Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF DIGITAL AC VOLTAGE DETECTOR USING MOBILE APPLICATION WITH NOTIFICATIONS AND LOGGING CAPABILITIES

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Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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DEVELOPMENT OF DIGITAL AC VOLTAGE DETECTOR USING MOBILE APPLICATION WITH NOTIFICATIONS AND LOGGING CAPABILITIES

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I declare that this project report entitled “Development Of Digital AC Voltage Detector Using Mobile Application With Notifications And Logging Capabilities” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Engineering Technology (Computer Systems) with Honours.

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Supervisor Name : RADI HUSIN BIN RAMLEE

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DEDICATION

To my beloved mother, Zabedah Binti Abdul Hamid, and father and my Aminuddin Bin Yaakub, Huge thanks and admiration to Radi Husin Bin Ramlee, my Final Year Project Supervisor, who has been giving us with direction and assistance in order for me to complete this project with patience.

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May Allah swt bless this study that I've been working on.

Thank you very much

ABSTRACT

Technology is one of the strongest efforts to increase the efficiency of modern manufacturing products in this age of globalization. Technology has provided us with incredible tools and services, allowing us to access valuable knowledge at any time. The conventional voltage detector used in testing has no logging capabilities and is hard to monitor. The objective of this project is to build mobile applications that can connect to a digitized voltage meter for monitoring and trobleshoting for care of electrical appliances. This project will utilize some wireless connectivity to connect the voltage meter to the mobile application. A voltage meter with the capability of monitoring and logging reading data from a mobile application. This project will use wireless communication boards, Internet of Things (IoT) platforms and mobile applications. This project is simple to access and user-friendly since it combines a superior upgrade in the learning module of electricity. This study demonstrates the use of wireless monitoring in problem-solving dissemination, particularly for the purposes of enhancing maintenance dependability and increasing the productivity of electrical appliance repair. This mobile application includes five features: real-time measurement with notification, a notepad that uses a database for logging capabilities, website notes, a calculator that acts as an external web browser, and users can provide feedback via a Google form for any suggestions or improvements to this mobile application. Various system modifications may be done in the near future, such as boosting signal reliability by adding some elements to the system, which can make the system more stable, and utilizing a more precise voltage.

ABSTRAK

Teknologi adalah salah satu usaha kuat untuk meningkatkan kecekapan produk pembuatan moden di era globalisasi ini. Teknologi telah memberikan kami alat dan perkhidmatan yang luar biasa, yang membolehkan kami mengakses pengetahuan berharga pada bila-bila masa. Pengesan voltan konvensional yang digunakan dalam pengujian tidak mempunyai keupayaan log dan sukar dipantau. Objektif projek ini adalah untuk membina aplikasi mudah alih yang dapat menyambung ke meter voltan digital untuk pemantauan dan pemecahan masalah untuk penjagaan peralatan elektrik. Projek ini akan menggunakan sambungan tanpa wayar untuk menyambungkan meter voltan ke aplikasi mudah alih. Meter voltan dengan keupayaan memantau dan mencatat data bacaan dari aplikasi mudah alih. Projek ini akan menggunakan saluran komunikasi tanpa wayar, platform Internet of Things (IoT) dan aplikasi mudah alih. Projek ini mudah diakses dan mesra pengguna kerana menggabungkan peningkatan yang unggul dalam modul pembelajaran elektrik. Kajian ini menunjukkan penggunaan pemantauan tanpa wayar dalam penyebaran penyelesaian masalah, terutama untuk tujuan meningkatkan kebolehpercayaan penyelenggaraan dan meningkatkan produktiviti pembaikan perkakas elektrik. Aplikasi mudah alih ini merangkumi lima ciri: pengukuran masa nyata dengan pemberitahuan, pad nota yang menggunakan pangkalan data untuk keupayaan pengelogan, nota tapak web, kalkulator yang bertindak sebagai pelayar web luaran dan pengguna boleh memberikan maklum balas melalui borang Google untuk sebarang cadangan atau penambahbaikan pada aplikasi mudah alih ini. Pelbagai pengubahsuaian sistem boleh dilakukan dalam masa terdekat, seperti meningkatkan kebolehpercayaan isyarat dengan menambahkan beberapa elemen pada sistem yang boleh menjadikan sistem lebih stabil dan menggunakan voltan yang lebih tepat.

