Subprojects

A Basics / Modelling

A3 Monitoring of Autonomous Systems
Prof. Dr. Michael Hülsmann (Systems Management, International Logistics, School of Engineering and Science, Jacobs University, Bremen)

A4 Rule-based Graph Transformation
Prof. Dr. Hans-Jörg Kreowski (Computer Science)

A5 Dynamics of Autonomous Systems
Prof. Dr. Bernd Scholz-Reiter (Production Engineering)
Dr. Sergey Dashkovskiy (Mathematics)

A6 Control-theoretic Modeling
Prof. Dr. Neil A. Duffie (Mechanical Engineering, University of Wisconsin, Madison, WI, USA)

A7 Autonomous product construction cycles
Prof. Dr. Katja Windt (Prof. Dr. Katja Windt (Global Production Logistics, School of Engineering and Science, Jacobs University, Bremen)

B Methods / Tools

B1 Autonomously Controlled Routing
Prof. Dr. Bernd Scholz-Reiter (Production Engineering)
Prof. Dr. Carmelita Görg (Electrical Engineering)

B2 Adaptive Business Processes
Prof. Dr. Bernd Scholz-Reiter (Production Engineering)

B4 Knowledge Management
Prof. Dr. Otthein Herzog (Computer Science)
PD Dr. Hagen Langer (Computer Science)
Prof. Dr. Rainer Malaka (Computer Science)

B6 Sensor Systems
Prof. Dr. Walter Lang (Electrical Engineering)
Prof. Dr. Rainer Laur (Electrical Engineering)

B7 Autonomous Adaptation of Vehicle Schedules
Prof. Dr. Herbert Kopfer (Business Studies)

B9 Collaborative vehicle routing and scheduling
Prof. Dr. Herbert Kopfer (Business Studies)

C Applications

C1 Integration of RFID in Die Casting
Prof. Dr. Matthias Busse (Production Engineering)

C2 Data Integration
Prof. Dr. Klaus-Dieter Thoben (Production Engineering)

T Transfer

T1 Automobile Logistics
Prof. Dr. Katja Windt (Global Production Logistics, School of Engineering and Science, Jacobs University, Bremen)
BLG Logistics Group AG & Co. KG., Bremen

T2 Order Allocation within the Supply Chain
Prof. Dr. Bernd Scholz-Reiter (Production Engineering)
Prof. Dr. Katja Windt (Global Production Logistics, School of Engineering and Science, Jacobs University, Bremen)
Ospig Textil Gesellschaft W. Ahlers, Bremen
Wespig Textil Logistik, Bremen
Padmac China, Zhongshan City, China

T3 Sensor Systems for Storage Management
Prof. Dr. Walter Lang (Electrical Engineering)
Prof. Dr. Bernd Scholz-Reiter (Production Engineering)
Prof. Dr. Katja Windt (Global Production Logistics, School of Engineering and Science, Jacobs University, Bremen)
BLG Logistics Group AG & Co. KG., Bremen
Feig Electronic, Weilburg

T4 Monitoring Technologies for Food Transports
Prof. Dr. Carmelita Görg (Electrical Engineering)
Prof. Dr. Walter Lang (Electrical Engineering)
Cargobull Telematics, Altenberge
CCG Cool Chain Group, Bremen
Dole Fresh Fruit Europe, Hamburg

Z Infrastructure Projects

Z1 Coordination and Administration
Prof. Dr. Bernd Scholz-Reiter

Z2 Application Platform and Demonstrator
Prof. Dr. Bernd Scholz-Reiter

Z3 Graduate School
Prof. Dr. Bernd Scholz-Reiter

Deutsche Forschungsgemeinschaft
DFG

Funding

The high standard of Bremen's interdisciplinary logistics research has now been confirmed. The German Research Foundation (DFG) has decided to continue funding the Collaborative Research Centre 637 "Autonomous Logistics Processes – A Paradigm Shift and its Limitations" at the University of Bremen for a further four years. Project duration: 2008 - 2011

Gestaltung: Feilcke & Günsmann Fotos: Sabine Nollmann, GTG, SFB u.a.

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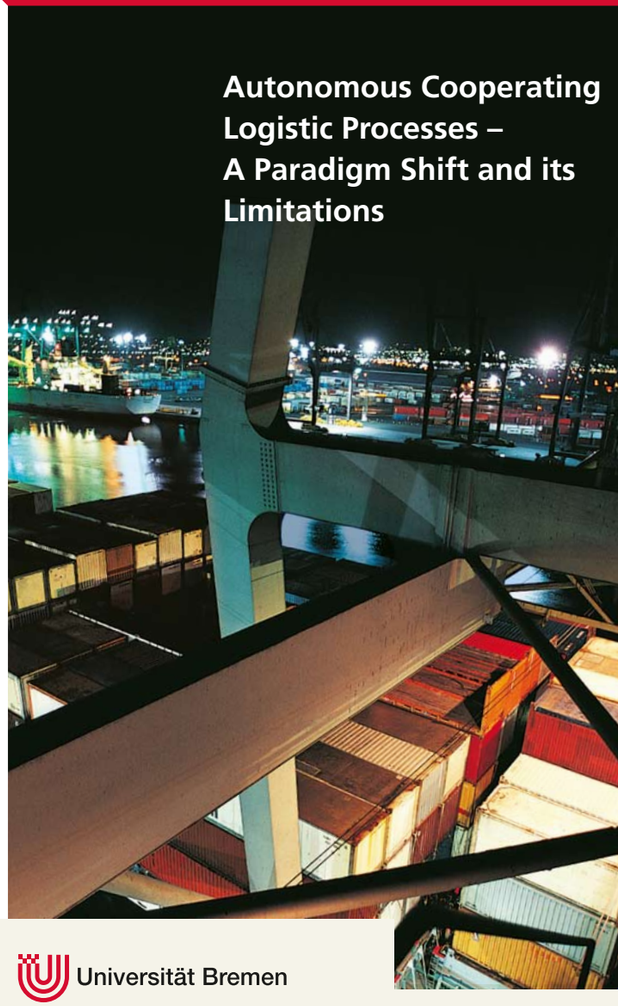
Deutschland
Land der Ideen

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.

CRC 637
Autonomous Logistics

Autonomous Cooperating Logistic Processes – A Paradigm Shift and its Limitations



Universität Bremen

CRC 637
Autonomous Logistics

Autonomous Cooperating Logistic Processes – A Paradigm Shift and its Limitations

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 control 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.