

LogDynamics Newsletter November 2016

Projects

More Safety in the Air-freight Chain

From visual inspections to X-rays - until a package finally arrives in the cargo hold of an airplane it has to be checked several times. This is time-consuming, personnel-intensive and expensive. The BIBA institute at the University of Bremen has worked on the topic "Further Safety in the Airfreight Chain" for three years with five partners. The idea: digital logistics shall make processes more efficient and simultaneously guarantee complete monitoring and documentation of the airfreight chain. Recently, the Cargo-Fingerprint-Information system has been presented at the Airport Bremen.

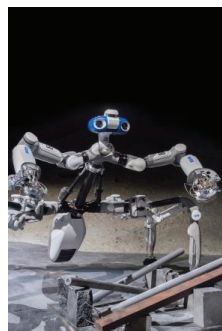


The project, named "Enhanced Security for Logistics" (ESecLog), was funded by the Federal Ministry of Education and Research (BMBF) and its aim was to develop a Cargo-Fingerprint-Information system for audit-proof labelling and review of airfreight shipments. Project partners were the BIBA, the Fraunhofer Institute for Factory Operation and Automation IFF, Bundesanstalt für Materialforschung und -prüfung (BAM), Airbus DS Airborne Solutions, Panalpina and Viaboxx as well as associated partners Lufthansa Cargo, NXP Semiconductors Germany, the Federal Aviation Office and the Bremen Airport.

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Adaptive Software Allows Robots Smart Handling in Space and on Earth

Robots are nowadays used in various fields for increasingly complex tasks – they could, for example, build up infrastructure on other planets. More intelligent systems, which resemble human capabilities, are thus required. In the project BesMan ("Behaviours for Mobile Manipulation"), the DFKI team and the University of Bremen developed generic control methods for one-armed and two-armed manipulation. The key aspect: These algorithms operate independent of the robot's morphology, both in human-like systems as well as in climbing robots with multiple legs. With the help of the newly developed algorithms, robots are not just able to manipulate various objects, but also to flexibly react to unexpected situations - without human intervention. Furthermore, the scientists from Bremen developed a machine learning platform which enables the system to learn situational behavior patterns from demonstrations performed by humans.



The Robotics Innovation Center of the DFKI has a leading role in robotics today: by integrating several functionalities in a highly complex system, the scientists are able to realise more and more intelligent robots for different

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fields of application. In the space area, the use of such systems could save immense costs, because compared to manned missions significantly less weight would have to go to space.

The four-year project BesMan was funded with around 3.8 Mio Euro by German Space Agency (DLR) with resources of the German Federal Ministry for Economic Affairs and Energy.

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Curing Degree Monitoring of Fibre Composite Components with RFID-Technology

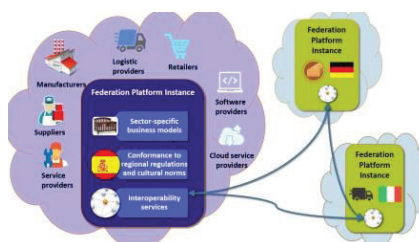


In the production of fibre composite components, it is still a problem to monitor the curing process reliable. In this project a Curing Transponder will be developed, which uses RFID technology to detect the curing degree of fibre composite components within an autoclave. The project focuses on glass and carbon fibre components. The transponder can store detailed data about the component state and send this data to a knowledge-based expert system. That system will collect further data such as location, temperature, RFID signals and manufacturing constraints of various components and will find patterns in this data. Thus, it will be enabled to control the production steps more efficiently. The BIBA institute assumes the data analysis and the development of algorithms which are necessary to interpret the RFID signals to determine the degree of cure of the fibre composite components. The project is performed in cooperation with the Bremen Fibre Institute (FIBRE) and the companies tagltron (Salzkotten) and Haindl Kunststoffverarbeitung (Bremen).

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Photo: Haindl Kunststoffverarbeitung GmbH

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Collaborative Network for Industry, Manufacturing, Business and Logistics in Europe



One of the future challenges of the European production industry will be the participation of SMEs in the accelerating digital connection of devices and business processes. Even today, it is difficult for SMEs to make use of the vast possibilities provided by the Internet. Many companies trust in large platform providers, such as Amazon and eBay, or pay lots of money for customer-specific advertisement. The NIMBLE project develops an Open-Source platform infrastructure (federated platforms) for business-to-business customers. The infrastructure can be customized for regional or industry specific needs. It enables SMEs to connect with their supply chain to support and optimize business processes.

