4th Workshop on Service Orientation in Holonic and Multi-Agent Manufacturing

Nancy, France, November 5-6, 2014
http://www.sohoma14.cimr.pub.ro

Session title: **Discrete-event System Modelling for Agent-oriented Manufacturing - DMAM**

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Short presentation: Manufacturing control systems require certain modelling, evaluation and validation steps between design and implementation. The goal of these steps is to ensure that a manufacturing control architecture satisfies the present high level requests on adaptability, flexibility and safe operation. By providing a proper model-prototype, several properties can be highlighted, including important ones as correctness and completeness. Discrete event models are widely used for reducing the initial system to a finite-state abstraction where the targeted problems may become decidable or easier to solve. Petri nets proved to be adequate models that can be used in different phases of system development, analysis or control, including specification of requirements, validation of various manufacturing scenarios, or design of supervisory strategies. For example, an appropriate model can be used for a state space analysis that may reveal omissions and errors of design, thus demonstrating the benefits of formal techniques in protocol design processes. Moreover, specific model properties (as scalability, adaptability) can be even used during system exploitation for checking different operation hypotheses.

A present tendency aims to use distributed intelligent approaches for manufacturing control, as it is the case of holonic and multi-agent based control schemes. For these new methods the problems of modelling and assessment are even more important, because they are often based on ad-hoc constructions. In such cases, a suitable model can prove multiple system functionalities and can increase the beneficiary confidence. Also, the model structure can allow the development of control algorithms for fulfilling certain specifications. In this context, the main topics of this session include:

- Petri net models for holonic and multi-agent manufacturing systems;
- Models of coordination protocols in distributed systems;
- Modelling and validation of concurrent systems;
- Performance analysis methods for intelligent manufacturing systems;
- Coloured Petri net prototyping of control systems;
- Supervisory control strategies for Petri net models;
- Analysis and control algorithms based on structural properties of Petri nets;
- Industrial case studies on Petri net applications.

Keywords: manufacturing systems modelling, Petri nets, coordination protocols, structural properties, supervisory control strategies

Important dates:

- Full Paper Submission: May 22, 2014
- Notification of Acceptance: June 22, 2014
- Final Paper Submission: September 8, 2014