

LogDynamics News November 2015

New LogDynamics Member: Prof. Dr. Drechsler Brings Competence in the Field of Computer Architecture

In 1992 and 1995, Rolf Drechsler received his diploma and his academic title Dr. Phil. nat. from the Goethe University in Frankfurt am Main. Afterwards, he worked for the Department of Computer Science at the Albert Ludwig University of Freiburg from 1995 to 2000 as well as for the Corporate Technology Department of Siemens AG in Munich (2000/01). Since 2001 he has become a professor of Computer Science at the University of Bremen and covered the field of computer architecture. Since 2011, he is a director in the German Research Center of Artificial Intelligence (DFKI) in Bremen, where he also leads the research group of Cyber-Physical Systems.



From 2008 to 2013 he was the Vice President for Research and Young Academics and in this function, he managed the construction and design of the Graduate Center of the University of Bremen (ProUB). Since November 2012, he is the spokesman of the Graduate School System Design (SyDe), which has been set up in the context of the successful application of the University of Bremen in the third line of the 'Exzellenzinitiative'. His research interests comprise the circuit and system draft, where he especially deals with testing and verification. Rolf Drechsler has joined the LogDynamics research cluster in September 2015 and brought along competence in the area of computer architecture.

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Further Support for LogDynamics Research Cluster in the Area of Smart Cyber-Physical Systems

In February 2015, Anna Förster was appointed as a Professor for Communication Networks in the Faculty of Physics / Electrical Engineering. Her main teaching and research interests lie in the field of communications networking with applications in sustainability, civil defense and disaster management, as well as Smart City, Smart Home and Smart Grid.



Anna Förster was born and raised in Bulgaria. She studied Computer Science at the Free University in Berlin and obtained her doctorate at the University of Lugano in Switzerland. From 2010 till 2014, she worked as a research associate at the University of Applied Sciences of Southern Switzerland. At the University of Bremen she intends to pay special attention to integrating research-based learning in her teaching and research activities.

Bremen Research Cluster for Dynamics in Logistics



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To facilitate this, she will set up the „Smart Cyber-Physical Systems” lab in the Faculty of Physics/Electrical Engineering, where University and school students across all disciplines will be able to implement their own applied research projects. Since September 2015, Anna Förster has joined the interdisciplinary *LogDynamics* research cluster and further strengthened the *LogDynamics* research competences in the area of sustainable communications networking and Smart Cyber-Physical Systems.

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LogDynamics Member Prof. Dr. Till Becker Joins CIRP as Research Affiliate

Till Becker has been accepted as Research Affiliate in September 2015 by the International Academy for Production Engineering (College International pour la Recherche en Productique, CIRP). The academy, based in Paris, is an international affiliation of scientists from production engineering. The goal of CIRP is to promote research and development in its field in academia as well as in industry and to foster the exchange among its members. The academy currently has about 600 members from 50 countries.



Till Becker will in particular participate in the ‘Operations’ committee, which deals with the design and modeling of production and service systems, including planning, control, simulation, and optimization. He is the head of the research group ‘Production Systems and Logistic Systems’ at the Department of Production Engineering of University of Bremen, and at BIBA, also he is a *LogDynamics*’ member since 2014.

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Projects



New European Research Project at BIBA deals with Product-Service- System Design



The value of a product is increasingly defined by the services supporting it. Manufacturers therefore need to offer additional services and to quickly take customers’ expectations into consideration. Complex Product-Service-Systems - combinations of services and products – are in demand. BIBA coined the term “Extended Products” for such combinations. The new European research project FALCON (Feedback mechanisms Across the Lifecycle for Customer-driven Optimization of iNnovative product-service design) is coordinated by BIBA and focusses on the development of such Product-Service-Systems. Gaining and processing usage information e.g. for the knowledge-based design of products and related services is one of the core topics of FALCON.

Valuable knowledge for the design of products and supporting services can be derived by observing these Extended Products throughout their lifecycles. Embedded intelligence and sensors as well as feedback from the usage

phase via social media provide valuable information. Analysing the relevance of the data sources as well as improving and systematising their use are goals of the project.

Furthermore, FALCON addresses the semantic interoperability of usage data, and investigates which data source is best for which kind of product. The systematic evaluation of information sources on the Internet plays a key role. Inspiration for the development of Extended Products is gathered directly from the customer base: e.g., by analysing product ratings or recommendations for improvements from users in forums, blogs or social media. User feedback as well as usage data will be integrated and analysed through a Virtual Open Platform and provided as product-specific requirements to designers, developers and programmers.

