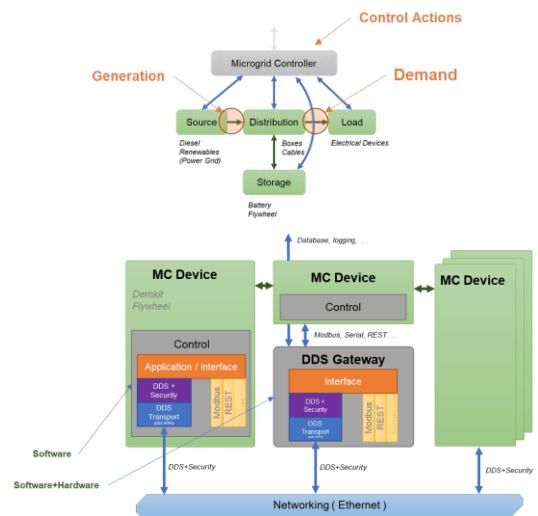


A DDS-BASED CYBERSECURE MICROGRID CONTROL COMMUNICATION MIDDLEWARE

By 2050, the Dutch Government needs to have their CO2 emissions reduced by 80-95%. Energy that is generated from exhaustible sources are going to need to be replaced by sustainable and renewable sources like wind and solar PV. But the use of renewable sources raised a new problem in form of grid stability and power availability, where management and scheduling of energy resources is of a great importance. Microgrids are key to boost the energy transition enabling a localized optimized way to access reliable and resilient energy through a decentralized and interconnected energy systems providing better flexibility, optimizations, stable and reliable energy resource management.



FlyOpen, developed by the Ambient Intelligence research group, is a distributed cybersecure communication middleware framework for networked distributed microgrid elements based on DDS communication middleware standard, and implemented using Cyclone DDS framework to enable secured and decentralized data communications in microgrids.

This assignment is being carried out in the context of the OP Oost EFRO project “*Flywheel technology for energy storage in microgrids*” lead by the commercial partner QuinteQ BV., where the Saxion research groups of Ambient Intelligence and Sustainable Energy Systems participate, as well as the University of Twente and the EEMCS research group. DEMKIT, developed at the UT, is an open-source Decentralized Energy Management Simulation and Demonstration toolkit used to simulate and evaluate different microgrids configurations as well as testing state of the art power steering algorithms.

PROJECT DESCRIPTION

The overarching goal of this assignment is to research and implement the cyber physical communication utilizing DDS microgrid standard, and DEMkit control implementation. The tasks will include but are not limited to:

- Implementation of bidirectional data communication middleware using DDS based FlyOpen framework and DEMkit functionality: i.e. data uplink from the end-devices to DEMkit controller, and control data downlink communication from DEMkit to end-devices.
- Manage DEMKit control signals for device actuation
- Investigate the best quality of service (QoS) for control data communication
- Testing and evaluation of the developed middleware framework on a real device test bed, e.g. a local network of raspberry pis’ and device simulating different microgrid load/supply elements.

PRACTICAL INFORMATION

- **Student profiles:** with passion about cybersecurity, data communications, networking, programming, linux, and Python.
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