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δ	-	Voltage angle
%	-	Percent

LIST OF ABBREVIATIONS

V	-	Voltage
V_{rms}	-	Root-mean-square
V_{peak}	-	Total height of the wave

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CHAPTER 1

INTRODUCTION

1.1 Background

Galvanometers were inspired by Hans Christian Ørsted's discovery in 1820 that a magnetic compass needle deflects when it is near an electric current wire. They were the first devices for detecting and measuring tiny quantities of current. The advancement of technology has a positive impact on our daily lives, besides improving our awareness towards safety in electricity. Technology is one of the strongest efforts to increase the efficiency of modern manufacturing products in this age of globalization. Technology has provided us with incredible tools and services, allowing us to access valuable knowledge at any time. The conventional voltage detector used in testing has no logging capabilities is hard to be monitored. This project is a system which is developed of AC detector using wireless connection. This system allows real-time input signal measurement from electrical equipment or devices with a power source. However, with the increasing proliferation of technologies such as the IoT (Internet of Things), there is always a need to find an alternate solution. A wireless link can be used to increase the effectiveness of monitoring. Furthermore, adopting wireless voltage monitoring might save time when it comes to data recording.

1.2 Problem Statement

Many voltage detectors on the market lack an appropriate safety routine, may harm users, and need expert advice to monitor when measuring electrical equipment.This device may also lack a safety guidance, power supply from inputs supply measures may cause danger to people, especially during measuring electrical equipment. There are some precautions that may reduce the number of unexpected incidents during usage of this device. It's important for users to understand that they're working with a high-voltage source. This is critical because they may injure themselves if they lack attention or misinterpret the measurement procedure. Avoid measuring in unsuitable conditions, such as crowded areas or on rainy days, because there is a high risk of receiving an electrical shock or causing damage to this product. When working with electrical equipment, the most important thing to remember is to always put safety first.

1.3 Project Objective

The main aim of this project is to propose a systematic and effective methodology to estimate system monitoring AC voltage with reasonable accuracy. Specifically, the objectives are as follows:

a) To develop a digitized voltage meter with wireless connection using smartphone for effective system monitoring and analysis.

b) To monitor the presence of voltage in electrical equipment using ZMPT101B sensor module based on the actual recorded energy at TRIAC signals, RMS values, and TrueRMS values.

c) To utilize the measuring method's performance using the Internet of Things (Iot) methodology.

1.4 Scope of Project

The scope of this project are as follows:

a) Radial distribution network with balanced load condition.

b) The voltage sensor collects the values of the voltage reading in analogue signal that were converted into digital signal by microcontroller.

c) A microcontroller is able to store and transfer data in real-time through a wireless connection.

d) The voltage detector is an excellent tool for eletrical troubleshooting and circuit inspections in the workspace were considered in the analysical models.

e) The voltage sensor for the measuring device has a maximum limit of 250 V and a minimum limit of 0 V.

f) To reduce the inconsistent reading to less than 10% using a specific method of analysis and calculation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this literature review in this module is to undertake research on previously completed Digital AC Voltage Detector Using Mobile Application projects. The entire study is based on relevant finding material that was finished within five years of the project's start date and may be used as a reference. The suitability of the search strategy for the executed project will also be studied, appraised, and evaluated. The benefits and drawbacks of hardware and systems will be weighed in order to improve the accuracy of the hardware selection used in this project's assembly. Previous research findings and procedures will be examined and analyzed to ensure that they are the most relevant and reliable sources of data for this project.

2.2 Review on Development of AC voltage detector using microcontroller and wireless connection

The purpose of distribution feeder (cable or line) is to provide path for energy flow from GSS all the way to the distribution customer. Traditional distribution feeders (without DER) are usually operated in radial configurations - the energy flows uni-directionally from the GSS to the load. The feeders are typically categorized by its: (i) voltage level, (ii) conductor material, (iii) conductor size (cross sectional area), (iv) insulation type and (v) no of phases. These feeders scattered all over different supply zones. Hence, they are extensive and large in numbers[1].

2.2.1 Development Iot Curret and Voltage Sesor with Wi-Fi Interface and Cloud Connection

The purpose of distribution current and voltage sensor is to provide guide of monitoring and handling the power source. Traditional distribution current and voltage (without wireless connection) are usually operated in radial configurations. MagLab production and Permanent Magnets LTD designs for industrial technology employing IoT Current and Voltage Sensor with Wi-Fi Interface and Cloud Connection for daily voltage maintenance monitoring[2]. The method assists plant owners who manage to cut daily energy use and regulate excessive energy output.

The contactless Hall or CT current sensor, shunt resistor based current sensor, battery voltage sensor, and temperature sensor make up the IoT Current and Voltage Sensor. Analog-to-digital converters which is ADC's read the four sensor signals, which are then processed by a programmable state-of-the-art microprocessor and sent to the cloud through WiFi interface. The module's connectivity may be expanded to include CAN, LoRa, GSM, Zigbee, Bluetooth, and Ethernet interfaces. The product's contactless galvanically isolated Hall sensor technology allows for simple and safe installation without interrupting the primary current cable. This also makes it possible to utilise the module for a simple retrofit application. The device is powered by a primary battery that provides 5V to 60V DC and may also be powered by a secondary 9V battery for self-contained operation.