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Optimization in Warehouse Logistics for Fruits and Vegetables



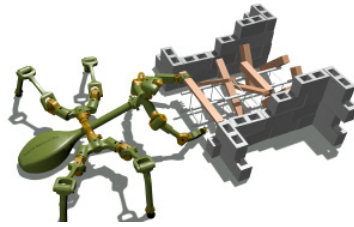
Fruits (e.g. apples) are stored in refrigerated warehouses for up to 6 months. Energy is not only needed for provision of cooling capacity, but also for the ventilators to keep up a steady air flow in every gap. The share of fans of the total energy demand is approx. 40%. In order to guarantee a sufficient and safe cooling in every box, fans are often oversized. The aim of the project COOL is to reduce the energy demand for air circulation significantly, namely by the help of a dynamic control of the revolution of single fans. Just in areas where too little air reaches the goods due to small gaps and unfavorable packing high revolutions are necessary. In other areas revolutions can be reduced.

Because the produced flow of the fans is finally transformed into heat through friction, a double savings effect is achieved. With reduced fan power less heat has to be directed out of the storage room. Moisture loss and thereby weight loss of goods through evaporation is reduced as well. The practical implementation in the project for "Optimization in Warehouse Logistics for Fruits and Vegetables" requires the detailed collection of the flow profile in the storage room with a network of flow sensors.

For 8 years the structure of small flow sensors is one of the core competences of IMSAS. A new chip design aims to measure the flows in various directions and angles. The influence of the casing on the absolute directional sensitivity of the sensor will firstly be reviewed with flow simulation and the design will be optimized. By the use of a new measuring principle the energy demand of the measuring circuit should be reduced further. The sensor uses a new radio module by the company microsensys for data transmission. By a combination of active and passive technologies, this should allow an operation with one button cell over several months. A wireless network of flow sensors will be tested in different field tests in practice laboratories. The COOL project is funded by the Federal Ministry for Economic Affairs and Energy from July 2015 until October 2017.

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Start of New DFKI Project Model-based Software Development for Robots



Whether in the production hall, in the operating room or in the deep sea – nowadays robots are used in various areas.

In order to meet more demanding tasks in different fields of application, more complex systems will be needed. In the project D-Rock of the Robotics Innovation Center (RIC), the German Research Center for Artificial Intelligence (DFKI) under the leadership of Prof. Dr. Frank Kirchner, a software framework, which allows the development and operation of powerful and reliable robotic systems through modeling and modularization, will be developed.

A major challenge in robotics is to develop systems efficiently and cost effectively, which are able to deal with this complexity in a robust manner. The researchers of the Robotics Innovation Center (RIC) therefore rely on the modularization in their software development and thereby on the efficient reusability of components. D-Rock is the follow-up project of the Robotics Construction Kit (Rock), a software framework developed in 2009. The D-Rock project, starts 1st June 2015, is supported by the Federal Ministry of Education and Research (BMBF) and the project management agency, Software Systems and Knowledge Technologies (PT-SW) of the German Aerospace Center e.V. (DLR) over 3 years with 2.5 million Euros budget.

Besides of modularization, the special feature of D-Rock is the extensive modeling approach, which makes the software complexity manageable. The models not only describe how certain components can be used, they also allow their automatic management. Besides the software framework, the modeling also includes hardware and behavior of the systems. The system behavior is depicted in the software, which is then again depicted in the hardware. During the execution of the software the system status is aligned with the models – in this way a dynamic reconfiguration of the system is possible and the robot can react on unexpected situations clearly more flexible.

As a result of the D-Rock project, a set of software tools will be developed, which expands the Rock-Framework. The efficiency of the approach will be tested by the robot Mantis, which was developed during the DFKI-project LIMES and which has to clear and pass a blocked door autonomously in a standardized scenario.

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Photo source: DFKI GmbH/ Kai Alexander von Szadkowski

EU-funded Project RobLog Successfully Completed

In times of raising numbers of container turnover, automated unloading becomes a more and more important topic in logistics. Existing systems are attached to narrow scenarios and often not flexible, not adaptable and robust enough to respond to various, often unknown packing patterns and different numbers of packed goods.



The automated system in this field of application has to deal with challenges that are not trivial. The variety of the different objects is reflected in variance of forms, sizes and weights. These have to be recognized by suitable sensors. The gripping technology has to realize a safe transport with deformed

and bulky pieces as well. The robot kinematics have to fit to the limited work space in a container, but also need to be flexible and robust enough to handle the goods. Collisions have to be recognized early on and have to be avoided and unsteady environmental conditions should not have any influence on the safety of the processes.

