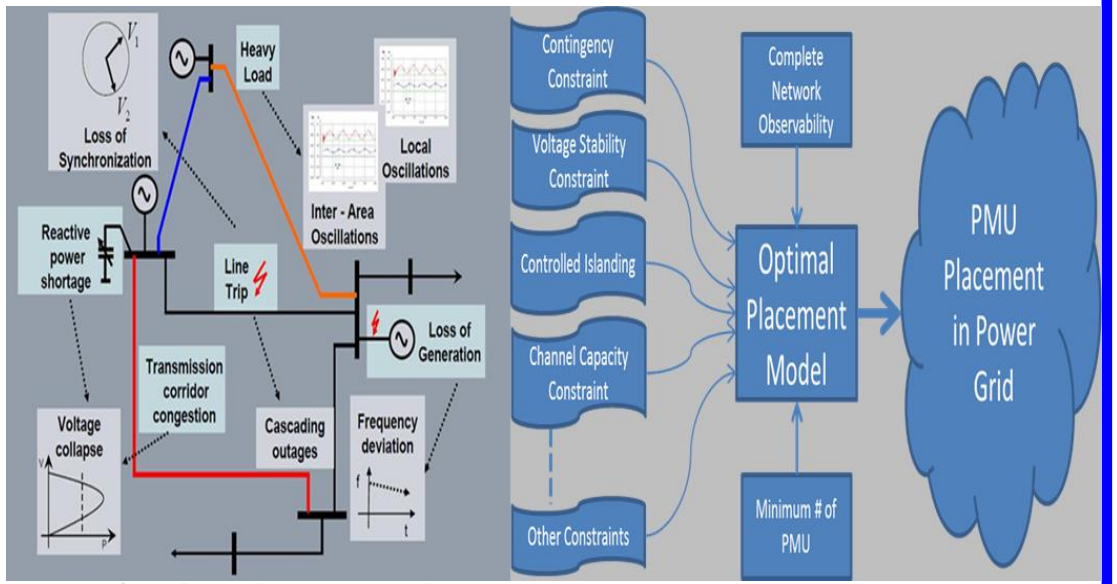
Emmanuel Oleka

Electrical and Computer Engineering

Title: *"An Enhanced Model of Optimal PMU Placement for Synchrophasor Applications in Electric Power Grids"*

Major Professor: *Dr. Gary L. Lebby*



RESEARCH QUESTIONS / PROBLEMS:

- Synchrophasor system, which is vital for a secure and stable operation of the modern electric power grid, is achieved with a network of Phasor Measurement Units (PMUs) that are optimally positioned across the power grid. The effectiveness of the synchrophasor system is dependent on the adequacy of the PMU (sensor) network. A problem arises on how to determine the optimal number and locations of PMUs for complete observability of a power network considering the peculiarities in characteristics of the power grids.

METHODS:

- Identified and modeled the power grid characteristics that affect synchrophasor deployment and their performances. Modeling was done considering the nature and effects of the different characteristics on the various parts of the power grid.

RESULTS / FINDINGS:

- The developed placement model yielded optimal placement solutions, which are robust, portable, scalable and unique to each power grid according to its unique characteristics.

SIGNIFICANCE / IMPLICATIONS:

- Development of this optimal PMU placement model solves the problem of adequate positioning of PMUs on the power grid, which is one of the major challenges in synchrophasor system deployment. The model enables synchrophasor applications developers to develop and deploy applications based on the realistic synchrophasor architectures. This model is a breakthrough in the development of technologies for enhancing reliability in electric power grid operations, and a step forward in the development of smart electric power grid.