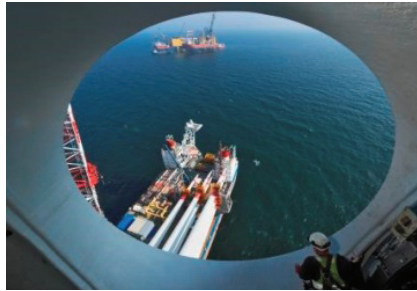
In NIMBLE, the University of Bremen will research and develop mechanisms for semantic data integration. Preliminary work on these mechanisms will

be continued and extended by semantic search capabilities. In addition, the university will lead the work package for requirements elicitation and analysis. A third task is the development of a concept for the information quality control on the platform infrastructure.

The technical challenges of the project concern, for instance, the security of business data, the flexibility of platform functionality, and the interoperability of all NIMBLE-based platforms. The project starts in October 2016 and is planned to end after 36 months. Its goal is the establishment of a European federation of commercially exploitable NIMBLE platforms.

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Development and Demonstration of a Rapid and Cost-effective Construction Concept for Offshore Wind Turbines



The offshore wind energy is a key technology for the Energiewende in Germany. The electricity generation costs are currently high in comparison to other technologies. A significant part of the costs are the installation costs. At present a comparatively expensive jack-up vessel is used for an installation, which shuttles between the installation site and the base port. In this project we investigate to what extent it is economically feasible to supply the jack-up vessel at the installation site with inexpensive feeder vessels. On this basis technical solutions for secure lifts will be developed.

In the subproject of the University of Bremen the research cluster *LogDynamics* considers the economic efficiency of the logistics concepts using simulations which contain all restrictions and process times. In addition, the lift processes will be modeled in a mechanical simulation. The movements of the crane and transport vessel which are caused by wind and swell will be simulated numerically. Afterwards, the calculated forces and movements will be used as the basis for the hoist development.

The goal of the project is a proof of a feeder vessel concept which supersedes the current logistics process in which the jack-up vessel shuttles between installation site and base port. Therefore, the procedural and technical processes will be significantly improved and essential basics and technologies will be developed for the further use of feeder vessels. If the project is successful, the installation of offshore wind power plants will be noticeably more cost efficient.

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Photo: Senvion GmbH 2014

Energy Saving Through a Novel Strategy of Regulation



The project "Geregelt - Integrated control for the energy self-sufficient operation of large-scale infrastructure based on environmental data" within the context of the program "KMU-Innovative: Resour-

ce and energy efficiency” is funded by the Federal Ministry of Education and Research. In this project an integrated regulation will be developed for a more energy-self-sufficient operation of the energy and building services in big infrastructures applied on the example of an airport.

The control system connects existing energy sources, storages and consumers and integrates environmental data such as passenger volume and weather forecasts. Therefore, the energy flows and environmental information in a selected application scenario are modelled. Consequently, optimized control algorithms will be deduced from a simulation study by the BIBA. Finally, these algorithms will be validated in laboratory and field tests. Besides the BIBA as coordinator, the Apandia GmbH for the software development of the regulation system and the netDV GmbH for the technical system design are playing a part in this 30-month research project.

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Photo: Airport Bremen

Awards ▲

Science Award Logistics 2016 Goes to Graduate of the University of Bremen

Dr.-Ing. Max Gath was recently honored with the Science Award 2016 for Supply Chain Management for his dissertation in the research cluster LogDynamics at the University of Bremen. The title of his thesis is: “Optimizing Transport Logistics Processes with Multiagent Planning and Control”. The goal was to optimize logistic transport processes in order to satisfy increasing demands regarding cost efficiency, quality, flexibility and reliability. Gath developed a multiagent-based control, where logistic objects are represented by digital substitutes. These agents could coordinate autonomously, negotiate with each other and find best possible solutions, in route planning for example. One main focus of his work is the development of highly efficient algorithms, which are used for decision making of the agents. The supervisor was Prof. Otthein Herzog from the Faculty Mathematics/Computer Science.



The decision was made in the final round of the two-step competition at the 33rd German Supply Chain Conference in Berlin. The jury praised the high scientific aspiration of the doctoral thesis and its results potential. According to the jury, a way for application is already concretely predefined. Max Gath was able to successfully realize first application projects with nationwide logistics service providers with his company XTL Kommunikationssysteme GmbH.

