MTA SZTAKI

Research Laboratory on Engineering & Management Intelligence

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INTRODUCTION

The main research activities of the Laboratory center around cyber-physical production systems and are aimed at developing such models, methods and techniques that are capable of handling complex production and business systems working in an uncertain, changing environment. Seeking a balance between the aspects of optimization, autonomy and co-operation, this research necessitates an interdisciplinary approach with special emphasis on computer science, operation research, manufacturing science and technology, as well as artificial intelligence.

MAIN R&D TOPICS

- modelling, prediction, control and optimization of technical and business processes
- modelling and robust control of virtual enterprises and production networks
- simulation of large technical and business systems, digital factories
- technological process planning
- production planning and scheduling
- advanced robotics and mechanisms
- sustainable, smart energy systems

International scientific partnerships

EMI develops and deploys systems and turn-key solutions which are based on results of basic research that are acknowledged also by the international scientific communities. The research activities are partly pursued in the framework of EU supported projects, some of them are coordinated by the Laboratory.

Researchers of the Laboratory take part in the management and working groups of the most significant international scientific organizations such as the International Academy for Production Engineering (CIRP), European Academy of Industrial Management (AIM), International Federation of Automatic Control (IFAC). A number of the colleagues are members of Editorial Boards of leading international journals like the CIRP Journal of Manufacturing Science and Technology, Computers in Industry, Advanced Engineering Informatics, International Journal of Computer Integrated Manufacturing, Omega, European Journal of Industrial Engineering, Central European Journal of Operations Research, Asia-Pacific Journal of Operational Research.

In 2010 the Fraunhofer Institute for Manufacturing Engineering and Automation (IPA), Stuttgart, MTA SZTAKI, and Fraunhofer Austria established the Fraunhofer Project Centre for Production Management and Informatics at SZTAKI which is coordinated by our Laboratory. For details, see www.fraunhofer.hu.

EMI develops solution for different industrial partners in the frame of direct or supported R&D projects. Some examples from the near-past are as follows:

- A new solution was developed for the automatic recognition and reuse of real production parameters departing from big industrial data logs. Data was used for mid-term production planning, simulation and the forecasting of key performance indicators.
- Our production scheduling system was deployed which provides optimized short-term production schedules in almost real-time, taking human and machine resources, raw material availability, and status of current orders into consideration.
- On-site deployment of the smart energy-positive street lighting system called E+grid, developed in academy-industry collaboration.

- Comau
- Continental Automotive
- Festo
- Gamesa
- Hitachi
- Jaguar LandRover
- Voestalpine
- Volvo Cars Corporation

Partners
- Fraunhofer Gesellschaft
- Fraunhofer Austria

- Audi Motor Hungaria Kft.
- Aventics Hungary Kft.
- BPW-Hungária Kft.
- Denso Kft.
- GE Hungary Zrt.
- Hoya Zrt.
- Knorr-Bremse Fékrendszerek Kft.
- Opel Szentgotthárd Kft.
- Robert Bosch Kft.

Partner
- Enterprise Group

- Industry 4.0 Research and Innovation Center of Excellence, GINOP-2.3.2-15-2016-00002, 2016-2020
- EPIC – Centre of Excellence in Production Informatics and Control, H2020-WIDESPREAD-2014-2015, https://www.centre-epic.eu
- Symbiotic Human-Robot Collaborative Assembly: Technologies, Innovations and Competitiveness (SYMBIO-TIC), H2020 FoF-06-2014 637107, 2015-2019, www.symbio-tic.eu
- Actions for Excellence in Smart Cyber-Physical Systems Applications Through Exploitation of Big Data in the Context of Production Control and Logistics (EXCELL), H2020-TWINN-2015 691829, 2016-2018, www.excell-project.eu
- Shock-robust Design of Plants and their Supply Chain Networks (RobustPlaNet), FP7-2013-NMP-ICT-FOF 609087, 2013-2016, www.robustplanet.eu
- Remote Laser Welding System Navigator for Eco & Resilient Automotive Factories (RLW-Navigator), FP7-ICT-285051, 2012-2015, www.rlw-navigator.eu
- Embedded Intelligent Information and Communication System for Optimizing Energy-Positive Public Lighting (E+Grid), KMR_12-1-2012-0031, 2012-2014, www.fraunhofer.hu/hu/hirek/e-grid.html
- Advanced Predictive-Analysis-Based Decision-Support Engine for Logistics (ADVANCE), FP7 257398, 2010-2013, www.advance-logistics.eu
- Virtual Factory Framework (VFF), FP7-NMP-2008-3.4-1 228595, 2009-2013, www.vff-project.eu