UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNDERGROUND CABLE FAULT FOR ALTERNATING CURRENT (AC) USING ARDUINO VIA BLYNK APPS

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the the Bachelor of Electrical Engineering Technology (Power Industry) with Honours.

by

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TAJUK: **Underground Cable Fault For Alternating Current (AC) Using Arduino Via Blynk Apps**

SESI PENGAJIAN: **2017/18 Semester 2**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree the Bachelor of Electrical Engineering Technology (Power Industry).. The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Projek ini mencadangkan pembangunan sistem kabel bawah tanah untuk arus berselang (AC) menggunakan Arduino melalui Aplikasi Blynk. Matlamat projek ini adalah untuk mengetahui lokasi sebenar kesalahan dan mencari tempat kesalahan itu. Aplikasi Arduino dan Blynk akan digunakan untuk menganalisis prestasi sistem ini. Apabila terdapat sebarang kesalahan kabel berlaku, Arduino akan menganalisis data dan menghantarnya ke Aplikasi Blynk. Projek ini boleh menjadi salah satu alat yang boleh membantu mendapatkan maklumat untuk mengesan kesalahan kabel bawah tanah dan direka bentuk berkaitan dengan objektif projek ini yang dapat mengesan kesalahan semasa. Projek-projek ini termasuk mengkaji mengenai Arduino, Aplikasi Blynk dan juga mereka bentuk menggunakan perisian Proteus dan simulasi. Dalam industri, projek ini sangat berguna kerana ia dapat membantu para pekerja dan jurutera untuk berjaga-jaga dengan kes kesalahan kabel. Dengan projek ini, ia akan membantu dan memudahkan pekerja dan jurutera untuk menentukan sama ada kesilapan kabel berlaku dan membuat proses pembaikan cepat dan efektif.

ABSTRACT

This project propose the development of the system of underground cable fault for alternating current (AC) using Arduino via Blynk Apps. The aim of this project is to find out the exact location of the cable fault and locate the place of the fault. Arduino and Blynk Apps will be used to analyse the performance of this system. When there is any cable fault occurs, the Arduino will analyse the data and sent it to the Blynk Apps. This project can be one of the tools that can assist to obtain the information to detect underground cable fault and it is designed related with the objective of this project which is able to detect current fault. The projects includes studying about Arduino, Blynk Apps and also designing using Proteus software and simulation. In industry, this project is very useful as it can help the workers and engineers to be alert with the cable fault cases. With this project, it will help and ease the workers and engineers to determine if there is cable fault occur and make the repairing process faster and efficient.

DEDICATION

First of all, I would like to express my gratitude to Allah S.W.T for His blessing and guidance. He's the One who fulfill my invocation. Alhamdulillah. And then, I would like to dedicate my thesis to family. Their endless love, encouragement and supplication is the most important things happened in my life. In addition, I would like to dedicate this work to my beloved project supervisor, Pn. Intan Mastura binti Saadon. She had given a lot of guidance, encouragement, assistance and support to me in completing this project. Finally, I would like to dedicate my thesis to all lecturers and friends who gives me support and guidance in any situation.

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AC	-	Alternating Current
MCCB	-	Molded Case Circuit Breaker
IC	-	Integrated Circuit
LCD	-	Liquid Crystal Display

CHAPTER 1
INTRODUCTION

1.1 Background

This project propose fault location model for underground power cable using Arduino microcontroller. The aim of this project is to determine the distance of underground cable fault from the base station in kilometers. This project uses the simple concept of ohm's law. When any fault like a short circuit occurs, voltage drop will vary depending on the length of fault on cable, since the current varies. A set of resistors is therefore used to represent the cable and a DC voltage is fed at one end and the fault is detected by detecting the change in voltage that using an analogue to voltage converter and an Arduino microcontroller is used to make the necessary calculations so that the fault distance is displayed on the LCD display. Besides, the projects will be tested for AC current and DC current.

