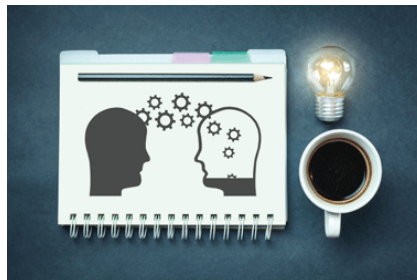


LogDynamics Newsletter November 2018

Projects

Bremen Logistics Transfer and Innovation Culture (BreLogIK)

The project Bremer Logistik Transfer- und Innovationskultur (BreLogIK) provides impulses for more transfer and innovation in the regional logistics economy. It addresses science communication and innovation management in close cooperation with the regional economy. Focusing on innovation, transfer on the three levels of technology transfer, knowledge transfer and idea transfer is well-filled.



The long-term goal of the project is to develop a cooperative transfer and innovation culture in which the boundaries between science and industry become transparent and ultimately enable „barrier-free“ cooperation. The focus will be on the professionalization of transfer processes, ensuring on-demand science communication, the development of innovation laboratories for the direct interaction between science and industry and an innovation hub for digital access.

The BreLogIK project is funded by the state of Bremen. In addition to the LogDynamics research cluster, the member institutes BIBA and ISL as well as the Bremerhaven University of Applied Sciences are involved.

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Photo: andranik123 / Adobe Stock

Intelligent Information Technologies for Process Optimization and Automation in Inland Ports (Binntelligent)

In the project „Binntelligent“, digital services as well as intelligent processes, procedures and information technologies for the optimization of trimodal logistics and transshipment processes in inland ports and the improved collaboration between inland and seaports are designed, implemented and evaluated in the field of application. It creates a cross-company visibility and transparency of decision-relevant information that allows predicting events in the supply chain. For this purpose, an information system for (semi-) automated information distribution, operative process support and predictions will be developed.



In addition to event predictions, forecasting capability in inland ports is achieved by simulation-based optimization of trimodal transshipment, which proces-

Bremen Research Cluster for Dynamics in Logistics

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ses real-time real data and enables adaptability in synchro-modal freight traffic. Binntelligent considers logistics processes for containers and bulk goods in inland ports as well as the pre- and post-carriages. The planned technologies are designed for use in the Weser and Mittelland Canal shipping areas with the ports of Hanover, Braunschweig, Bremen and Bremerhaven and will subsequently be implemented for application-oriented testing and evaluation.

The project is funded by the Federal Ministry of Transport and Digital Infrastructure (BMVI) as part of the „IHATEC - Innovative Port Technologies“ program. Scientific partners are ISL - Institute of Shipping Economics and Logistics (project coordinator) and BIBA - Bremer Institut für Produktion und Logistik GmbH.

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Details: www.isl.org/de/projekte/binntelligent
Photo: ISL

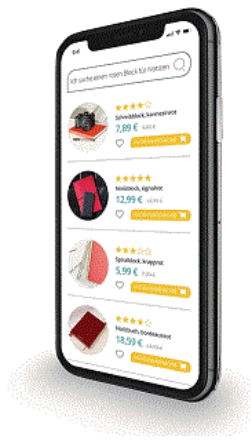
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AI Staging: DFKI and ePhilos Continue Successful Development of Intelligent Search Engines

Funded by the state of Bremen, the research division Cyber-Physical Systems of the German Research Center for Artificial Intelligence (DFKI) and ePhilos AG developed a search engine that follows the principles of artificial intelligence. The resulting search function aiPhilos is already used in online shops today. In the new project AI-Staging, which has now been launched and is funded by the European Regional Development Fund (ERDF) and the state of Bremen, the project partners are continuing their successful cooperation: In order to record articles uniformly in catalogues and thus optimise article inventories, they are developing intelligent methods for analysing article descriptions - for an even more reliable product search.



Companies are increasingly using so-called eProcurement systems to process their purchases efficiently and cost-effectively, both financially and in terms of personnel. However, such systems, as well as eShop systems, often reach their limits when searching for products. In the successfully completed project AI-Search, the DFKI Research Unit Cyber-Physical Systems under the direction of Prof. Dr. med. Rolf Drechsler and ePhilos AG - one of the leading providers of eProcurement systems - compiled innovative methods by which even imprecise or original search queries can be clearly mapped to the desired product. For this, natural language processing techniques as well as learning methods and knowledge databases are used.

