

PC BASED FOR POWER FAILURE MONITORING

CHAN KOK THAI

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Alamat Tetap: 1523 Tmn Bersatu,
Jln Telok Kechai,
06600 Kuala Kedah,
Kedah Darulaman

YUSMARNITA BT YUSOP
Pensyarah
Fakulti Kej Elektronik dan Kej Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 7 May 2008

Tarikh: 7 May 2008

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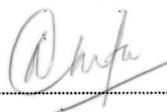
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:



Supervisor's Name

:

MDM. YUSMARNITA BINTI YUSOP

Date

:

7/5/08

Dedicated to my beloved family especially my father and mother, lecturer, and also
to all my friends

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ABSTRACT

PC-based for power failure monitoring is a system created to monitor the parameters of voltage, current, and wattage on the screen of PC. The measured data can be stored in the memory of the PC to allow subsequent downloading and analysis. Hence, the data can be analyzed by other software to detect and predict fault conditions. Besides, the system also can detect the faulty power point during the power trip occurred. The unstable voltage of main power supply and power trip are the phenomenon which mostly happen in the laboratory, and it not only subsequently causing the damage to sensitive equipments, but also affect learning process of students during carry out the experiment. The objectives of this system are to record the measured voltage level for analysis and provides auto detection for the faulty power point during power trip. In order to achieve the project objectives, LabVIEW have been used to create a front panel of virtual instrument. Therefore, the parameters of voltage, current, power, and indicator for faulty power point can be display on the screen of PC for monitoring purpose, and all power points also can be controlled through the front panel. Apart from that, data acquisition module is used for real time monitoring and it provides the interfacing between hardware and software, and then converts the physical value to the readable data by front panel. For future application, this system would be applied to laboratory and it will benefit to students as well as upgrade the learning quality of university.

ABSTRAK

PC-based for power failure monitoring merupakan satu sistem yang dicipta untuk mengawas parameter seperti: voltan, arus, dan kuasa pada paparan komputer. Data yang diukur akan disimpan dalam memori komputer untuk tujuan muat turun dan analisis. Maka, data tersebut boleh dianalisis dengan menggunakan perisian tertentu untuk tujuan mngesan dan meramal keadaan kerosakan. Selain daripada itu, sistem ini juga akan mengesan punca kuasa yang bermasalah ketika bekalan terputus. Ketidakstabilan paras voltan dan bekalan terputus merupakan fenomena yang sering berlaku di makmal, dan ia bukan sahaja menyebabkan kerosakan kepada peralatan makmal yang sensitif, tetapi juga menyebabkan pembelajaran pelajar terjejas semasa menjalankan ujikaji. Objektif utama sistem ini adalah untuk merekod paras voltan yang telah diukur untuk dianalisis, dan juga untuk mengesan punca kuasa yang bermasalah ketika bekalan terputus. Sebagai langkah untuk mencapai objektif projek, *LabVIEW* digunakan sebagai aturcara bergrafik untuk mencipta panel depan alatan maya. Oleh itu, parameter-parameter untuk voltan, arus, kuasa, dan penunjuk untuk bekalan kuasa yang rosak dapat dipaparkan pada komputer untuk tujuan pengawasan, dan semua punca kuasa dapat dikawal melalui komputer. Di samping itu, *Data Acquisition Module* digunakan untuk pengawasan masa nyata dan ia membolehkan pengantaramuka di antara perisian dan perkakasan supaya nilai-nilai fizikal yang diukur dapat ditukarkan ke bentuk data yang dapat dibaca melalui panel depan. Sebagai aplikasi masa depan, sistem ini akan diaplikasikan di makmal dan ia akan memanfaatkan pelajar dan juga meningkatkan kualiti pembelajaran universiti.

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LIST OF ABBREVIATION

PC	-	Personal Computer
VI	-	Virtual Instrument
LabVIEW	-	Laboratory Virtual Instrumentation Engineering Workbench
DAQ	-	Data Acquisition
NI	-	National Instrument
AC	-	Alternating Current
EMI	-	Electro-Magnetic Interference
RFI	-	Radio Frequency Interference
ADC	-	Analog-To-Digital Converter
MUX	-	Multiplexer
PGA	-	Programmable Gain Amplifier
NO	-	Normally Open
NC	-	Normally Closed
SMS	-	Short Message Service

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent years, with the extensive uses of the personal computer (PC), the interest with the heuristic applications both on the software tools for the development of virtual instruments and the tools for the computer interconnection at great distance had increased steadily. This interest is mainly due to the cost of the experimental laboratories can be reduced and the speed of development can be accelerated. A virtual measurement system which is the most widely used for power systems have been introduced to simplify the design, implementation, and use of programmable measurement system by adopting a visual interface.

This system titled “PC-based for power failure monitoring” is using the LabVIEW package has appeared on the market to enables the creation of “Virtual Instruments” which can display on the screen of a PC to measured quantities of voltage, current, and power. The use of a PC-based metering scheme gives rise to numerous added benefits; the measured data can be stored in the memory of the PC to allow subsequent downloading and analysis; the data can be analyzed by other software to detect and predict fault conditions. This system also performs an addition condition monitoring function for each power point in the laboratory which it can monitor the operating power point, and also detect the faulty Power Point when power trip occurred. In normal operating condition, this system can give the warning

to the user by turn on the buzzer and light up the abnormal voltage indicator in the virtual instrument when the voltage level exceed the set limit of normal voltage. The person in-charge also can turn OFF all the power point in the laboratory in one time through the front Panel of Virtual Instrument on the screen of PC if he or she needs to leave the laboratory in emergency case. For further development, this system also cans SMS to the person in-charge when abnormal of voltage condition occurred.

