



Type: Project Work -/ Bachelor Thesis

Title: Development of an OPC UA Server/Client for Skill-Based Integration for Logistical Robots

This project aims to develop an OPC UA Server/Client system to facilitate the integration of skill-based engineering concepts into logistical processes. Drawing inspiration from existing research on hardware-agnostic skill models and OPC UA communication, the project seeks to create a standardized interface for seamless communication between diverse devices and robot master control systems. By implementing basic skills within the OPC UA Server/Client, the project aims to enable easy integration and control of industrial robots and tools in flexible production environments.

Project Objectives:

1. **OPC UA Server/Client Development:** Develop a concept of an OPC UA Server/Client system with basic skills. The concept should support data exchange, command execution, and event notification functionalities.
2. **Skill Model Implementation:** Define and implement basic skills within the OPC UA Server/Client system. These skills should include fundamental functionalities such as drive, stop, and pick-place.
3. **Integration with Robot:** Integrate the OPC UA Server/Client system with the robot. Ensure seamless communication and coordination between the OPC UA components and the robot.
4. **Testing and Validation:** Conduct comprehensive testing and validation of the developed OPC UA Server/Client system. Evaluate its functionality, performance, and interoperability in various manufacturing scenarios.

Required Skills:

- Proficiency in OPC UA protocol and communication.
- Experience with software development in languages such as C/C++, Python, or Java.
- Familiarity with skill-based engineering concepts and their application in automation.
- Knowledge of system integration principles and best practices.
- Strong problem-solving skills for troubleshooting and optimization.
- Excellent communication skills for documenting project progress and presenting findings

Deliverables:

- Fully functional OPC UA Server/Client system with basic skills for logistical automation.
- Documentation including system architecture design, implementation details, and user manuals.
- Integration with the backend master control system.
- Test cases and validation results demonstrating system reliability and performance.
- Presentation of project outcomes and demonstrations to project stakeholders.

References

[1] Profanter, S., Breitzkreuz, A., Rickert, M. and Knoll, A., 2019, September. A hardware-agnostic OPC UA skill model for robot manipulators and tools. In *2019 24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)* (pp. 1061-1068). IEEE.

[2] Koch, P., Rawal, P., Töpfer, N., Haß, T., Böhlmann, C. and Hintze, W., 2023. Modular lightweight robot system for aircraft production using a generic OPC UA skill concept. *Production engineering*, 17(2), pp.329-339.