The AI-Staging project, which has now launched, addresses another challenge: the automated optimization of article inventories. As part of AI Staging, the project partners are developing methods for analyzing article descriptions, with the help of which the desired features can be at least partially automatically recognized and extracted from unstructured continuous text.

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Details: www.aiphilos.com
Photo: ePhilos AG

Smart Outdoor Lighting Concept in a Port Environment (OBELiSK)

The aim of the research project „OBELiSK - Intelligent Outdoor Lighting Concept in a Port Environment“ is to derive motion patterns or motion prognoses from operational data and DGPS coordinates of the port handling equipment or via smartphones using algorithms and thus enable intelligent lighting of a terminal by dimming LEDs. In addition, it must be possible to illuminate certain areas for special events via a central control system. The consortium estimates that lighting can save around 20% of current energy consumption.



The research project recently started at BIBA - Bremer Institut für Produktion und Logistik GmbH. It is funded by the BMVI within the framework of IHATEC program.

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Multi-Criteria Optimization of Position and Configuration of 3D Sensors through Virtual Reality for Flexible Automation Solutions in Logistics (VirtuOS)

The development of flexible handling robots and autonomous vehicles for logistic processes is a great challenge due to heterogeneous objects, variable environmental conditions and complex



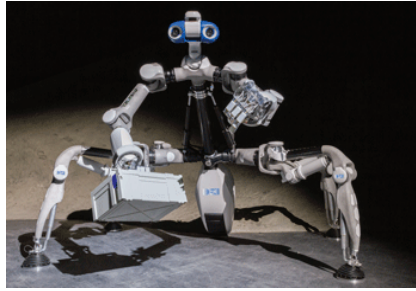
properties of 3D sensor technology, which is associated with high financial risks. The 3D sensor system can consist of several sensors and can differ in the sensor technology. The selection, configuration and positioning of the sensors are laboriously carried out manually and application-specifically. Simulative tests are not yet possible. Only then algorithms based on the sensor configuration can be developed.

Within the framework of the VirtuOS project at BIBA, a freely available online tool is to be developed with which application scenarios in the VR room can be configured at one's own discretion and sensor data can be simulated realistically. A multi-criteria optimization delivers, depending on different optimization criteria, application-specific optimal sensor configurations. Finally, the necessary technical requirements for the sensor technology are transmitted to the user. The working hypothesis is that the technological and environment-specific properties can be mapped realistically in the virtual working environment. SMEs, in particular automation companies, system integrators and suppliers of sensors and image processing solutions can thus be supported in the selection and configuration of sensors for new workstations or robots, which so far requires a very high level of expert knowledge. In addition, the tool accelerates the development cycles and thus the rapid development of new business fields. AI start-ups also benefit from the generation of test and training data for the training of machine learning systems, as they often lack the data necessary for product development due to the missing market access or application-specific knowledge.

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Tailor-made Robots for Everyone - DFKI Relies on Artificial Intelligence in Robot Development

The complexity of robots is constantly increasing. More and more powerful sensors and actuators make the vision of highly mobile, intelligent and autonomous systems a reality. This poses great challenges for developers and drives up development costs. The Robotics Innovation Center of the German Research Center for Artificial Intelligence (DFKI) is pursuing a revolutionary approach in the new Q-Rock project, which is funded by the Federal Ministry of Education and Research (BMBF) with 3.17 million euros: using methods of artificial intelligence, in the future it should also be possible for users without expert knowledge to develop cost-efficient, tailor-made robot systems for their applications.



