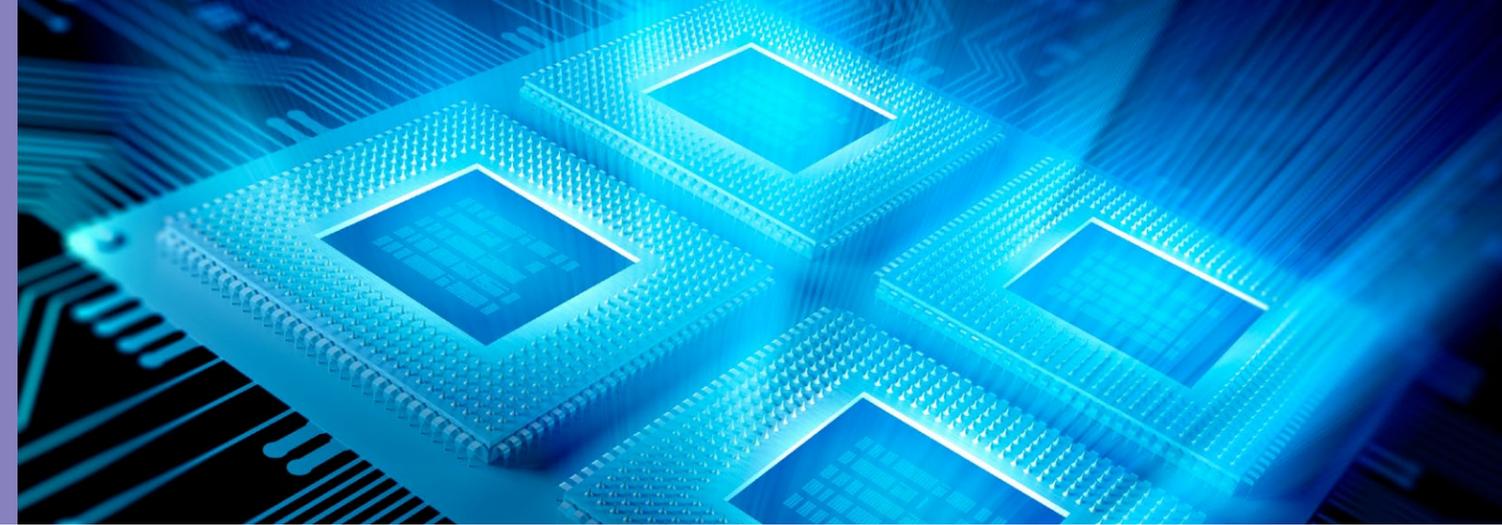
Fraunhofer IESE in Kaiserslautern is one of the worldwide leading research institutes in the area of software and systems engineering methods. A major portion of the products offered by its customers is defined by software. These products range from automotive and transportation systems via automation and plant engineering, energy management, information systems, and health care to software systems for the public sector. The institute's software and systems engineering approaches are scalable, which makes Fraunhofer IESE a competent technology partner for organizations of any size from small companies to major corporations.

Under the leadership of Prof. Peter Liggesmeyer and Prof. Dieter Rombach, the contributions of Fraunhofer IESE have been a major boost to the emerging IT hub Kaiserslautern for close to twenty years. In the Fraunhofer Information and Communication Technology Group, the institute is cooperating with other Fraunhofer institutes to develop trend-setting key technologies for the future.

Fraunhofer IESE is one of 66 institutes and research units of the Fraunhofer-Gesellschaft. Together they have a major impact on shaping applied research in Europe and contribute to Germany's competitiveness in international markets.



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Division Head

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Hidden in transportation systems, medical devices, consumer goods, and almost all other technical products, embedded systems are performing essential tasks that make our daily lives safer and more comfortable. Every year, more than three billion embedded components and devices are manufactured, incorporating 98% percent of all microprocessors built. Embedded systems are omnipresent, and our modern economy and society would be unable to survive without them.

The requirements regarding the reliability and functional safety of such systems are correspondingly high. Failures can rarely be tolerated – particularly when such failures might jeopardize people or the environment. At the same time, the systems are quickly becoming more complex, are highly interconnected, are developed in a distributed manner, and must also fulfill numerous, partly contradictory, functional and non-functional requirements at the same time. To master this challenge, the division “Embedded Systems” focuses on innovative methods and techniques for the cost-efficient development of highly dependable and safe systems. The division is organized into three departments dedicated to “Systems Engineering”, “Software Engineering”, and “Embedded Systems Quality Assurance”.

Department Head

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Department Embedded Systems Engineering (ESY)

It is crucial to look at Embedded Systems as a whole in order to be able to optimize them with regard to various quality properties. In doing so, it is important to keep system quality in focus right from the beginning. This calls for efficient support for the developers to allow them to keep on top of everything despite the rapidly increasing system complexity, and to make the right decisions based on facts. The department Embedded Systems Engineering supports its customers throughout the entire development lifecycle, from the system requirements to the transition to sub-disciplines such as software development, hardware development, and mechanics. During the further course of the development, too, the department supports its customers in managing the dependencies between different disciplines, in avoiding inconsistencies, and in enabling them to ensure interdisciplinary optimization of the desired system properties.

Competencies

- Systems Engineering
- Variation Management

Department Embedded Software Engineering (ESW)

Many innovations in embedded systems are only made possible through software. Thus, the impact of software quality on major system properties such as safety, performance, and costs is correspondingly high. The software architecture plays a decisive role in this regard. It determines whether the desired quality properties can even be achieved cost-efficiently at all, or whether the product will be able to achieve the flexibility and extensibility required for the business model. The department Embedded Software Development therefore supports its customers throughout the entire software development lifecycle, with a particular focus on the appropriate definition, evaluation, and sustainable evolution of an architecture that is optimized to the desired quality properties. The support provided by the department is not only methodological in nature. The architectures for innovative software-intensive systems are also developed in cooperation with the customers – from elicitation of the requirements to implementation of the concrete platform software.

Competencies

- Software Architectures & Platforms
- Model-based Development & Simulation

Department Embedded Systems Quality Assurance (ESQ)

In order to assure product quality, a major portion of the development costs are invested into quality assurance. Particularly for complex systems, efficient methods are needed that make high quality requirements attainable and at the same time decrease the costs for quality assurance. The department Embedded Systems Quality Assurance offers its customers cost-efficient methods that allow assessing system quality effectively and demonstrably. A special focus is on assuring functional safety. In this area, the department supports its customers from the initial risk analysis via the development of safety concepts to the safety case. The department uses innovative quality assurance techniques to support its customers in developing integrated safety cases.

Competencies

- Safety Engineering

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