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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Student project proposal

Project title   *Development of harmonic analysis for power quality applications*

Project type   ☒ MSc thesis   ☐ BA semester project   ☒ MSc semester project

Project responsible and e-mail
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Project description and objectives
Modern electrical distribution networks increasingly require advanced monitoring to maintain high-quality power delivery. In line with this, Phasor Measurement Units (PMUs) are becoming indispensable tools. However, the current generation of PMUs often focuses predominantly on fundamental frequency analysis. This project aims to extend the capabilities of PMUs by integrating harmonic analysis directly into the units in order to increase the types of electrical events that can be detected and analysed on the PMU itself.

Tasks of the student
- Develop New File Formats for Saving on PMU: Currently, PMUs use specific file formats for data storage. This task involves developing additional file formats like COMTRADE and PQDIFF to enhance the PMU's data compatibility and interchangeability.
- Study Types of Harmonic Analysis: Before diving into implementation, it's important to perform a comprehensive study on what types of harmonic analysis could be valuable.
- Online Integration: Upon determining the types of harmonic analysis to implement, the next step involves incorporating these algorithms for real-time, online monitoring.

Required skills
- Understanding of Signal Processing Concepts: A foundational grasp of signal processing techniques, particularly those relevant to power systems, is important for understanding and developing harmonic analysis algorithms.
- Labview RT: This project will employ Labview Real Time for algorithm implementation and integration into our PMUs. Experience with this platform is important.
- Basic Software Engineering Knowledge: Understanding the principles of modularity in software design, as well as techniques for robust code testing, will be important for creating maintainable and reliable code.
- Use of GitLab: GitLab will serve as the version control system for this project. Familiarity with GitLab's features—such as repositories, branching and merge requests.