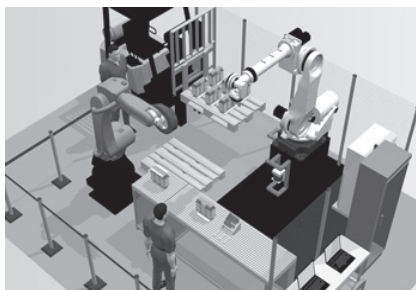
The Q-Rock project forms the second step of the Robotics Innovation Center's X-Rock project line and addresses one of the fundamental questions in robotics: How can a robot independently develop knowledge about itself and its capabilities without having to be given this by a developer? On the one hand, Q-Rock relies on artificial intelligence methods such as machine learning and structural reasoning. On the other hand, it builds on the extensive database of the predecessor project D-Rock. The database combines modeled software with hardware and behavior models and also supports robot development through comprehensive modularization - i.e. the efficient reusability of components.

Prof. Dr. Dr. h.c. Frank Kirchner, Head of the DFKI Robotics Innovation Center: „Q-Rock is an important step towards so-called ‚integrated AI solutions‘. This approach will also enable people who are not AI or robotics experts to develop and deploy systems tailored to their own needs. In the future, small and medium-sized companies in particular will be able to benefit from this and thus afford the use of robots on a larger scale.“

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Details: www.robotik.dfk-bremen.de/en/research/projects/q-rock.html
Photo: Annemarie Popp, DFKI GmbH

Autonomous Assistance System to Support HRC Assembly Processes (AutARK)

The central goal of the project is the development of an autonomous assistance system close to the body for human-robot collaboration (HRC) in assembly, which is particularly characterized by system neutrality. The aim is to enable HRC-capable assembly processes within various applications in medium-sized companies. Exemplary, the potential of this new type of Assistance systems in terms of flexibility, cognitive relief, ergonomics and safety is being tested and evaluated in application cases. On the one hand, the assembly of transformers during the production process is being considered and on the other hand the welding of mechanical components is being focused in the welder training.



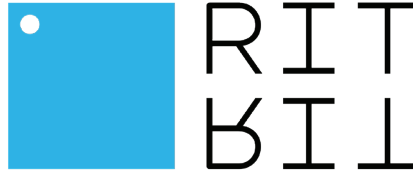
The overall objective of the subproject run at BIBA - Bremer Institut für Produktion und Logistik GmbH includes the development of an autonomous sensor system close to the body as well as a sensor system close to the robot or machine, which

will be fused in a sensor framework and thus enable human-robot collaboration in assembly. Furthermore, a method for the design of HRC systems is to be developed.

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Robust Industriell Transformasjon (RIT)

Competitive advantages can be achieved not only for products with reduced costs and shorter design and production cycles, but also by opening up new business models, such as the further development of classic products into product service systems. The project

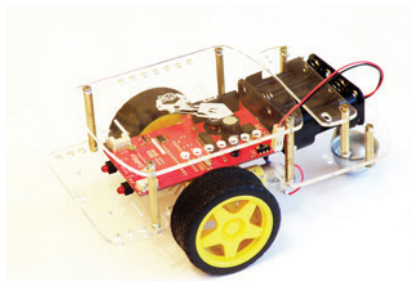


„Robust Industrial Transformation“ (RIT), funded by the Norwegian Research Council and run by BIBA, supports medium-sized boatbuilding companies in successfully mastering this paradigm shift. The focus is on the development of a broad spectrum of new solutions to open up new value creation potentials, such as the adaptation of processes in the design phase or the development of new product concepts based on real usage data. Building on data acquisition and processing approaches from previous research projects, RIT prepares the data of the boat manufacturers to provide targeted early-stage product development. This will enable boat manufacturers to analyse large amounts of product data in relation to specific design requirements and to structure and visualise these in conjunction with other data.

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Students Implement Autonomous Driving in a Teaching Project

Autonomous driving is currently a much-discussed research topic and is considered at different stages by all major manufacturers. In order to introduce students to the associated problems, Tobias Sprodowski, research associate of the Dynamics in Logistics (DiL) working group, and Prof. Dr. Jürgen Pannek offered student in four groups the opportunity to become acquainted with this topic theoretically and practically in teaching projects. The groups worked independently on various aspects of the model vehicles at the software and hardware level with the aim to integrate the components into a complete system.



