

## Master Thesis/Bachelor Thesis

### Frequency estimation for Power system

**Context:**

Power system frequency measurement has been in use since the advent of alternating current generators and systems. The speed of rotation of generator rotors is directly related to the frequency of the voltages they generate. In literature, there are numerous methods for estimation of frequency in Power system, hence a suitable method should be selected for frequency estimation, which can be implemented on microcontroller for PMU application.

A phasor measurement unit (PMU) is a device, which measures the electrical waves on an electricity grid using a common time source for synchronization. Time synchronization allows synchronized real-time measurements of multiple remote measurement points on the grid. The resulting measurement is known as a synchrophasor. PMUs are considered one of the most important measuring devices in the future of power systems.<sup>[1]</sup> A PMU can be a dedicated device, or the PMU function can be incorporated into a protective relay or other device.

We have developed an PMU device on a microcontroller based on TI-F2379D. We are able to generate the frequency, rate of change of frequency and phasor. We would like to characterize the PMU with Real time digital simulator (RTDS) on our lab for the errors and try to optimize the PMU for minimizing the error

**Your tasks:**

The major tasks involved in the thesis are as tabulated below.

- Comparison of frequency calculation methodologies.
- Implement methodology in microcontroller.
- Improve the phasor calculation in the microcontroller.

**What will you learn:**

You would have the following knowledge till the end of the thesis

- A good knowledge of IEEE Std. C37.118 PMU standard
- Type A characterization of instruments
- A good signal processing knowledge
- A better understanding of embedded C programming

**Profile:**

Basic understanding of Embedded C

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