Reference:	**QSE-OPCUA**
Topic:	**Automated Tester for OPC-UA-Based Devices in Production Automation**
Lecture-Type:	Practical course, Seminar, Bachelor thesis
Start:	As soon as possible
End:	To be defined
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Background

In automation systems, such as production automation systems or steel mills, the flexible configuration of components and subsystems is of high interest by industry, such as required by Industrie 4.0 initiatives[1]. During system development and maintenance changes, e.g., the exchange of hardware sensors (e.g., a temperature sensor) need to verified and validated prior to system run, i.e., without having the device implemented in the real system.

OPC UA [1][2] is a machine-to-machine (M2M) communication protocol that support data description and propagation of device characteristics based on a semantic technologies, i.e., the meaning of available data is available and can be used in applications. Note that OPC UA is also capable of handling runtime data. Thus, OPC UA can be used for the verification and validation of system behavior during development and during maintenance of automation systems prior to real-world application.

Figure 1 presents a conceptual overview of an automated tester of OPC-UA-based devices in the production automation domain.

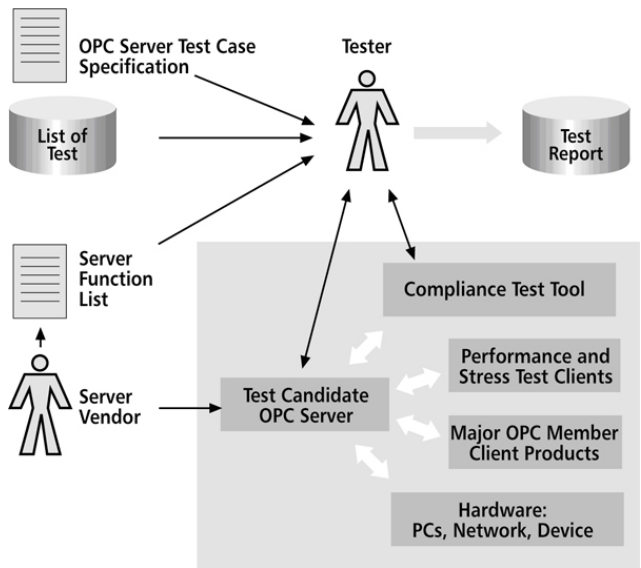

Figure 1: Overview on OPC-UA Protocol Testing[2]

[1] Industrie 4.0: http://www.hightech-strategie.de/de/Industrie-4-0-59.php
[2] OPC UA Protocol Tester: https://www.automation.com/automation-news/article/opc-ua-compliance-test

Tasks

Based on the overall goal, specific tasks include:

- Investigate the state of the art of OPC UA protocol tests
- Definition of a software architecture that is capable of automatically testing the compliance of devices and an existing automation system.
- Definition of compliance rules based on the OPC UA standard
- Prototype implementation of a software tool that can handle automation-supported OPC UA protocol tests.

Expertise and Skills Needed

Based on different tasks, required expertise and skills may vary. For this project, the following skill set is recommended:

- Software Engineering Skills
- Java and the standard technology stack (e.g., Build Tools, Issue tracker, SCM)
- Interest in test automation
- Nice to have: interest in OPC UA and/or AutomationML modeling

You will learn

- Automation systems engineering basics
- AutomationML and OPC UA in practice

References

[1] Mahnke W., Leitner S-H, Damm M.: „OPC Unified Architecture“, Springer, 2009.

[2] Rinaldi J.S.: “OPC UA – Unified Architecture: The Everyman’s Guide to the Most Important Information Technology in Industrial Automation”, CreateSpace Independent Publishing, 2016.