

Research Project Proposal (Winter Semester 2024/25):

Analysis of Communication Protocols in Smart Grids



Introduction: Smart grids represent the evolution of traditional electrical grids into more intelligent and interactive systems capable of managing power generation and consumption more efficiently. At the heart of this modernization are the communication protocols that enable the integration and coordination of different components within the grid, including power generation sources, distribution systems, and end-user devices.

This research project aims to analyze smart grids' most common communication protocols and highlight their roles in facilitating efficient energy distribution and management.

Research Objectives:

To comprehensively analyze the common communication protocols utilized in smart grids, such as Modbus, DNP3, IEC 61850, and ZigBee. This analysis will explore how these protocols support smart grid functionalities, including real-time data transmission, load balancing, and remote monitoring.

Methodology:

- **Literature Review:** Conduct an extensive review of academic and industry literature on smart grid communication protocols.
- **Protocol Analysis:** Examine the technical specifications and functionalities of each communication protocol.

Future Extensions:

This research project provides a solid foundation for further exploration and can be extended into a bachelor's or master's thesis. Potential extensions could include a deeper dive into the security features of smart grid communication protocols, an exploration of emerging protocols, or the development of new strategies for optimizing protocol performance in smart grids.

The selected student will work closely with a PhD candidate, contributing to cutting-edge research in smart grid cybersecurity. Interested applicants are invited to send their CVs or an email to mamdouh.muhammad@fau.de to arrange a discussion meeting about the project topic.

The deadline for applications is September 30th, 2024.

Good luck to all applicants!

Friedrich-Alexander-University Erlangen-Nuremberg (FAU)

Computer Science 7 (Computer Networks and Communication Systems)