In this year, the prize is shared in accordance with the jury’s decision. The Science Award Logistics includes 10,000 Euro for the award winners and 10,000 Euro for the supervising institutes. The second award winner is the scientist Dr.-Ing. Zázilia Seibold from Karlsruhe with her dissertation “Logical Time for Decentralized Control of Material Handling Systems”.

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Photo: Bundesvereinigung Logistik / Kai Bublitz

Best Paper Award of WGP Congress 2016 Goes to BIBA

On the 6th Congress of the German Academic Society for Production Engineering (WGP), the Paper “Evaluation of Strategies for the Coupling of Central Planning and Autonomous Control in Dynamic Job Shop Environments” by Susanne Schukraft, Sebastian Grundstein, Michael Freitag and Bernd Scholz-Reiter was selected for the Best Paper Award in the Session “Organisation”. The Paper has been compiled during the research project “Zentronom – Methods for the interlinking of central planning and autonomous control in production” and contains a simulation based analysis of coupling strategies concerning logistic performance and planning adherence.



The WGP Congress was organized for the second time by the Laboratory for Manufacturing Technology (LaFT) at the Helmut Schmidt University, University of the Federal Armed Forces Hamburg and took place from 05.-06. September in Hamburg.

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Best Paper Award at PRO-VE 2016 for IGS and BIBA

Morice Daudi, Jannicke Baalsrud Hauge and Klaus-Dieter Thoben received the best paper award for their paper on 'Effects of Decision Synchronization on Trust in Collaborative Networks'. The paper was presented at the PRO-VE 2016 – 17th IFIP Working Conference on Virtual Enterprises. University of Bremen and BIBA have long been contributing to this research field through several research projects as well as PhD thesis. Morice Daudi, the PhD candidate at the International Graduate School for Dynamics in Logistics (IGS) presented key parts of his PhD research on trust in collaborative networks and logistics. The main contribution in the article is a behavioral trust model, which Morice Daudi has developed as a part of his PhD. Among others, the behavioral trust model addresses trust in the collaborative sharing of logistics resources. In its early evaluation, the model was validated using logistics scenarios which involve synchronizing incompatible decision rights among collaborating partners. During the next year he will work on the comprehensive validation of the model.



The PRO-VE conferences addresses topics related to collaborative networks and collaborative organization forms like Virtual Organizations, Virtual Enterprises and other forms of Enterprise Networks, Professional Virtual Communities, or industry clusters and business ecosystems are now supported by large research and business practice communities.

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Bremen University Students Reach the Final at Robotics Competition with Parcel Delivery Robot

A place on the podium of the “DHL Robotics Challenge 2016“ is now safe for the student team of the University of Bremen, as they were selected as one of the finalists in the world-acclaimed robotics competition. Their “Last Mile Assistant Robot“ (LaMA) convinced the selecting jury. On the 17th November, the team presented its vehicle, which is intended to facilitate the work of the parcel delivery staff, to 180 selected experts at the DHL Innovation Center in Troisdorf near Bonn. The robot was developed within several student projects at the BIBA institute.



For the “Robotics Challenge 2016“, a “Prototype of a Selfdriving Delivery Cart“, a demonstrator of a self-propelled small transport vehicle should be developed. On the so-called “last mile“, as the delivery to the end customer is called, the vehicle should follow and assist the couriers by autonomously carrying their heavy loads. The vehicle must therefore be able to travel in typical urban and rural environments loaded with packages at walking pace. It should be simple to control, robust and weatherproof.

The battery-operated tracked vehicle can be simply steered via gestures. For example, it moves forward or sideways as required, follows the delivery person, and it can raise the loading area so that the courier can easily remove the parcels without bending. Another special features of the vehicle is its innovative traction concept, which ensures extraordinary flexibility and maneuverability. This is possible through the use of the working principle of Mecanum wheels, which has been transferred here into a tracked vehicle.

For BIBA director Prof. Michael Freitag the results of the student project confirm the teaching of the production engineering department of the University of Bremen, in which the institute is strongly involved.