1.2 Problem Statement

Until last decades, cables were made to lay overhead and currently it lies to underground cable, which is superior to an earlier method. This is because the underground cables are not affected by any adverse weather condition such as storm, snow, heavy rainfall as well as pollution. However, when any fault occur in cable, then it is difficult to locate fault. Therefore, we will move to find the exact location of fault.

Now, the world is become digitalized so the project is intended to detect the location of fault in digital way. The underground cable system is more common practice followed in many urban areas. While fault occurs for some reason, at that time the repairing process related to that particular cable is difficult and waste of energy, time and cost due to not knowing the exact location of cable fault.

1.3 Project Objectives

The objectives of this project are:

i. To design an embedded system that can detect fault cable by using Arduino microcontroller.
ii. To develop cable fault detector system for alternating current (AC) system.
iii. To create a monitoring process at smart phone using Blynk Apps.

1.4 Scope of Work

This project focuses on three main areas. In order to ensure this project achieve the desired objectives, this three main scopes must be done within the project area.

I. Circuit design
   - Microcontroller – design and build a circuit system for cable fault detector using Proteus.

II. Area of study:
   - Study of current sensor for AC and DC with a research.

III. Monitoring
   - Development of monitoring process using Blynk Apps.

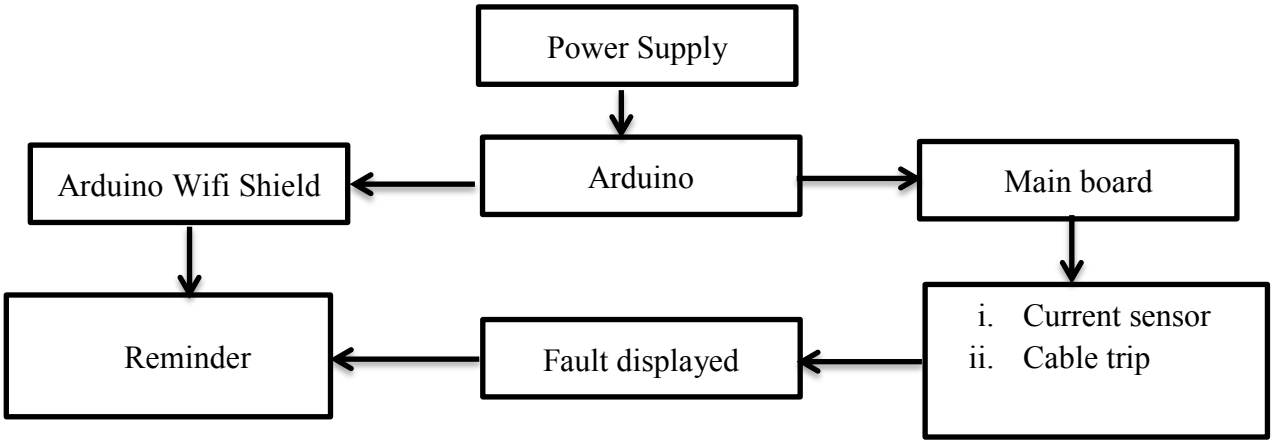

Figure 1.1: The flowchart of the system

1.5 Process Flow of Cable Fault for AC using Arduino via Blynk Apps

For this project, the Arduino will be able to analyse the data when the current fault occurs and it can sent the data to LCD display and determine the exact location where the current fault. In the same time, if there is any current fault detected, it will be able to send the signal from Arduino into the Blynk Apps to make sure the data can be sent to the workers and engineers so that the information about the current fault can be received and repairing process will become more faster. Figure 1.1 is a flow chat that shows the whole process to build this project.