1.2 Objectives

The main purposed of this project are to design and implement a PC-based for power failure monitoring system. Therefore, the objectives as below should be achieved.

1. To design and develop the PC-based for power failure monitoring system by using LabVIEW.
2. To study and understand the basic concept of voltage and current measurement.
3. To identify the suitable type of DAQ and transducers in the project, and also study the interfacing technique between software and control circuit.
4. To store the measured voltage record for analysis, detect faulty power point when power trip occurred, monitor the operated power point, and to close all the power point in one time through the front panel.

1.3 Problem Statement

Power quality, in recent years, has become an important issue and is receiving increasing attention by utility, facility, and consulting engineers. Present equipment setups and devices used in commercial and industrial facilities, such as digital computers, power electronic devices, and automated equipment, are sensitive to many types of power disturbances. Power disturbances arising within facilities have increased significantly due to the increasing use of energy efficient equipment such as switch-mode power supplies, inverters for variable speed drives, and more.

The monitoring and data collection of power disturbances for power quality study therefore has to be conducted. In the other side, the situation of power trip is one of the phenomenons that always happen in the laboratory. This because of the short circuit occurred during students carry out the experiment because of wrong circuit construction. This would cause the time wasting for find the faulty power point and student are unable to complete their task within time given. This will caused the bad learning effect to the students. Besides that, the careless of students have been an issue related to safety aspect of laboratory. Some of the students are not turn OFF the equipments after used for lab session. These not only waste the electricity and shorten the life of equipments, but also expose to risk of fire due to equipment over heat. This project is designed and developed to overcome these problems.

1.4 Scope of Work

The scopes of works in this project are:

1. LabVIEW is used to create the front panel of virtual instrument.
2. NI DAQ 6009 is a data acquisition unit that used to interfacing between hardware and software.
3. Step-down transformer is used to step down the AC voltage from power terminal to the voltage level that can read by data acquisition unit.
4. Current Transducer is used to converts the measured load current to the voltage level that can be use by data acquisition unit.
5. Relay and control circuit are used to control and detect the condition of power point.

1.5 Brief Explanation of Methodology

First of all, this project is beginning by having a discussion with supervisor about the general ideas and concepts that would be used in this project. Next, for literature review stage, the background of this project is studied and research is done by referring various sources like: reference book, I.E.E.E journals, website of National Instrument, and data sheet. For the following stage, all the information

related to components, DAQ, transducer is seeking, and the most suitable would be selected for used in this project. On next stage, the LabVIEW programming is studied, and the front panel of virtual instrument is created and simulated. Hardware interfacing would be studied on the following stage. After that, the hardware for this project is built and assembled; and the system is ready for overall system testing. If the outputs of this system fulfill the project requirements and specification, so this project is considered success. If the output of this system did not fulfill the desired output, so the troubleshooting would be carry out until it reaches the project requirements.

1.6 Report Structure

This report is documentary delivering the ideas generated, concepts applied, activities done, and finally the product of project itself. It consists of five chapters. Following is a chapter-by-chapter description of information in this report.

Chapter 1 gives reader a basic introduction to how the idea of this project generated. The chapter contains introduction, objective of the project, problem statement, scopes of work, brief methodology, and report structure.

Chapter 2 is a literature review on theoretical concepts applied in this project. The chapter concludes the background study of power system, PC-based monitoring system. Besides that, this chapter also explains how the PC-based for power failure monitoring work, what is LabVIEW, what is DAQ, and application of others component. Then, why choose the specific DAQ, transducer, and related components.

Chapter 3 introduces the methodology of the project. The chapter contains the flow chart which explains the overall method taken along the project carry out. Besides that, this chapter also introduces the construction of the project, which involves hardware development and software development. Basically, the hardware development for the project concludes with circuit design, prototype or body design, and PCB fabrication. Besides, the software development of project will discuss what

graphical programming is, how to use the LabVIEW, and how to implement it on this project.

Chapter 4 will be covered all the result from designing process. It will also include a discussion about the project. The chapter concludes with discussion on front panel of virtual instrument and control circuit for the system.

Chapter 5 will be conclusion of the PSM project. The chapter concludes with some recommendation that can be implemented in the future.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter discusses about literature discourse and review of PC-Based for Power Failure monitoring system. Throughout the world, there have been many researches about the concept and implementation of this PC-based for power monitoring system. This project is implemented to enhance the available similar system with additional functions and applied it on the Laboratory of Electronic Industrial at UTeM.

Literature reviews are based in information obtained from valid sources such as books, articles of relevance, published paper or any other source deemed appropriate. One of the more famous sources for literature reviews from IEEE, denoting the Institute of Electrical and Electronics Engineers which is based in New York, USA. The forms of literature include standards of practice, proceeding paper or conference papers such as those from the Power Engineering Conference.

2.2 Background Study

Power Quality is a technical term that has practical implications for equipment. When power is generated, it has very predictable characteristics. It