Development and implementation of digital optimization and control model in the production processes

Summary

The main goal of the research is to study and develop digital optimization and control models using AI functionality in the real production process.

Research field:	Mechanical engineering
Supervisors:	Prof. Dr. Jüri Majak
	Kristo Karjust
Availability:	This position is available.
Offered by:	School of Engineering
	Department of Mechanical and Industrial Engineering
Application deadline:	Applications are accepted between November 16, 2020 00:00 and December 16, 2020 23:59 (Europe/Zurich)

Description

Main objective of the thesis

The main goal of the research is to study and develop digital optimization and control models using AI functionality in the real production process.

The research is focusing on the following general tasks:

- Development of a virtual 3D model of production unit and production processes including mobile robots
- Development of a prototype of a digitized production line. Selection of sensors, actuators and integration of mobile robots
- Development of digital process optimization and management models using AI functionality
- Implementation of the developed digital process optimization model into the production processes

Various production problems which have arisen are closely linked to the need of the digitalization of products parameters and production processes. With the increasing use of innovative software and hardware solutions, it is possible to monitor production processes very accurately in the real time and to operate and implement various management decisions according to these digital models. Such digital models make it possible to react quickly to physical problems in production and to solve them quickly in the short and long distance. The biggest challenges in manufacturing, related to the digitalization, in creating and implementing digital twins are data aggregation and processing, analytical platforms and technologies for preparing data analysis which can be used to prepare interactive models that provide insight, recommendations and guidance for management decisions.

Requirements

- The call is open for candidates with a wide range of backgrounds in engineering.
- Practical and project related (research) competences and knowledge in production digitalization is required.

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