# Abstract

Electrical smart grids are the pivotal component of the present technological infrastructure that has integrated into human lives. The world greatly relies on a safe, robust and unwavering power delivered by a highly congregated group of precisely engineered devices. This work covers one of such module termed as "data acquisition system".

The motivation for this work is to study the existing data acquisition systems like the open source project, OpenPMU and Electrical Data Recorder. Derive advantages from the two to build a new system whilst trying to minimize the disadvantages. The major focus of this work is on the procedure that both the systems exhibit when synchronizing to the 1PPS reference signal from the GPS receivers. The new system is developed on the Zynqberry manufactured by Trenz electronics which has a form factor of Raspberry Pi.

The system developed on Zynqberry is divided into modules like parser unit, DPLL and delay compensation unit where each of the modules are explained further in detail. An approach where post processing of the digital data from ADC is eliminated by directly synchronizing the DPLL with 1PPS signal is implemented. The parser unit helps the ADC in providing time stamp of the arrival of 1PPS.

A delay compensation unit that is capable of inducing a known delay is implemented for compensation of internal delays. The method followed is explained in detail. Finally all the results and the test equipment are also presented.

**Keywords: DPLL, 1PPS, Zynq architecture based data acquisition system, Electrical smart grids**