340242 - SDIN-K7P07 - Distributed Industrial Systems

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control
Academic year: 2016
Degree: BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: Samà Monsonís, Albert

Prior skills
It is recommended that students took Industrial Informatics lectures

Degree competences to which the subject contributes
Specific:
1. CE28. Applied knowledge of industrial and communication computing.

Teaching methodology
The teaching methodologies include classes, problem solving, lab sessions, autonomous learning and supervised activities

Learning objectives of the subject
Objectives
1. Characteristics of the industrial distributed systems
2. Analysis of the computation and communication systems in industrial distributed systems
3. Design and implement device-level communications under different environments: CAN, ETHERNET and OPC

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>20.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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## Content

<table>
<thead>
<tr>
<th><strong>Introduction to distributed industrial systems</strong></th>
<th><strong>Learning time:</strong> 13h</th>
</tr>
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<tbody>
<tr>
<td>Theory classes: 1h</td>
<td>Guided activities: 3h</td>
</tr>
<tr>
<td>Self study: 9h</td>
<td></td>
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</tbody>
</table>

**Description:**
2. OSI model
3. Point-to-point communications and field bus
4. Buses and industrial networks, middlewares for industrial applications
5. CAN - Controller Area Network
6. Etherent
7. OPC - OLE for Process Control

<table>
<thead>
<tr>
<th><strong>Controller Area Network</strong></th>
<th><strong>Learning time:</strong> 63h</th>
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<tbody>
<tr>
<td>Theory classes: 7h</td>
<td>Laboratory classes: 17h</td>
</tr>
<tr>
<td>Self study: 39h</td>
<td></td>
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</tbody>
</table>

**Description:**
1. CAN characteristics
2. Physical layer
3. Media access
4. Use of CAN in the industry
5. CAN i Arduino UNO

**Related activities:**
Lab: sessions working with an Arduino UNO development board

<table>
<thead>
<tr>
<th><strong>Ethernet and OPC</strong></th>
<th><strong>Learning time:</strong> 74h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 7h</td>
<td>Laboratory classes: 28h</td>
</tr>
<tr>
<td>Self study: 39h</td>
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</tbody>
</table>

**Description:**
1. Ethernet characteristics
2. Physical layer and media acess. Transport layer.
3. OPC protocol characteristics
4. Use of OPC and Ethernet in the industry
5. Ethernet, OPC and Raspberry

**Related activities:**
Lab: sessions with Raspberry and OPC servers
Qualification system

Bibliography

Basic:


