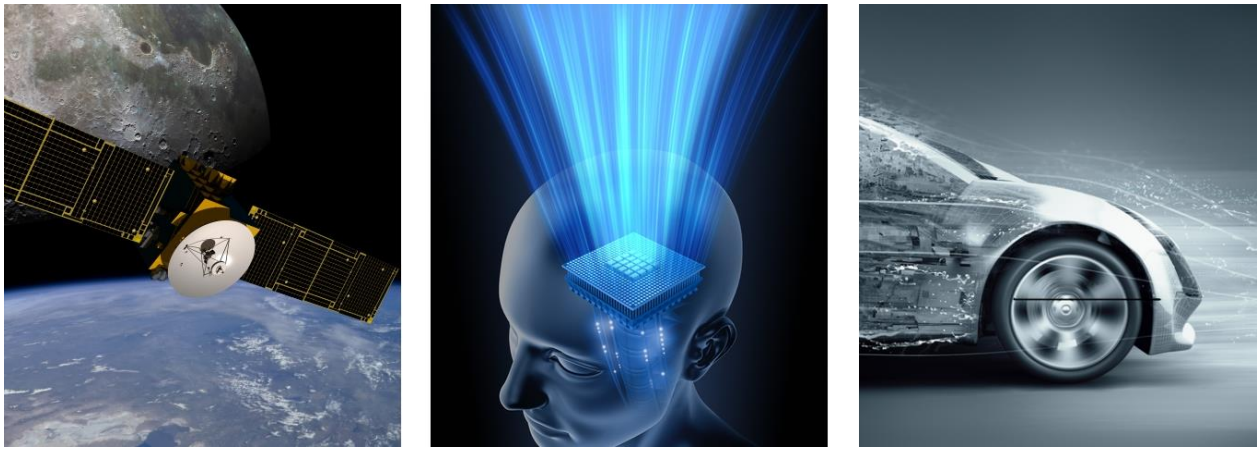
Safer travels and implants with DeSyRe systems

The DeSyRe project developed a novel DeSyRe SoC architecture and underlying concepts for reliability. Such SoCs have been shown to typically use 28 percent less energy and 48 percent less chip area while offering nine times lower hardware failure rate if designed with this novel architecture. DeSyRe's industry partners are using the new concepts to help create safer cars and trains, medical devices that can live longer and are more reliable, brain models that are more advanced, and even easier-to-program embedded many-core systems.



Safer travels and implants with DeSyRe systems

The use of electronic embedded systems is becoming more and more pervasive in many domains, from industrial to automotive and biomedical, and in most of these markets there exists a set of applications which are considered safety-critical.

The DeSyRe project (www.desyre.eu) brought together leading European experts in the field of fault-tolerant and self-repairing design, both from academia and industry. Now that the project has ended, DeSyRe's industry partners YOGITECH, Recore Systems and Neurasmus are already implementing the new design techniques in general-purpose embedded systems and dedicated products for the space, automotive, and medical industry to reap the benefits from this research.

Industry partner YOGITECH (www.yogitech.com), founded in 2000, helps silicon vendors and system integrators to meet functional-safety challenges. Their main customers are from the automotive market, while companies in industrial automation, biomedical and railway markets are catching up to the importance of safety. YOGITECH participated in the DeSyRe project to offer their customers fault tolerance and continuous availability on top of safety.

During the DeSyRe project, YOGITECH extended their specific know-how, built on their proprietary faultRobust Methodology (fRMethodology), and tightly combined fault detection, fault diagnosis, and reconfiguration to implement safe and dependable architectures for available and reconfigurable embedded systems. An ARM-based demonstrator showed the benefits of newly developed hardware and software IPs.

"The results of the DeSyRe project contributed in winning new businesses and reinforced YOGITECH's leadership in the functional-safety market," *said Silvano Motto, CEO of* YOGITECH. *"The DeSyRe project is a good example of how joint activities between universities and companies can work and give an efficient boost to both scientific and industrial progress".*

Industry partner Recore Systems (www.recoresystems.com) designs heterogeneous many-core processor systems and works on making many-core programming easy. They transferred DeSyRe's fault-detection and reconfiguration techniques to two different application fields.

The first application is missions into deep space where radiation levels are high, unprotected systems degrade rapidly, and reliable and fault-tolerant systems are a must. *"For years, we've been working on detecting faults and continuing proper operation in case part of a chip breaks down" says Gerard Rauwerda, CTO at Recore Systems. "With the DeSyRe technologies, we offer our space customers even more reliability in on-chip networks and DSP cores. It immediately piqued interest at the European Space Office."*

The second application is in Recore Systems' FlexaWare many-core embedded platform (www.flexaware.net). DeSyRe explored concepts of task-based programming and runtime task migration for fault tolerance, which found an immediate application in the development of an intelligent many-core operating system and runtime for the FlexaWare platform – crucial for easy programming of many-cores.

Neurasmus (neurasmus.com) is a research and development company operating under the holding of Erasmus Medical Center and the medical-applications provider behind DeSyRe. Neurasmus valorizes existing intellectual property from the EMC and develops new high-tech medical systems which can be used as research tools or for the treatment of neuroscience-related and other diseases.

By partaking in the DeSyRe project, Neurasmus have significantly upgraded and extended their R&D activities, and have scored research breakthroughs in the field of computational neuroscience, computer engineering and beyond. *"DeSyRe opened a window to a whole new world for us."* says Chris de Zeeuw, CEO at Neurasmus.

Work in DeSyRe has stimulated the launch of two novel Neurasmus products: the Implant Toolbox and the BrainFrame. The Implant Toolbox is a collection of fault-tolerance and security techniques finely tuned for implantable medical devices (IMD's). Brainframe is a domain-specific platform delivering high-performance, scalable and intuitive-to-program features for labs and companies active in the field of brain-modeling research and applications. BrainFrame is already in the early steps of commercialization. Both ideas are highly innovative and, while targeting niche markets, face no serious competition.

All in all, DeSyRe has brought together a variety of experts in fault tolerance which worked together for three years to create a new architecture and develop many underlying concepts. Each partner now continues to build on the project ideas and concepts to deliver more robust and safer products for their customers, within their area of expertise. This way, one research project benefits many!

About the EU FP7 project DeSyRe

The DeSyRe consortium brings together leading European experts in the field of fault-tolerant and self-repairing designs, both from academia and industry. University partners are: project leader Chalmers University of Technology (Sweden), University of Bristol (UK), EPFL (Switzerland), FORTH (Greece) and Imperial College London (UK). Industry partners are Neurasmus and Recore Systems (The Netherlands) and YOGITECH (Italy).

Project start date: 1st October 2011; end date: March, 2015

Project website: www.desyre.eu

Industry partner websites;

YOGITECH: www.yogitech.com

Recore Systems: www.flexaware.net

Neurasmus: neurasmus.com