AUTOMATED MEASUREMENT OF SINGLE PHASE MATRIX CONVERTER TEST-RIG

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Thank you very much and may Allah bless you always.

5. Report

5.1 Proposed Executive Summary

Power electronics is involved with many parameters and all of these parameters use many test points and equipments in the system. Because of this, the system becomes complicated with many connections of cables between various equipments. It takes a large portion of time connecting the standard hardwired instrumentation, which allows to measure voltage, current and real power. Human monitoring each of the parameters are also not possible. Therefore, this work proposes an interfacing system using Laboratory Virtual Instrumentation Workbench (LabVIEW) programming between test rig and laptop computer. LabVIEW is a platform and development environment for a visual programming language from National Instruments (NI).

It is reflected on how to measure variables such as voltage and current by interfacing system through instruments. An installation of NI LabVIEW 8.5 software and Tektronix Mixed Signal Oscilloscope (MSO4054) to the laptop computer is needed as the main procedure. Universal Serial Bus (USB) is used to interface the connection between oscilloscope and laptop computer. Data is measured from Single Phase Matrix Converter (SPMC) circuit and it is generated and displayed by oscilloscope. Through the oscilloscope, measured variables are acquired and were converted into digital formats and transferred it into the laptop computer. Oscilloscope performs the actual measurements.

5.2 Enhanced Executive Summary

This main objective of this project is to design an interfacing system by using LabVIEW programming. Variables that should be measured from Single Phase Matrix Converter (SPMC) circuit are voltage and current. Data of measured variables obtained through oscilloscope are compared to the output data from LabVIEW programming. By comparing it, the results from both analyses must be similar.

5.3 Introduction

Interfacing system is a set of standards for physically connecting and transferring data between computers and peripheral devices [1]. Instrument interfaces play pivot role in all kind of digital equipments. It is the job of these equipments to make a symbiotic liaison between the external environment data and the process data. Some of the main considerations for computer based instrument interfaces depend on the type of connector on the instrument, type of cables needed, electrical properties involved, signal levels, grounding, cable length, communication protocols used, and the software drivers available [2]. A virtual instrumentation (VI) system is software that is used by the user to develop a computerized test and measurement system, for controlling external measurement hardware device from a computer, and for displaying test or measurement data on panels in the computer screen. The test and measurement data are collected by the external device interfaced with the computer. Virtual instrumentation also extends to computerize systems for controlling processes based on the data collected and processed by a computer based instrumentation system′[3]. A virtual instrument is usually composed of the following blocks:

- Sensor module
- Sensor interface
- Information systems interface
- Processing module
- Database interface
- User interface

Figure 1.1 shows a general architecture of a virtual instrument. The sensor module detects physical signal and transforms it into electrical form, conditions the signal, and transforms it into a digital form for further manipulation. Through a sensor interface, the sensor module communicates with a computer. Once the data are in a digital form on a computer, they can be processed, mixed, compared, and otherwise manipulated, or stored in a database. Then, the data may be displayed, or converted back to analog form for further process control. Virtual instruments are often integrated with some other information systems. In this way, the configuration settings and the data measured may be stored and associated withthe available records [3].

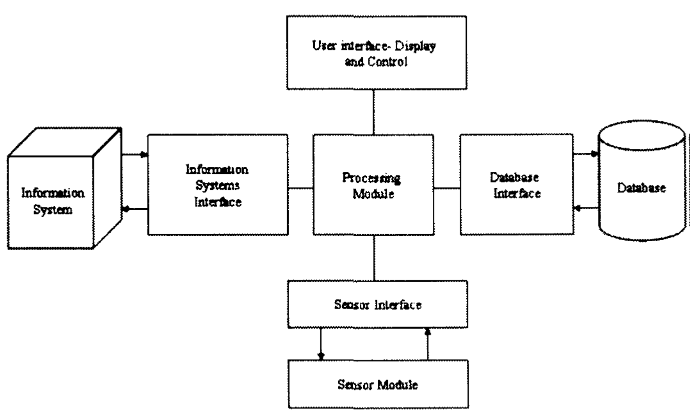

Figure 1.1: Architecture of a virtual instrument