CyProS – Cyber-Physical Production Systems

ENHANCEMENT OF PRODUCTIVITY AND FLEXIBILITY BY NETWORKING INTELLIGENT SYSTEMS IN THE FACTORY

The Federal Ministry for Education and Research (BMBF) has launched the fourth industrial revolution with their support program „Research for the production of tomorrow“. Various different research projects integrate modern information and communication technologies in production and logistics. The BIBA - The Bremen Institute of Industrial Technology and Applied Work Science at the University of Bremen is participating with its project “Cyber-Physical Production Systems - Enhancement of Productivity and Flexibility by Networking Intelligent Systems in the Factory” (CyProS).

The growing customer demands like for example individualized products as well as increasingly short delivery times combined with a rapidly rising efficiency and cost pressure lead to a significantly intensified competition. Especially the response towards changing market conditions is important for producing companies. However, the lacking transparency concerning all company levels as well as lacking methods and tools that permit to implement reconfigurations on product resources quickly and efficiently stand in the way of this. Having the aim to continue producing high quality products in a high salary location like Germany means that production and logistical systems are required which can easily adapt to new circumstances. They have to be capable of supporting humans as much as possible to carry out their tasks.

Research project CyProS

The research project CyProS works on the creation of methods and tools for the development and operation of Cyber-Physical Systems (CPS). These lead to a better control of the complexity in production and logistics. To do this, not only basics like for example a uniform reference architecture or security concepts for the data transmission between CPS but also concrete applications are being developed. These are based on the analysis of industrial organizations and the derivation of requirements in regard to the CPS-based production. This includes the development of new types of assistance systems which are for example implemented on a tablet PC and provide humans with context sensitive information about products, processes and systems in real-time. For the low effort converting of production systems industrial Plug & Play applications are being researched like for example the changing of a gripper as a result of the processing of different tasks. Furthermore, planning and controlling systems for production and logistics are continuously being updated so that they can adapt to the current condition of the production level. They for example have a self updating core database which enables them to do this. The results that are drawn from the project CyProS are implemented and validated in three Competence and Transfer Centers as well as in the industrial application.

Project contents of the BIBA

Within the framework of the project the BIBA is developing a Cyber-Physical Logistics System as well as a Competence and Transfer Center for CPS-based logistics. The Competence and Transfer Center will on the one hand be applied for the qualification of components of the Cyber-Physical Logistics System and can on the other hand also be used for training and demonstration purposes. The focus of the BIBA lies on the adaptation of autonomous controlling methods, thus enabling logistical objects to make decentralized decisions as well as on the development of a mechanism to integrate data semantically.

The Bremer Institut für Produktion und Logistik GmbH (BIBA) at the University of Bremen is a scientific research institute for engineering in production and logistics. The Institut is devided into two departments “Intelligent Production and Logistics Systems” (IPS) and „ICT applications for production (IKAP). Based on distinct research the institute focuses on application-oriented research and industrial contract research on a national and international scale. The BIBA operates in the fields of logistics services, automobile, aviation and wind energy amongst others.