On 2nd December 2008 the CRC 637 is “A Landmark in a Land of Ideas”

The Collaborative Research Centre (CRC 637) “Autonomous Cooperating Logistic Processes – A Paradigm Shift and its Limitations” has been awarded by the initiative “Germany – Land of Ideas” within the contest “365 Landmarks in the Land of Ideas”, which has been initiated under the patronage of federal president Horst Köhler, the federal government, the German industry and the “Deutsche Bank”. Therefore it belongs to the 365 selected landmarks, which represent the location Germany with creativeness, innovative ability and orientation towards the future.

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Motivation

The dynamic and structural complexity of logistics networks makes it very difficult to provide all information necessary for a central planning and control instance. It requires, therefore, adaptive logistic processes including autonomous capabilities for the decentralised coordination of autonomous logistic objects in a heterarchical structure. The autonomy of the logistic objects such as cargo, transit equipment and transportation systems can be realised by novel communication technologies such as Radio Frequency Identification (RFID) and wireless communication networks.

These and others ICT technologies permit and require new central strategies and autonomous decentralised control systems for logistic processes. In this context, aspects like flexibility, adaptivity and reactivity to dynamically changing external influences, while maintaining the global goals, are of central interest.

Objectives

The overall objective of the CRC 637 is the systematic and broad research on “autonomy” as well as its implementation as a new control paradigm for logistic processes. There are four major goals:

- Scientific research of the “autonomy” concept and the development of a theoretical framework for the modelling of autonomous logistic processes,
- Methods and tools for efficient dynamic control systems as well as their communication and coordination geared towards logistics systems,
- Investigation of the impacts of the autonomy paradigm on logistics systems and their future development using modified control methods and processes,
- Transfer, prototypical implementation and verification of the researched mechanisms for autonomous control.

Interdisciplinary Approach

The autonomy paradigm and its application to logistic processes can only be developed in a holistic and cross-disciplinary approach. Based on a system concept known from systems engineering, there are three task layers to be covered in the CRC 637: material flow and logistics, communication networks and knowledge-based methods, and organisation and management. The research centers therefore around the autonomous physical flow of wares and goods, its realisation by information systems, and the management of autonomous logistic processes.

Project Domains

Four project domains were derived from the major objectives of the CRC 637:

- A – Foundations for the modelling of autonomous logistic processes
- B – Methods and tools for autonomous logistic processes
- C – Applications of autonomous logistic processes
- T – Transfer of autonomous logistic processes

Working Groups

Topics of cross-project importance are dealt within working groups to bring in the needed competencies and to capitalize on synergy effects. The following working groups have been established:

- Scenarios/Modelling/Methods
- Software Platform
- Demonstrator Platform

Application Platform and Demonstrator

The prototypical application of the developed autonomy concepts will be realised on a common application platform in order to ensure the suitability for its practical use. Furthermore, the application platform serves as a demonstrator to make the idea of autonomy in logistics tangible and to demonstrate its practical relevance.