At this point, the project “RobLog” aims at the development of methods and technologies to unload universally packed goods out of shipping containers. The focus is on the cognition with recognition and management of the packed goods as well as autonomous of automated unloading by the system. Two demonstrators were built to integrate and validate the developed procedures and technologies in different scenarios. The first, scientifically motivated, scenario covered the unloading of disordered, heterogeneous packed goods and the second scenario considered the unloading of heavy coffee bags under real industrial conditions. For the recognition, classification and localization of the goods, a universally applicable detection method of objects was developed, which was used in both scenarios. For the handling of the objects robots with an accompanying gripper were developed and equipped with a corresponding control software, adapted to the prevailing requirements of the scenarios. The realization of the specified requirements in the project was proven through tests and evaluation of both systems.

The 7.61 million Euros project, was funded by the European Commission. It was initiated by the BIBA Institute and undertaken together with the Reutlingen University and a group of international consortium, consisting of University of Örebro/Sweden, Jacobs University Bremen, University of Pisa/Italy as well as from industries, Qubiq/Denmark and Vollers GmbH from Bremen.

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Internationalization

Logistics Overcomes Distances – not only by Routes of Transportation



The International Graduate School for Dynamics in Logistics (IGS) participates in three Erasmus Mundus mobility projects, funded by the European Commission, with partner universities in Asia. Scholarships on all academic levels are available for mobilities to Europe or vice versa. Since 2013, already 32 students and researchers from Asia to Bremen have been mobilised and this has intensified the cooperation across wide distances.

Currently, the application portals of FUSION (Featured eUrope and South Asia mObility Network and gLINK Sustainable Green Economies through Learning, Innovation, Networking and Knowledge Exchange) are open. German researchers, lecturers and students, of the University of Bremen in particular, are encouraged to spend some months in one of the 20 Asian partner universities.

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Researchers and Students in Logistics from Asia are Guests at the University of Bremen

Since September 2015 Dr. Shree Ram Khadka from Tribhuvan University in Nepal has been a guest in Bremen. In the scope of the Erasmus Mundus exchange program cLINK - Center of Excellence for Learning, Innovation, Networking and Knowledge – he visits the research cluster LogDynamics. He continues his previous research at the University of Bremen in the Production Systems and Logistic Systems (PSLS) working group of Prof. Dr. Till Becker. His research deals with the sequence planning of just-in-time production systems and logistics in disaster management.



In the near future, more students, PhD students and Post-Docs will arrive at the University of Bremen to get to know the scientific landscape of Bremen and to make a contribution to the education and research in logistics. With the Erasmus Mundus projects of LogDynamics also students and researchers from Bremen have the opportunity to travel to Asia. The projects offer scholarships for a study visit or research visit in Bhutan, Nepal or in other Asian partner countries.

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Events



LogDynamics at the 32nd German Logistics Congress

Having theme „A World in Motion“, the 32nd German Logistics Congress took place from 28th to 30th of October 2015 in Berlin. The research cluster LogDynamics and the BIBA - Bremer Institut für Produktion und Logistik were represented with a booth at the accompanying exhibition. The focus of this year's presence was set on technologies for the realization of Industry 4.0. During the conference interesting talks about logistics solutions took place and many new contacts were developed.



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RFID tomorrow 2015 Congress & Exhibition

Already for the fifth time in a row the trade magazine „RFID im Blick“ organized the RFID Congress, which takes place in Düsseldorf. This year, from 28th until 29th September 2015, different topics from RFID technology, industrial automation, logistics, maintenance, to solutions in the field of access and safety as well as trade logistics and medicine were presented.



The research cluster LogDynamics and BIBA - Bremer Institut für Produktion und Logistik have once again participated in the accompanying exhibition and presented the „Intelligent Load Carrier Management“ (LaMa) project. The LaMa project focusses on the intelligent telematics and sensor solutions, which enable monitoring of logistic objects in real-time. An increasing relevance of real-time management arises especially for high-quality and perishable goods. The concept of the „adaptable telematics“ can increase transparency in logistic processes.

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4th Symposium of acatech and the Chinese Academy of Engineering on „iCity and Intelligent Logistics“



Environmental pollution, an overloaded transport system, the city as employment motor: the infrastructure of Chinese cities faces various challenges. Following the invitation by acatech – German Academy of Science and Engineering and the Chinese Academy of Engineering (CAE), scientists from Germany and China discussed about possible directions for solutions – about “iCity and Intelligent Logistics”. The Symposium was held on 21st and 22nd of September 2015 in the House of Science in Bremen, was also supported by the Jacobs University, University of Bremen, Bremen Research Cluster for Dynamics in Logistics (LogDynamics), Bremen Chamber of Commerce, and the Konfuzius Institute of Bremen.

