

Student project proposal

Project title *Synchrophasor estimation algorithm development and testing*

Project type MSc thesis BA semester project MSc semester project

Project responsible and e-mail

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Project description and objectives

Phasor Measurement Units (PMUs) are critical in modern power distribution networks, providing real-time monitoring and state estimation. With advancements in our PMU architecture, easier integration of the Interpolated Discrete Fourier Transform (IpDFT) component directly into the Real-Time (RT) part of the code is now possible.

In this project you will implement and test advanced signal processing algorithms. Two key algorithms in focus are the enhanced Interpolated Discrete Fourier Transform (e-*IpDFT*) and iterative Interpolated Discrete Fourier Transform (*i-IpDFT*). Alongside these, different windowing techniques will also be explored for their impact on measurement accuracy and computational efficiency.

Tasks of the student

- Implementation of *i-IpDFT* Algorithm: The iterative version of *IpDFT* (*i-IpDFT*) offers more robust performance under varying signal conditions. This task involves understanding the algorithm, implementing it, and carrying out performance assessments.
- Exploration of Different Windowing Techniques: Signal processing often involves the use of different windowing techniques to minimize errors due to non-stationary or time-variant conditions. Investigating how different windowing methods affect the performance of various algorithms in the PMU is needed to accomplish this project.

Required skills

- Understanding of Signal Processing Concepts. This includes familiarity with Fourier Transform techniques, and their real-world applications in power systems.
- Proficiency in LabVIEW RT: The project development environment will utilize LabVIEW Real-Time. Previous experience with LabVIEW RT will be highly advantageous.
- Basic Software Engineering Principles: Understanding how to design modular code, and how to implement rigorous testing protocols.
- Use of GitLab: Proficiency in using GitLab for version control is essential. This includes understanding of repositories, branching and merging.