A DESIGN OF IN-LAB VOLTAGE MEASURING KIT BASED ON LABVIEW AND ARDUINO APPLICATION

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A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Engineering (Electrical Power)

School of Electrical Engineering
Faculty of Engineering
Universiti Teknologi Malaysia

FEBRUARY 2022

DEDICATION

In the name of Allah, Most Gracious, Most Merciful. I praise and thank Allah.

This thesis is dedicated to my beloved father and mother, Nazeer bin Julkarnain and Kamariah Abu Bakar, who have paid all my study fees all these years. Special thanks to their love, support, enthusiasm, encouragement, and motivation.

Also, my late grandfather, Zulkifli Zulkarnain once said, what makes you wealthy is not money and status, but the knowledge you have, and you earned more in this world and hereafter when you use your knowledge and give it back to societies.

To my supervisor,
Dr. Noor Azlinda binti Ahmad,
For such incredible help, patience, understanding and support.

ACKNOWLEDGEMENT

First and foremost, I thank Allah for the strength, courage, and perseverance that made this humble effort a reality.

I would like to express my utmost gratitude to my supervisor, Dr. Noor Azlinda binti Ahmad for her invaluable guidance and assistance throughout this research project. Her profound knowledge, ideas, and support continuously motivate me to give my all for this project. I appreciate her leadership from the start until final level, which enable me to develop an understanding of this research thoroughly. It would be a lot tougher to complete without her advice and assistance. I also sincerely thank you for the time spent proofreading and correcting my mistakes.

I would like to express my thanks to my siblings, Nurfateen Helmy Abdellah, Nurfahmee Aiman Hakeem, Nurfaez Hafeezah Hadee, Muhammad Ameer Hamdee and Muhammad Adam Mukhreez for their support and motivation.

Finally, I wish to thank all my friends and those who were directly or indirectly supporting me and helping me along the way. The knowledge and support that they shared with me will always be remembered.

ABSTRACT

This project is about designing an in-lab voltage measuring kit based on LabVIEW and Arduino Uno. This thesis involves designing an online monitoring system for a voltage of 1 kV or less for testing purposes and by using LabView software. The voltage circuit was developed for an Arduino board. The Arduino device used is Arduino Uno Board, which acts as a converter from analog to digital. The simulation software used is Proteus 8 Professional. In this project, there is no hardware developed. The Proteus 8 Professional software is the platform to design a circuit and connect to the Arduino Uno device. LabVIEW software can create a system that can measure and save a stream of data every second when inputting data from an Arduino device. Data will be kept automatically to be analysed by the user to convert raw data to graph representative. The main intention of this project is to build a system for measuring purposes that is user-friendly and easy to use that is suitable for the learning and teaching process in Low Voltage Laboratory.

ABSTRAK

Projek ini adalah mengenai mereka bentuk kit pengukur voltan dalam makmal berdasarkan LabVIEW dan Arduino Uno. Tesis ini melibatkan mereka bentuk sistem pemantauan dalam talian untuk voltan 1 kV atau kurang untuk tujuan ujian dan dengan menggunakan perisian LabView. Litar voltan telah dibangunkan untuk papan Arduino. Peranti Arduino yang digunakan ialah Arduino Uno Board, yang bertindak sebagai penukar daripada analog kepada digital. Perisian simulasi yang digunakan ialah Proteus 8 Professional. Dalam projek ini, tiada perkakasan dibangunkan. Perisian Proteus 8 Professional ialah platform untuk mereka bentuk litar dan menyambung ke peranti Arduino Uno. Perisian LabVIEW boleh mencipta sistem yang boleh mengukur dan menyimpan aliran data setiap saat apabila memasukkan data daripada peranti Arduino. Data akan disimpan secara automatik untuk dianalisis oleh pengguna untuk menukar data mentah kepada wakil graf. Matlamat utama projek ini adalah untuk membina satu sistem bagi tujuan pengukuran yang mesra pengguna dan mudah digunakan yang sesuai untuk proses pembelajaran dan pengajaran di Makmal Voltan Rendah.

TABLE OF CONTENTS

	TITLE	PAGE
	DECLARATION	**iii**
	DEDICATION	**iv**
	ACKNOWLEDGEMENT	**v**
	ABSTRACT	**vi**
	ABSTRAK	**vii**
	TABLE OF CONTENTS	**viii**
	LIST OF TABLES	**x**
	LIST OF FIGURES	**xi**
	LIST OF APPENDICES	**xii**
CHAPTER 1	**INTRODUCTION**	**1**
1.1	Problem Background	1
1.2	Problem Statement	2
1.3	Research Objectives	2
1.4	Research Goal and Scope	3
1.5	Research Outlines	3
CHAPTER 2	**LITERATURE REVIEW**	**5**
2.1	Introduction	5
2.2	State-of-the-Arts	5
2.3	Summary of the Research Paper	13
CHAPTER 3	**RESEARCH METHODOLOGY**	**15**
3.1	Introduction	15
	3.1.1 Proposed Method	15
3.2	Flow Chart	17
3.3	Voltage Circuit	22
3.4	Arduino Uno device connection	23

