

Lesson Plan (for educators)

Industry 4.0



Lesson plan - 90 minutes

AIM:

Developing your ability to visualise data gathered from an industrial PLC used for controlling a certain production process.

ACTIVITY:

Establishing OPC UA server to broadcast data and using Node-RED dashboard to capture and visualise it.

Suitable for

Students undertaking: Mechatronics, Computer Science, Autonomous Robotics, Big Data, Augmented Reality, Cybersecurity, and other engineering related skill areas.

Resources needed

1. Video & SDH access (link)
2. Task brief
3. Marking criteria/scheme
4. Infrastructure list
5. H&S checklist
6. Skill fact sheet (WSUK)
7. End of assessment quiz

Skills

Self-Management, Informed, Reflection, Self-Belief, Drive, Confident, Data analysis, Data capture, cross-platform data collection, modern industrial communication protocols, PLC configuration and programming, basics of data visualisation, visual programming.

Learning outcomes

After completing this activity learners will be able to:

- think about how to embrace industrial applications by helping operators to distinguish crucial data and visualise it
- recognise the importance of data visualisation and SCADA systems in general
- identify important pieces of information that will prove useful to the system's operator
- explore modern types of industrial communication
- learn how to configure Siemens PLCs with OPC UA server, browse it using OPC UA client and visualise it in web browser using Node-RED dashboard.

Delivery modes

1. Students can go through the online materials independently – either at your facilities, if you have access to enough computers, or can go through the materials at home in their own time.
2. You can download and print all relevant resources, access the video demos and deliver the activity in the classroom.

Section	Timings	Key teaching points
Lesson Plan	5 minutes	Introduce the topic and its relevance to skills competitions and how it directly correlates to industry.
Video OR photo demonstration (ensure descriptors are provided for each photo)	10 minutes	Get students thinking about their final goal and what advantages this process will give us. Brief information about required software.
Task Brief (below)	10 minutes	Familiarise students with the key steps to complete the set task. Steps: <ul style="list-style-type: none"> • examine an initial system • plan your sequence of operations for the task • identify important pieces of information given the requirements • modify PLCs hardware configuration to enable OPC UA server and update it • use UA Expert client to find previously identified bits of data • create Node-RED dashboard and populate it with data identified using UA Expert and visualise it according to their type and designation.
Infrastructure and H&S checklist	10 minutes	Prepare for the activity by ensuring all equipment is ready to use and that all H&S checks are in place.
Task Completion	60 minutes	Get students to complete the task by following the instructions on the task brief and videos supplied.
Marking Criteria	2 minutes	Provide markings to the students and encourage learners to record their received marking on LMS. You will find the marking scheme in this module and the resource library. Do not forget to feedback to WorldSkills UK.