

RELY research project to explore new chip design methodology

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Seven partners from the German business and research communities are teaming up in the three-year "RELY" project to explore ways of enhancing the quality, reliability and resilience of modern microelectronic systems. The focus will be on applications in transportation, in particular electromobility, in medical technology and automation. Microelectronics will play a far more

prominent role in these sectors in the coming years.

While vehicles today incorporate semiconductor components to the value of some 300 US dollars, this figure is set to rise to about 900 US dollars in hybrid and electric vehicles. We will see electronic systems for enhanced safety and comfort making greater inroads into the automotive sector, and some of them call for enormous computing capacity: they will enable the recognition of speed limits and persons in the dark, and allow automatic parking systems, radar-based driver assistance systems and emergency call systems, for instance. To fulfill all these tasks, the respective semiconductors have to provide an ever-growing number of functions, while meeting stringent quality and safety standards approximating those in the aerospace industry.

The RELY research project, which sets out to design new development processes for tomorrow's microelectronic systems and to integrate new reliability and safety criteria, is supported by the German Federal Ministry of Education and Research (BMBF) with Euro 7.4 million under the "Information and Communications Technology 2020" program. The team members alongside project leader Infineon Technologies AG are EADS Deutschland GmbH, the Fraunhofer-Gesellschaft, MunEDA GmbH, X-FAB Semiconductor Foundries AG, the Technische Universität München (Technical University of Munich) and the Universität Bremen (University of Bremen).

The RELY research project lays the foundations for establishing reliability as a new target parameter throughout the chip development process. So far, optimization has been levelled primarily at area, performance and energy consumption. In the course of the research, the partners seek to develop novel chip architectures that will allow a chip to automatically determine its operating status, react to it and even enter into interaction with the electronic system. In future, such a self-test function of the chip could permit a timely alert of possible signs of wear in electronic systems. This is important particularly in applications that have to operate reliably for many years, such as production plants, trains or cars, or medical implants such as insulin pumps.

In order to be able to implement the self-test function of chips, the research will initially focus on various preparatory activities. The project partners will work on extending the modelling of manufacturing technologies, formulating new chip design specifications, defining new characteristics also in higher design levels, and in enabling system simulation and chip verification with respect to reliability. The German RELY research project is part of the European CATRENE project of the same name – also coordinated by Infineon.