Karlsruhe Institute of Technology

Communications Engineering Lab (CEL)
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Integration of Mesh Technologies into Functionally Safe Automation Solutions

Master's Thesis

Project

Modern factory automation is evolving rapidly with Industry 4.0, where non-cellular wireless technologies like DECT NR+ 2020 are emerging as promising alternatives. Their integration into safety-critical systems remains largely unexplored. A key question is how mesh networks - and wireless communication in general - can be effectively and safely utilized in automation. For example, what adaptations are needed in safety protocols to support mesh topologies, and how can architectures like OPC UA enable such integration?

In this thesis, you will investigate how mesh networks can be integrated into modern factory automation in the context of safety

Tasks

1. Introduction to industrial automation and mesh networks.
2. Mesh communication in safety-critical automation systems.
3. Identification and evaluation of mesh topology requirements.
4. Investigation of OPC UA publish-subscribe model in mesh-based communication.
5. Verification of results where possible.

Requirements

- ✔ Studies in electrical engineering, computer science, or a comparable field.
- ✔ Knowledge in mobile communication technology.
- ✔ Knowledge in automation technology and real-time systems is an advantage.

Institute

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