For this purpose, the main topic was divided into four individual projects: structure and control and modelling of the vehicles; indoor localization; design and implementation of a graphical application for operating the vehicles and for collecting data; development of a predictive controller (MPC) with subject to collision avoidance. The vehicles are based on the Raspberry Pi ARM boards with the GoPiGo vehicle kit, whereat the basic framework was extended by Marvelmind beacons mounted on the vehicles for indoor position detection and compatible cameras. In addition to displaying the vehicles on a map, the graphic application also offers the readout of vehicle data, the streaming of camera images and the planning of vehicle routes considering individual starts and targets. The route to these targets were determined by a distributed, predictive controller.

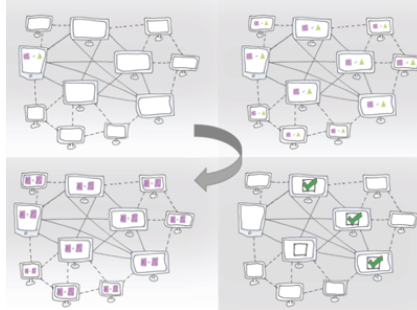
Besides solving the difficulties for technical content, IT and hardware, the students also learned to handle the difficulties of project management within and between the groups through the teaching projects and are now successfully completed their projects. Besides the support from the research cluster

LogDynamics, the project leaders are particularly pleased that due to the innovative character of the projects, which can be traced back to the commitment of both Mr. Sprodowski and the students, a further support by the University of Bremen could be received. The project has thus been improved and will be continued in the current semester.

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Blockchain Technology in Production and Logistics

The teaching project „Blockchain Technology in Production and Logistics“ has been performed at BIBA - Bremer Institut für Produktion und Logistik GmbH. In the project 13 bachelor students in the winter semester 2017/2018 examined the opportunities and challenges of blockchain technology in production and logistics. In small groups, applications of the technology for the Bremen innovation clusters „Maritime Economy and Logistics“ (container logistics), „Aerospace“ (aircraft construction) and „Food and Beverage“ (fair trade) were identified and illustrated in short videos.



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Details: www.biba.uni-bremen.de/en/news/article/blockchain-technologie-in-produktion-und-logistik.html
Videos: www.youtube.com/watch?v=_YjwuxcBKF8, www.youtube.com/watch?v=ZpPsYvwX0gU&t, www.youtube.com/watch?v=8Wmz3IT0llo

Awards

BIBA Start-Up Wins BVL Start-Up Competition

With its new conveyor system celluveyor, the start-up team cellumation from the BIBA - Bremer Institut für Produktion und Logistik GmbH at the University of Bremen has won the start-up contest of the German Logistics Congress of the German Logistics Association (BVL) in Berlin. Six young companies with different innovative solutions for logistics were selected for the pitch competition, two of them from the US. After the short presentations (pitches), the audience made the decision and ranked the Bremen-based start-up first by a wide margin.



The example of the celluveyor from BIBA shows how research can be successfully transferred into innovative products: What began in the course of scientific development work as a supposedly crazy idea of a lateral thinker and with countless night shifts in the BIBA laboratories became one of the most flexible material flow solutions in the world. Not only inventor Claudio Uriarte and his colleagues Dr.-Ing. Hendrik Thamer, Ariandy Yoga Benggolo and Ivan Kuznetsov see it this way. Together they form the start-up cellumation.

This unique development is based on small hexagonal conveyor modules with specially arranged wheels (omnidirectional), each of which is individually controlled. They can move and position several objects simultaneously and independently on any path as required. The conveyor modules are joined together like building blocks and thus allow any geometries of conveyor systems. In this way, even the most complex conveyor technology tasks can be carried out

on the smallest of surfaces. This makes the celluveyor an intelligent, highly flexible modular conveyor and positioning system.

The BIBA spin-off is supported by the EXIST research transfer program of the Federal Ministry for Economic Affairs and Energy. The system has already been successfully tested in production and logistics and the start-up has been founded. Real operation is scheduled to begin next spring.

