In Process Homogeneous Object-Binding Structure for Preference Zone Based Decision Making

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Abstract. This paper leads on research of decision support methods for software engineering. Regulation of temperature for Ensuring of cooling chain, triggering of grouped maintenance tasks, sensor based filling and sorting out of bottles, cutting, positioning, assembling and sorting in in high rack warehouse are typical examples for control decisions in factories. By the favorable technological innovation rate immense numbers of sensors and actors are available in highly complex machine factories. Modern production and quality optimization incorporates complex cooperative not context-aware control commands. To improve energy-efficiency of existing control and logistics systems and to provide context for new complex software engineering solutions, structure, objects and wide and compressed parameter evaluation is required. To improve robustness and quality of logistics solutions we developed idea of a homogeneous object-binding structure for an object-zone-based preference. Preference integrates real-time decision zones, energy zones and a zone-compressed application gradient for self-organization of sensor-actor-tasks.

Keywords: zone-based preference, object-binding, decision making, key-value, energy-efficient, adaptive learning, quality.

1 Introduction

In order to automatically produce goods of high quality in an energy-efficient way, control tasks have to be transferred to production machines to right point in time by maintenance and logistics solutions using context knowledge of factory structure.

Main idea is to create objects by object-binding to provide object-context bound data for maintenance and logistics entities. Thereby binding is applicable to many machines by a generic homogeneous key-value attribute format.

One main focus of factory planning researchers is energy-efficient load distribution and self-organized carrier distribution to on demand usable specialized machines. Homogeneous format allows for generic controlling of such machines while preference integrates homogeneous structure and other parameter to self-organized routing and control decisions.

A Preference of an object is a weighted sum of quality criteria used as comparison criteria between objects in simple case by greedy monotony criteria. Furthermore target formulation, machine learning optimality by preference exchange mechanism,
weighting and update rules have to be considered. Preference allows self-organisation by an application gradient. Furthermore it allows routing under extreme conditions with fluctuation energy levels, signal disturbances and technology breakdowns by exploitation of factory structures. A gateway level takes the load from autarkic sensor network and on highest hierarchy level a centralized server with database is used Fig. 1 [1].

In order to bind sensor data a probabilistic approach is presented which uses a tolerance value [2].

Content management Systems like Joomla [3], Django [4] or bootstrap [5] allow the higher level creation of web applications using predefined objects and template systems.

Social services like Twitter and Facebook enhance simple unstructured common sense message transfers by user preference relevant parameters like likes, number of followers, favourites, retweets-dependencies, hashtag keys and general data about persons.

Mechanical Engineering tool Labview allows for mapping of extern data from wifi or plc to fixed addresses for fixed evaluation.

Object oriented databases allow storing of objects and access via object oriented programming function calls [6].

In sensor network routing target is to reduce overhead of transferring messages to not requiring nodes to save energy for unneeded transmission. Approaches are e. g. formulation of network as dominating set problem or introduction of reliability parameters to reduce sending to all nodes called broadcasts with the problem of possibly not shortest paths any more [7].

Fig. 1. Hierarchical network (Process node, Technical node, GW Gateway, Server, Vehicle) with carrier belt objects and portal device objects for zone based self-organized preference decisions for data and carrier