Model-Driven Embedded Systems Design Environment for the Industrial Automation Sector

A Conceptual Framework for Industrial Automation Design

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CDL Opening Event, 12. April 2010, Vienna

Project Nr. FP7-ICT-2007-1-211448
Motivation

High investment and engineering costs for automation and control systems in industrial automation

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>3%</td>
</tr>
<tr>
<td>Planning &amp; Engineering, Programming and System Ramp-Up</td>
<td>55%</td>
</tr>
<tr>
<td>Validation and Tests</td>
<td>3%</td>
</tr>
<tr>
<td>Manufacturing &amp; Installation Control Sys.</td>
<td>11%</td>
</tr>
<tr>
<td>Control Hardware and Software</td>
<td>28%</td>
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</tbody>
</table>

*Source: AIDA, Analysis Cost Structure Investment-Costs for Control and Robotics, 2005*
Project Goals and Objectives

Now (↑) and Then (↓) in automation system design!

MEDEIA approach
Project Members

Partners at all levels of the value creation chain

- IMA
- G.D.
- SACMI
- TetraPak
- SELCOM
- CRIT

Standardisation Dissemination

Tool & Service vendor

Industrial Enterprise

System Integrator

Machine vendor

Device vendor

Research Organisations

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Definition: Automation Components (AC)

Automation Component = Embedded HW & SW
Definition: Automation Components (AC)

Automation Component Model = Embedded HW & SW Description
Definition: Automation Components (AC)

Automation Component Model = Embedded HW & SW Description

Automatic (bidirectional) transformation of models!
Engineering Example

Target application: Sorting different parts
Target application: Sorting different parts

High Level Planning – Functional

DSV – Gantt Chart

AC-Model
Target application: Sorting different parts

Detailed Planning – Handling Unit

DSV – Step Sequence

AC-Model

x-Axis

y-Axis

Gripper
Tool Integration

Requirement

- (Seamless) Integration of various DSV and PSI methods and tools

Solution

- MEDEIA Engineering Service Management (MESM)
- Usage of concepts from the Enterprise Service Domain – i.e. Service Oriented Architectures / Enterprise Service Bus
- Adoption for its usage in industrial automation and control
Expected Impact

**Increased productivity of automation & control system development**

- Rapid production process development and time to market (reduction of complexity up to 50%)
- Controlled software development process
- Easy change of production spectrum & creation of product variations
- Simulation of production lines enhances customisation
- Drastic reduction of programming errors in automation systems

**Improved competitiveness of European (EU) companies**

- Reduction of design & systems engineering costs (~ 25% expected)
- Reduction of planned production downtimes
- Reduced outsourcing of jobs
- Enhancing the good position of EU companies in indust. automation
Summary

- MEDEIA aims to optimize the engineering flow for the design of industrial automation and control systems
- A formal framework is proposed on basis of the main element “Automation Component”
- The MEDEIA approach integrates diagnostics, simulation and verification

Outlook

- A basic design framework will become available for the public as open source solution
- First version available since begin of November 2009
- Second improved version will be available in April 2010
Thanks for your attention!

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