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Details: <https://www.youtube.com/watch?v=v6V4kztcS-0>
Photo: Sabine Nollmann

Internationalisation



Call for Application – gLINK Scholarships

The call for the last cohort of gLINK Projektes gLINK – Sustainable Green Economies through Learning, Innovation, Networking and Knowledge Exchange is open now. From EU to Asia, scholarships on all levels of education and academia are available. The offered grants include the following living expenses



- Undergraduate / Master for 4 months monthly 1,000 Euro
- PhD for 6 months monthly 1,500 Euro
- Post-doc for 6-10 months monthly 1,800 Euro
- Academic staff (only for academic staff of the partner universities) for 2 months 2,500 Euro per month

Additionally, all grants will cover return travel expenses, insurance, and bench fee (if applicable). Only German or European citizens are eligible for an outgoing gLINK scholarship.

Through gLINK, a number of incoming scholarships will be available to the talented students and staff to promote European HEIs as 'centres of excellence' in thinking green, teaching, research and professional practice, and to enhance the attractiveness, image, visibility and accessibility of the European higher education and research in the participating third countries in Asia. The incoming guest will receive the same amount of money, only the duration of the mobilities differ, see www.glink-edu.eu/apply for details.

Details of the previous Erasmus Mundus mobilities and the experiences of the scholars as well as local details of the offers of the International Graduate School for Dynamics in Logistics (IGS) are available online at www.Erasmus-Mundus.LogDynamics.de.

Application deadline is **December 31, 2016**.

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VIA BREMEN Trains Ambassadors for Bremen

"It is about an unusual love story", describes logistics ambassador Bushra Kamran her connection to Bremen in her acceptance speech for the certificate award of the fourth VIA BREMEN Logistics Ambassadors cohort. In the evening of the 27th of October 2016, thirteen students



of the Jacobs University and the University of Bremen proudly received their certificates, signed by the Bremen minister of economy Martin Günthner. With a lot of passion and logistic expertise, the students from eight nations intend to intentionally expose the advantages and competences of the logistics location Bremen/Bremerhaven.

The prospective Bremen logistics ambassadors from China, Vietnam, India, Pakistan, Iran, Cameroon, Nigeria and Bulgaria gathered their insider knowledge on several excursions in the logistics world of Bremen. The programme, which was organised and designed by the marketing network VIA BREMEN, offered a full view on several logistics companies. The goal is to internationally promote the wide range and various specialised logistics services of Bremen. Multipliers, who know, value and learned to love the location, are therefore required.

For the first time, students of the University of Bremen and the IGS doctoral candidates participated in the certificate award ceremony. "The Logistics Ambassadors optimally contribute to our interdisciplinary teaching method in the research cluster *LogDynamics* at the University of Bremen. They stand for good partnership between the industry and science in Bremen as well, as for substantial locational advantage on an international level", praised Prof. Dr. Hans-Dietrich Haasis the programme. In the next cohort of the programme the participation of 6 doctoral students of the IGS is planned.

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Foto: Felix Clebowski



Industry Symposium “Logistics for the Wind Energy”

Date: 1st December 2016

Venue: BIBA, Bremen



The wind energy sector on sea (Offshore) and on land (Onshore) is confronted with the task of cutting expenses in the production of electricity. Substantial efficiency potential lays in a lifecycle crossing view and an optimisation of the whole supply chain – from the product development over the transportation to the recycling. The term “wind energy logistics” combines different concepts, processes and technologies that provide a crucial contribution to this goal.

The industry symposium “Logistics for Wind Energy – Challenges and Solutions for Modern Wind Plants“ brings together important stakeholders and research facilities of the sector. Task and approaches to logistic question marks along the lifecycle and the successful dealing with elements of uncertainty (wind, weather, gearbox failure etc.) along the supply chain will be discussed.

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Details and registration: <http://www.windenergie-logistik.logdynamics.de>

For the First Time in Bremen: Annual Meeting of the Brazilian-German Research Cluster BRAGECRIM



For the first time, the annual meeting of the research cluster “Brazilian-German Collaborative Research Initiative on Manufacturing Technology” (BRAGECRIM) by the German Research Foundation (DFG) and the Brazilian Ministry of Education (CAPES) took place in Bremen. From the 14th to the 16th of November, around 50 researchers of both nations met at the BIBA institute at the University of Bremen. They discussed current research questions and projects during the “8th Annual BRAGECRIM Meeting”.

Brazil is Germany’s most important trading partner in Latin America. It is also one of the most important partners in education and science. The BRAGECRIM program, which was founded in 2009, shall help to continue this successful relationship. Its main goal is the development of sustainable production technologies to foster the industrial sector in both countries. The cooperation deals with central questions about the whole production cycle and beside production technology also includes the areas of metrology and logistics as well as topics of materials science.