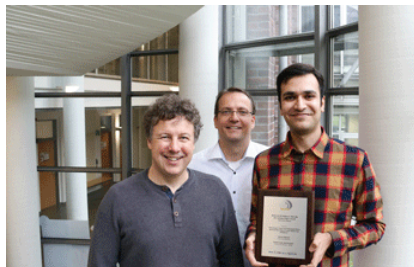
Contact: Dr.-Ing. Hendrik Thamer thamer@cellumation.com

Details: www.biba.uni-bremen.de/presse/pressemitteilungen/2018/pressemitteilung-vom-25-oktober-2018.html

Film: www.youtube.com/watch?v=R8b8NT3HDCA

Multiply - But Correctly! Bremen Research Work Wins Best Paper Award

Arithmetic circuits such as multipliers are present in every processor today. If they are faulty, this causes high costs. The scientists at the University of Bremen and the German Research Center for Artificial Intelligence (DFKI) Alireza Mahzoon, Dr. Daniel Große and Prof. Dr. Rolf Drechsler have investigated how the functional correctness of such circuits can be proven.



For their research work, they were awarded the Best Paper Award at the International Conference on Computer Aided Design (ICCAD), one of the leading conferences in the field of circuit design, in San Diego (USA) on November 5th, 2018.

The multiplication of large numbers is extremely computationally intensive. Especially when a calculation has to be carried out very quickly or power consumption has to be as low as possible, circuits optimized according to these criteria, so-called multipliers, are used. The focus of the excellent work entitled „PolyCleaner: Clean your Polynomials before Backward Rewriting to Verify Million-gate Multipliers“ is on the verification of multipliers, i.e. the verification of the correct function of such circuits. Until now, this could only be realized fully automatically for comparatively small bit widths and simple architectures.

For the first time, Bremen's research work now allows the correctness of multipliers with more than one million gates to be proven. To this end, the scientists developed new theoretical findings and implemented them in the „PolyCleaner“ tool. The tool uses so-called polynomials to represent the verification task. However, the use of polynomials has led to an explosive increase in memory requirements. Thanks to PolyCleaner, exactly this is prevented: Redundant terms that occur hundreds of thousands of times are first eliminated, so that the automatic correctness check can then be successful without any problems.

Contact: Prof. Dr. Rolf Drechsler Rolf.Drechsler@dfki.de

Photo: Lisa Jungmann, DFKI GmbH

BIBA Researchers Win IJAT Review Award 2018 from International Journal of Automation Technology

Authors Klaus-Dieter Thoben and Stefan Wiesner from BIBA as well as Thorsten Wuest from West Virginia University win the IJAT Review Award 2018 for their paper „Industrie 4.0' and Smart Manufacturing - A Review of Research Issues and Application Examples“. The award is presented for the third time to the most prominent review paper of the last two years, selected

among the articles from the International Journal of Automation Technology. The journal focuses on advanced automation technologies ranging from basic techniques to a variety of applications meeting industrial requirements, e.g. for production, logistics and control systems. For a long time, BIBA and West Virginia University have contributed to the field of digitalization of industrial production through research projects and publications.



The awarded paper provides an overview of Industrie 4.0 in Germany and smart manufacturing programs in the USA, analyzes the application potential of cyber-physical systems starting from product design through production and logistics up to maintenance and exploitation (e.g., recycling), and identifies current and future research issues. Besides the technological perspective, the paper also takes into account the economic side considering the new business strategies and models available. To achieve these objectives, the paper presents a literature review on the corresponding state-of-the-art and a study on application scenarios from research and industries, such as cyber-physical logistics systems and safe human-robot interaction. The authors are honored by the award, recognizing the outstanding quality of research on the digitalization of industrial production by BIBA and the West Virginia University.

Thoben K-D, Wiesner S, Wuest T (2017) "Industrie 4.0" and Smart Manufacturing – A Review of Research Issues and Application Examples. IJAT 11:4–16. doi:10.20965/ijat.2017.p0004
www.fujipress.jp/ijat/au/ijate001100010004
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Best Paper Award at the 7th International Conference on Through-life Engineering Services for BIBA-Researcher

At the 7th International Conference on Through-life Engineering Services, Karl A. Hribernik from BIBA received a Best Paper Award for his paper „Towards a Unified Predictive Maintenance System - A Use Case in Production Logistics in Aeronautics“. This paper investigates a use case in the maintenance of assets ("jigs") for the transport of wing upper covers produced by a transnational aeronautics OEM.

High-value, complex products such as aircraft are not produced by a single organization at a single production plant. Rather, a network of highly specialized suppliers collaborates with often geographically distributed OEM production plants focused on specific parts of the product. This means that a suitable predictive maintenance strategy needs to take into account not only multiple stakeholders and locations in the production processes itself, but also the production logistics processes and their stakeholders. Based on the analysis of the application case, it derives the requirements towards a predictive maintenance system and projects them onto current state of the art standards like MIMOSA OSA-CBM and RAMI4.0. From this a unified predictive maintenance system for the optimization of jig maintenance procedures is proposed and initial results in the form of the application of a conceptual architecture to the problems



identified in the use case are presented.

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Internationalization

Sustainable International Cooperation through the IGS

In October 2018, the almost ten-year link between the Universidad Arturo Prat (UNAP) in Iquique, Chile, and the Bremen Research Cluster for Dynamics in Logistics (LogDynamics) at the University of Bremen was consolidated with a Memorandum of Understanding (MoU).



The development of this collaboration began with a lecturer at UNAP who received a CONICYT Bicentennial Becas-Chile Scholarship to do his doctorate at the International Graduate School for Dynamics in Logistics (IGS). Based on the joint research work, projects were developed and an exchange started. Meanwhile, another UNAP lecturer is doing his doctorate at the IGS, a third is currently applying for a DAAD scholarship. This kind of sustainability is a success story of the structured doctoral training program of the IGS.

In November 2018, the Interdisciplinary Research Colloquium of the IGS took place in Word Cafe format in order to intensify the discourse across cultural and departmental boundaries for the benefit of the challenges in logistics.

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Details: www.logistics-gs.uni-bremen.de/school0.html?&L=1

Events

The Digital Now: Serious Virtual Reality / Robotics and AI

Date: **December 4th, 2018 / January 23rd, 2019**
Venue: Bremen

„The Digital Now“ is a series of events offered in cooperation with the Mittelstand 4.0-Kompetenzzentrum Bremen, the interest group bremen digitalmedia and the Senator for Economic Affairs, Labor and Ports.



The next event is called „Serious Virtual Reality“. It will take place on December 4th, 2018 at engram GmbH in Bremen. There is a great potential for the use of Virtual Reality outside the gaming world which opens up new ways in production, sales and training for medium-sized companies. The Virtual Reality technology allows complex processes to be clearly depicted and presented in the virtual world. In this way, the transfer of knowledge to end customers or employees can be made more emotional and understandable. As a result, experienced contents remain more persistent in one's memory.

Another event will take place on January 23rd, 2019 in the Robotics Innovation Center of the German Research Center for Artificial Intelligence (GmbH) in Bremen. An exciting excursion into the world of robotics and artificial intelligence awaits the participants. During a guided tour, you can visit the unique

research infrastructure of DFKI, which serves the development and testing of autonomous mobile robots for various fields of application. In addition, DFKI scientists will demonstrate a robotic exoskeleton for use in medical rehabilitation.

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Details: www.kompetenzzentrum-bremen.digital/events/serious-virtual-reality-wissen-erlebbar-machen/

Photo: Robert Kneschke / Fotolia

ISL Maritime Conference 2018 - Progressive Digitalization Opens New Directions for the Maritime Economy

The ISL Maritime Conference, which is held every two years in Bremen, has a long history. It stands in the tradition of the former Liner Shipping Conferences, which were already organised by the ISL in the seventies and eighties and were already a fixed date for the maritime economy, politics and science at that time.

This year's event once again proved that history and modern technologies are not mutually exclusive: thematically, the focus was on the future, on the maritime economy of the future and thus on the rapidly advancing digitalization of the industry. The spectrum of lectures on October 23rd, 2018 ranged from „Courage to innovate: autonomous maneuvering“ to „Data treasure: currency of tomorrow/today“ to „Cyber security in port telematics“.