The Symposium dealt with three topics: “iCity Logistics”, “iCity Industry Development” and “iCity Criteria”. An “Industrial Roundtable” concluded the symposium, where scientists discussed, among others, also the challenges of autonomously driving cars in the city. Professor Otthein Herzog from Jacobs University and University of Bremen, Professor Klaus-Dieter Thoben from LogDynamics/BIBA and University of Bremen and Professor Pan Yunhe from Zhejiang University and CAE chaired the event. Also young researchers of the International Graduate School (IGS) of LogDynamics participated actively in the symposium.

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Calls for Participations ▲

5th International Conference on Dynamics in Logistics (LDIC 2016) Bremen, 22nd – 26th February 2016



The 5th International Conference on Dynamics in Logistics (LDIC) takes place from 22nd until 26th February 2016 in Bremen. The conference series, which was initiated by the Bremen Research Cluster for Dynamics in Logistics (LogDynamics) of the University of Bremen, and is concerned with the identification analysis, and description of the dynamics in logistics processes

and networks. The spectrum reaches from modeling, planning and control of processes over supply chain management and maritime logistics to innovative technologies and robotic applications for cyber-physical production and logistic systems.

Parallel to the LDIC 2016 the 7th IFAC conference – Conference on Management and Control of Production and Logistics (MCPL 2016) will be held. The scope relates to information technology in control and management, concepts, methods and algorithms for decision support systems, factory automation, robotics and man-machine interaction, and engineering science.

The LDIC 2016 and the MCPL will provide a platform for discussion of advances in the areas of “logistics” and its use in the industrial practice, and will be accompanied by several satellite events, including among other the Internet of Things (IoT) Workshop and the *LogDynamics* Summer School (LOGISS 2016).

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The Internet of Thing (IoT) Workshop Bremen, 24th February 2016



The “Internet of Things” Workshop is one of the Satellite Events of the 5th International Conference on Dynamics in Logistics (LDIC 2016). The recent developments in the area of IoT are closely linked to the content of the LDIC 2016. The term Internet of Things (IoT) describes the networking of everyday objects. While in the consumer sector, many applications already exist, industrial application is still in its infancy. At the same time IoT promises to be enabling technology for many applications of the industry 4.0 discussions. The IoT Workshop addresses industrial users, researchers, and doctoral candidates to discuss potentials of industrial IoT applications and how latest technologies to prototype solutions can be implemented.

The purpose of the workshop is to gain knowledge of today’s industrial IoT efforts and discuss potentials and limitations of today’s IoT technology and infrastructure. At this, the main focus lies on prototyping an own application either with low cost single board computer or even industrial PLCs. A second integral aspect of the Workshop will be the discussions of application and business models for industrial IoT.

The participants of the LDIC 2016 or the MCPL 2016 can participate at the IoT Workshop without paying further fees, however a one day ticket, only for attending the IoT Workshop is also available and can be purchased via the LDIC 2016 ConfTool System www.conftool.net/ldic2016.

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LogDynamics Summer School (LOGISS 2016) Bremen, 29th February – 4th March 2016



The complexity of logistic networks and systems is growing in today's globalized world. Individual customer requirements cause a significant increase in the number of product variants and services as well as shorter product life cycles.

This implies new technical and economic challenges for logistic systems and processes. In order to meet these challenges, innovative control methods are required to flexibly adapt to continuously changing conditions. The ability to incorporate and utilize the dynamic aspect is essential for successful manufacturing and transport logistics. Moreover, it guarantees strategic advantages in terms of competitiveness on the world market, but also enables green and sustainable logistic solutions.

The goal of this course, having theme "Control Interfaces in Logistics: Data and Algorithms", is to introduce students to methods and tools to develop distributed control algorithms and interfaces. To this end, the students will learn how to use and combine logistic data (e.g., tour plans, bills of material, sensor information, demand forecasts, etc.). The idea is not only to provide students with the ability to use tools to monitor and control the flows (of material, energy, people, and information) in a variety of dynamic logistic environments (from global networks via urban areas to the shop floor). Instead, the students will study information and algorithmic properties, which allow to increase efficiency, reduce emissions, or create robust processes on free scales.

The course is designed for PhD students or advanced Master students in Logistics, Computer Science, Industrial Engineering, or related fields. It is assumed that the students have some basic knowledge in modeling, programming, and statistics.

We invite you to submit your application, including CV and a short description of your project, latest by **30th November 2015** via e-mail at: summerschool@logdynamics.de.

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