Module 19: Practical SCADA Systems for Industry

Nominal duration: 3 weeks (36 hours total time commitment)
This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), and the time necessary to complete the assignments and further study.

**MODULE PURPOSE**
This module covers the specification, design, installation, commissioning and troubleshooting of Supervisory Control and Data Acquisition (SCADA) systems used in Industrial plants.

**PRE-REQUISITES**
Module 18

**ASSESSMENT STRATEGY**
To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.

**SUMMARY OF LEARNING OUTCOMES**
1. Design a basic SCADA system infrastructure
2. Compare WAN communication technologies for SCADA systems
3. Apply OPC technology to SCADA system operation
4. Examine the security issues related to SCADA systems

**Learning Outcome 1**
Design a basic SCADA system infrastructure

**Assessment Criteria**
1.1 Compare commercially-available SCADA software packages
1.2 Examine the components of SCADA systems as well as their functions, specifically:
(a) Servers
(b) Historians
(c) HMIs
(d) RTUs
(e) Firewalls

1.3 Design an Ethernet-based SCADA system at component level

1.4 Perform basic configuration of SCADA software

1.5 Examine redundancy concepts for SCADA systems

**Learning Outcome 2**

**Compare WAN communication technologies for SCADA systems**

| Assessment Criteria | 2.1 Compare the basic attributes of the WAN technologies used for SCADA, including:
|                     | (a) T1/E1
|                     | (b) Packet Switching (X.25)
|                     | (c) Frame Relay
|                     | (d) ATM
|                     | (e) SDH/SONET
|                     | (f) Leased lines
| 2.2 Compare wireless technologies in SCADA systems, including:
|                     | (a) Point-to-point microwave
|                     | (b) Cellular
| 2.3 Examine the application of the following communication protocols in SCADA systems:
|                     | (a) TCP/IP
|                     | (b) MODBUS
|                     | (c) DNP3 |
## Learning Outcome 3
Apply OPC technology to SCADA system operation

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<thead>
<tr>
<th>Assessment Criteria</th>
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<tbody>
<tr>
<td>3.1</td>
<td>Examine the basic OPC concepts</td>
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<td>3.2</td>
<td>Collect SCADA tag values via OPC</td>
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## Learning Outcome 4
Examine the security issues related to SCADA systems

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<th>Assessment Criteria</th>
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<tr>
<td>4.1</td>
<td>Examine the nature of cyber threats against SCADA installations</td>
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<td>4.2</td>
<td>Examine an overall security philosophy for SCADA systems</td>
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<td>4.3</td>
<td>Outline firewall requirements and placement within SCADA systems</td>
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## Delivery mode
A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, PowerPoint slides, notes, reading and study materials (in PDF, HTML and Word format) accessed through the Moodle Learning Management System (LMS).