Isabella

Automobile logistics in sea and inland ports: interactive and simulation-based operation planning, dynamic and context-based control of device and load movements

Left: 3D-visualization of the BLG automobile terminal in Bremerhaven | Above: Scanning process via mobile app for communication between control algorithm and driving personnel, Sources: Sabine Nollmann

Motivation

Logistic processes on sea and inland ports play an important role in the context of finished vehicle logistics. Due to increasing dynamics and complexity, the planning and control of these processes requires high flexibility and reactivity.

Approach

The project Isabella comprises the development of solutions for the improvement of the planning and control processes on sea and inland ports. The developed planning and control system was implemented for pilot testing on the vehicle port of the BLG in Bremerhaven. The developed planning tool works on a visual and thus most intuitive basis. A multi-touch table visualizes a 3D-layout of the terminal. Furthermore, the interactive planning tool allows the simulation based comparison of planning alternatives and the graphical visualization of the simulation results. Furthermore, the process of order assignments was digitalized and an optimization algorithm was developed for the management of vehicle movements on the vehicle port. The algorithm assigns tasks based on the current order situation and the location of the vehicles. The developed tracking and tracing system for the localization of the vehicle locations in indoor areas is based on WLAN Round Trip Time.

Results

The interactive planning tool supports the users by the visualization of the planning situation and enables planning adjustments depending on the expected order development. The task assignment based on the localization of the vehicles results in route optimization and the minimization of empty runs. The project was carried out in cooperation with the project partners BLG and 28Apps. The project was funded by the German Federal Ministry of Transport and Digital Infrastructure (BMVI) as part of the program for innovative port technologies (IHATEC).

Publications:

Hoff-Hoffmeyer-Zlotnik, M.; Schukraft, S.; Werthmann, D.; Oelker, S.; Freitag, M.: Interactive Planning and Control for Finished Vehicle Logistics. In: Jahn, C.; Kersten, W.; Ringle, C. M. (Hrsg.): Digitalization in Maritime and Sustainable Logistics. epubli GmbH, Berlin, 2017, S. 77-93

Schukraft, S.; Oelker, S.; Werthmann, D.; Freitag, M.; Görges, M.; Gencer, E.; Malek, A.: Interaktive Planung und Steuerung für den Automobilumschlag - Lösungsansatz für die Steigerung der Effizienz und Flexibilität der Logistikabwicklung auf See- und Binnenhäfen. In: Industrie 4.0 Management, 33(2017)6, S. 11-14

Jathe, N.; Lütjen, M.; Freitag, M.: Indoor positioning in car parks by using wi-fi round-trip-time to support finished vehicle logistics on port terminals. In: Dolgui, A.; Ivanov, I.; Yalaoui, F. (Hrsg.): IFAC-PapersOnLine 52(2019)13. Proc. of IFAC MIM 2019, Elsevier, Amsterdam, 2019, S. 857-862

BIBA is an engineering research institute located at the University of Bremen. It is committed to basic research as well as to application-oriented development projects and engages itself in practice-oriented implementations, whereby it relies on cross-national, -institutional and interdisciplinary cooperation and transfer. BIBA always considers the entire value-added chain: from the idea, concept and production, through to the use and the end recycling of a product.

Prof. Dr.-Ing. habil. Klaus-Dieter Thoben
Prof. Dr.-Ing. Michael Freitag

WWW.BIBA.UNI-BREMEN.DE

FUNDED BY:

Bundesministerium für Verkehr und digitale Infrastruktur

aufgrund eines Beschlusses des Deutschen Bundestages

PROGRAM:

Projektträgerschaft Innovative Hafentechnologien

PROJECT PARTNERS:

BLG LOGISTICS

28APPS SOFTWARE