A total of approx. 130 guests discussed the potentials and risks of digital cargo handling and digital traffic in Schuppen 2 of the Bremen Überseestadt with the speakers from business, science and politics. The event in 2018 was decisively supported by the Mittelstand 4.0-Kompetenzzentrum Bremen, so that for the first time it was possible to hold the established ISL Maritime Conference as a free offer for small and medium-sized enterprises. The next ISL Maritime Conference will take place in 2020.

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Details: www.isl.org/de/news/isl-maritime-conference-2018

Photo: ISL

Innovative Technologies for Space Operations - DFKI Robotics Innovation Center at the IAC 2018 in Bremen

As a cross-sectional technology par excellence, the development of artificial intelligence (AI) is of outstanding importance for the exploration of the universe. The Robotics Innovation Center of the German Research Center for Artificial Intelligence (DFKI) combines first-class AI research with the development of autonomous self-learning robot systems for use



in space. At the International Astronautical Congress (IAC) in Bremen from October 1st to 5th, 2018, the research division presented itself at the stand of the Horizon 2020 Strategic Research Cluster on Space Robotics Technologies in the Exhibition Hall of the Bremen Exhibition Center.

As part of the Strategic Research Cluster (SRC) on Space Robotics Technologies, the European Commission is promoting core technologies for a new generation of space robots with the aim of advancing orbital and planetary research into our solar system. The new technologies will be used to build both modular and reconfigurable satellite systems as well as to explore Mars, the Moon and other celestial bodies. The DFKI Robotics Innovation Center under the direction of Prof. Dr. med. Dr. h.c. Frank Kirchner is a partner of the „PERASPERA (ad ASTRA)“ consortium, which plans and implements the strategic objectives of the Strategic Research Cluster (SRC) of the European Union in subprojects. At the accompanying exhibition of the IAC 2018, the project partners presented the PERASPERA subprojects at the SRC booth, which was organized by the Robotics Innovation Center.

At the International Astronautical Congress 2018 (IAC 2018) more than 4,500 experts discussed the broad field of the various space disciplines at the Bremen Exhibition Centre from October 1st to 5th. The accompanying exhibition featured more than 100 exhibitors from 32 countries.

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Details: www.iac2018.org, www.h2020-peraspera.eu, www.robotik.dfk-bremen.de/en/startpage.html
Photo: DFKI GmbH

LogDynamics at the 35th German Logistics Congress for the 10th Time

The German Logistics Congress is one of Europe's most important events on logistics and supply chain management. Here, the leading thinkers and experts in the logistics sector impart knowledge and recommendations for action as well as discuss current problems and future topics. Around 3,500 trade visitors and 200 exhibitors took part in this year's anniversary congress.



The LogDynamics research cluster was also involved in the accompanying trade exhibition. For the tenth time in a row, the research cluster presented innovative solutions from Bremen logistics research and entered into an intensive dialogue with the industry. Along the lines of the motto of the 35th congress „Digital meets Real“, our presence was completely dedicated to digitalization as well. The focal points were: digital communication, digital service, digital traffic, digital product and digital cargo handling.

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5th Research Conference of World Society of Disaster Nursing in Bremen

This year's conference of the World Society of Disaster Nursing (WSDN) took place on October 18th and 19th in Bremen, focusing on „Future Challenges for Global Disaster Risk Management - Evidence based Research and Powerful Competencies Needed for Nurses“. The conference, organized by Professor Görres (University of Bremen) and his team, was attended by over 170 participants from 16 countries and 4 contingents. As part of a keynote, Professor Anna Förster and Dr.-Ing. Udugama (University of Bremen) together with Dr.-Ing. Michael Lütjen and Ann-Kathrin Rohde (BIBA) presented a phase model

for the reconstruction of information technologies after a disaster („Rehabilitation of communications to enable fast response in disaster scenarios“). Professor Thoben chaired a discussion panel at the conference and, in a joint contribution with Professor Drechsler (University of Bremen), Dr.-Ing. Matthias Burwinkel and Ann-Kathrin Rohde (BIBA), explained research needs for cross-company collaboration with the aim of restoring logistical processes for disaster relief in seaports („Digitized cross-company and seaport-wide collaboration to restore and sustain disaster relief“). The released conference papers can be found at www.wsdn2018.de/presentations.



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