3.5	Designing the Monitoring System	24
CHAPTER 4	**RESULT AND DISCUSSION**	**26**
4.1	Introduction	26
4.2	Voltage Circuits	26
4.3	Finalize of the block diagram in LabVIEW software	30
4.4	LabVIEW monitoring simulation result	31
CHAPTER 5	**CONCLUSION AND RECOMMENDATIONS**	**33**
5.1	Conclusion	33
5.2	Future Works	34
REFERENCES		**35**
APPENDIX		**37**

LIST OF TABLES

TABLE NO.	TITLE	PAGE
Table 1	Summary of the Research Paper	13
Table 2	Voltage Output	28

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
Figure 2.1	Oscilloscope data capture front panel	7
Figure 2.2	Oscilloscope view and linear gate selection front panel	8
Figure 2.3	Signal averaging front panel	9
Figure 2.4	Voltage measuring circuit	10
Figure 2.5	Wiring schematic for LCD-Arduino interfacing	11
Figure 2.6	Proteus Arduino LCD Shields	12
Figure 3.1	Block Diagram	16
Figure 3.2	Overall view of project development	17
Figure 3.3	Proteus 8 Professional Development	19
Figure 3.4	LabVIEW National Instruments software development	20
Figure 3.5	Simulation of Voltage Circuit	22
Figure 3.6	Low Voltage connection to the circuit, Arduino Uno and LCD	23
Figure 3.7	Front panel function	24
Figure 3.8	Block Diagram View	25
Figure 4.1	Voltage Circuit	27
Figure 4.2	Block Diagram of LabVIEW software	30
Figure 4.3	Front panel	31
Figure 4.4	Voltage graph	32

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix A	Coding Arduino Uno	37

CHAPTER 1

INTRODUCTION

1.1 Problem Background

Building a safe condition system for the consumer is always the most crucial part for an engineer in the vast realm of engineering. Every analytic result is critical to achieving a superior outcome. Any electrical shock can cause nerve damage. Even the electric igniter on lighters can be dangerous. For this reason, it is important that all the equipment of the network meets the requirements of the relevant standard as in (1).

This project relates generally to circuits and methods for measuring a voltage. Most known circuits and methods for measuring a voltage that exists within circuit either directly measure the voltage being measured or measure another voltage that is related in some way to the voltage being measured (2). Known circuits and methods for testing a voltage that normally exists solely within a circuit, such as an output voltage of a charge pump.

This study is being carried out to examine a measurement using an Arduino device and interface it with LabVIEW software. When utilizing the Arduino device and LabVIEW software, a stream of data is saved, which helps measure a voltage. As a result, the examination of voltage may be monitored by a computer and is more accurate. In addition, the data may be recorded for future use with data acquisition. The outcome of this study is also crucial in various applications, including power transformers, switchgear, overvoltage arresters, insulators, power cables and transformers.

1.2 Problem Statement

Electrical appliances need to be designed in such a way that they operate properly within the limits. In most cases, electrical equipment cannot handle big voltage fluctuations (3). In case of a power failure or a mains power outage, some devices and appliances will malfunction.

To avoid these issues, researchers are looking into how air breakdown voltage might be used to solve the problem in voltage power equipment (4). Furthermore, manually gathering data will result in more errors; however, this problem can be avoided by using Arduino devices that can be connected to a computer and then display input saved to an excel file.

The Arduino device can convert analog to digital data, which can then be saved in real time. This will display the voltage's characteristics when a breakdown occurs when the voltage is increased. The breakdown voltage characteristics produced from the study utilized to improve the design of any electrical equipment.

1.3 Research Objectives

The research objectives are to design of in-lab voltage measuring kit based on LabVIEW and Arduino applications. The measurable objectives are as follows:

a. To design a measuring kit that is suitable for in-lab measurement.
b. To investigate the minimum and optimum voltage applicable for the measuring kit.

1.4 Research Goal and Scope

The research goal is to provide output data that is suitable for different types of low voltages measurement application based on simulation result. This project is limited to low voltage application which is voltage less than 1 kV only. The designed is based on simulation work and no hardware involved due to limitation to the lab access. The analysis focus on the implementation of this project is illustrated in Chapter 3.

1.5 Research Outlines

This report consists of 5 chapters describing the methods and details of the study. Chapter 1 is about the introduction to this report. To understand this project, an introduction is one of the sections that can understand the readers about the whole process of study. Therefore, in this chapter, the background and objective of the study are reported. Besides that, the problem statement and limitation study have been discussed in this chapter to clarify the basic concept of this study.

Chapter 2 is about the study on the previous research related to this project. The finding was focused on low voltage system, their connection and the graphical user interface.

Meanwhile chapter 3 discussed the methodology used to solve the problem. The conception about the connection and the component used will be explained in chapter 3. Besides, the operation of the project and the flow of study will be discussed in this chapter 3 to understand the concept of circuit operation.

Chapter 4 discusses the results and conclusions. It contains information about the project's procedure and simulation flow. This chapter will detail the component's final development. This chapter describes concern about the strategy used to accomplish the project’s objectives. Besides that, the coding that used in this project will be shown. The procedures used toward the project implementation will be explained in more detail until the project is successfully done.

Finally, chapter 5 is about the conclusion and recommendation for this project. This chapter will describe the final result obtained from this project. The decision will relate to the main objective, whether it can be achieved or not. After that, the recommendation is to suggest the subsequent study that wants to improve this project to get more accurate result.

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