The Brazilian-German partnership has a long-standing tradition in the Faculty “Production Engineering“ of the University of Bremen. For decades, the Faculty has maintained contacts to Brazil and has been involved in BRAGECRIM from the beginning. Thereby, the IWT Bremen and the BIBA already completed four research projects successfully that were funded by the BRAGECRIM programme. The BIBA recently started a new project. On the German side, BIBA-director Prof. Michael Freitag is the coordinator of the new project and Prof. Enzo Morosini Frazzon from the working group “Intelligent Logistics and Production Systems” at the University of Santa Catarina (UFSC, Florianópolis/

Brazil) on the Brazilian side. Prof. Frazzon is an alumni of the International Graduate School for Dynamics in Logistics (IGS) at the University of Bremen.

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Construction 4.0 – Innovative Solutions for the Construction Industry



On 26th of August 2016 the 4th network meeting of the ZIM cooperation network “Construction 4.0” took place in BIBA. The network of companies and research institutions, which came together for the topic “Construction 4.0”, plans to implement the objectives of the “digital agenda” in the construction industry using innovative R&D-based technology projects. In particular, this shall be reached by research and development of digital technologies and new forms of partnership. The goal of the network is to develop methods and products, which are suitable for small and medium-sized companies and which make the transformation process of digitalization in the construction industry up to BIM possible. Principles and technologies of Industry 4.0 are used.

On that day, the BIBA as network partner presented R&D solutions concerning the topic Human-Technology-Interaction with “Augmented Reality” as well as new drive technology for construction machines. The new drive technology is already being developed in the current ZIM project “Omniketten”. Here, a universal equipment carrier (undercarriage system) is developed by which a vehicle can drive to any direction at any time. The system offers various uses for different applications. It is especially suitable for uses on rough grounds. The omnidirectional continuous tracks show a very high potential for construction and agricultural machines, especially in the field of hydrodemolition (concrete erosion using high-pressure water jet), stone quarry work, tunnel construction and robot construction machines.

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Who Owns Artificial Intelligence and Robotics?

Robotics and AI today experience - after a long start-up period in research - a gold-rush atmosphere especially in commercial companies. Autonomous vehicles and robots, which are working together with humans, the analysis of huge sets of customer data, only to mention a few examples, promise an economic boost for new products and services. Markets with annual double-digit growth rates arose, investors desperately searched for start-ups with interesting ideas.

The Bremen University Talks (BUG) with the topic “Cognition-enabled Robotics: Democratising a Disruptive Technology” deals with this red-hot topic. On the 10th and 11th of November 2016, a top-class round of 40 representatives from international science and industry discussed about the prospects, which we are able to compete with. Given this circumstances, how can scientists, small and medium-sized companies, research and innovation policy sustainably and successfully develop a technology area, which is characterized by high investments?

LogDynamics member Prof. Michael Beetz and Prof. Andreas Birk are co-

ordinators of the conference. They value the most promising answer on the concentration of research in the hands of only a few IT giants in an interest group of scientists and companies, which develop open standards, open-source software and a preferably large pool of various applications of flexibly usable procedures and jointly sharing. Similar to Linux, which was developed by voluntary software programmers in form of two freely accessible programs and which became popular in wide areas of commercial operating systems, it is necessary to develop an open system for AI-based robotics as well.

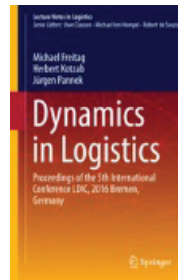
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Publications



Dynamics in Logistics – Proceedings LDIC 2016

These proceedings contain research papers presented at the 5th International Conference on Dynamics in Logistics, held in Bremen, Germany, February 2016. The conference is concerned with dynamic aspects of logistic processes and networks. The spectrum of topics 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. The growing dynamic confronts the area of logistics with completely new challenges: it must become possible to describe, identify and analyze the process changes. Moreover, logistic processes and networks must be redesigned to be rapidly and flexibly adaptable to continuously changing conditions. Special attention has been paid to the topics: Supply Chain Management and coordination as well as to the new technologies: Cyber Physical Systems und Internet of Things. The editors are: Prof. Michael Freitag, Prof. Herbert Kotzab and Prof. Jürgen Pannek.



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