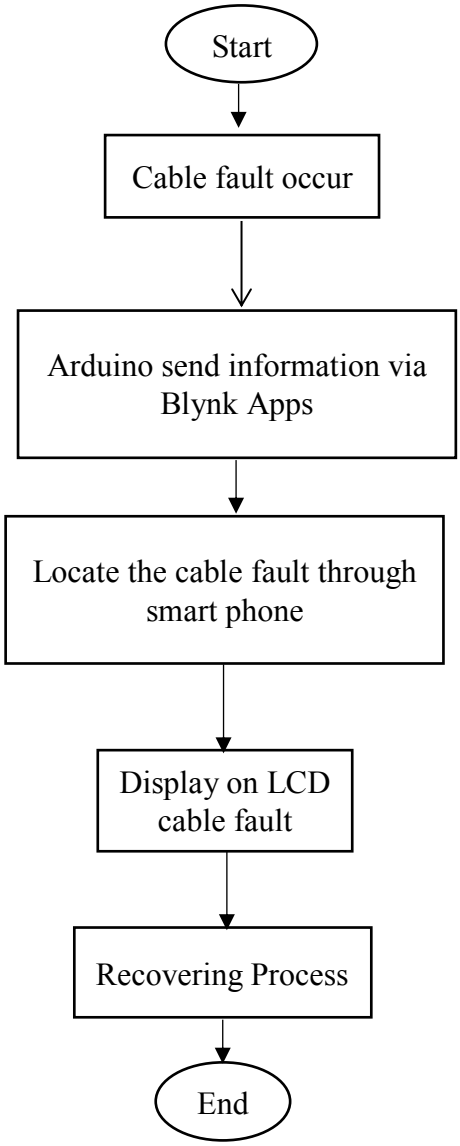

Figure 1.2: Flow Chart

1.6 Thesis Outline

This report consists of chapters that will explain and discuss more details about this project. This report was divided into 5 chapters. The first chapter are an introduction about cable fault for alternating current (AC) system using Arduino via Blynk Apps, objectives and problem statements of the project, scope of the project, process flow of cable fault for alternating current (AC) using arduino via Blynk Apps and also the thesis organization of the report.

Second chapter is about the literature review of the project. Literature review includes description of the perspective and methods used in the research past and review the extent to which a student project is linked to a study and existing theory and the theories and concepts that have been used in solving project problems. The literature review helps to understand the basic fundamental of this project.

Third chapter will explain about the project methodology. Methodology includes the methods and approaches used such as data collection methods, methods of processing and analysing data, models and flow charts.

Fourth chapter is about the result and discussion of this project, finding the analysis throughout the research and project development. All the data and results that obtained during this project will be documented in this chapter.

Lastly, fifth chapter is about the conclusion of this project. This chapter rounds up the attained achievement of the whole project and reserves suggestions for possible future research.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This project is to design Underground Cable Fault Distance Locator that are able to detect underground cable fault. When a fault occurs, it is difficult to do a repairing process due to unknown location of the fault in the cable. Therefore, this project can overcome this problem by identifying where the cable fault location is by using Arduino and Blynk Apps.

This literature review is a combination of information gathered from various sources to form the basis for design Underground Cable Fault Distance Locator. The information is collected from journal, website, book and research article to discuss the theory, basic principle and general character in the development of this project which uses the Arduino Uno R3 Microcontroller and Blynk Apps.

2.2 Related Work

In a real life as an engineer, cable fault is one of the common issues that need to be faced by each of the engineers to monitor the real situation as a professional worker. To make sure cable fault problem is solved, there are one invention that can be designed, known as cable fault distance locator. Cable fault distance locator can be used to locate the periodic faults such as insulation faults in underground.

There are two ways to make sure the cable fault can be detected. The first method is to use cable fault detector equipment. Terminal fault location methods are techniques which are performed from one or both ends of the cable circuit. In general, these methods are most useful in pre-locating the cable fault (Karan, 2015). This method have its own advantages and disadvantages. One of the advantages and disadvantages of this method is, it is easy to conduct but waste in energy and time. Figure 2.1 shows the equipment that is needed in industry to detect cable fault. The second way is to develop a programme or software that can detect the cable fault. By using combination of some circuit, the programme or software such as GSM, IOT Bluetooth and Blynk Apps can be used to detect the cable fault.

Figure 2.1: Power Cable Fault Locator

In real life, there are many kind of situation that occurs from cable fault. For example, in Malaysia on Wednesday, 1 October 2014, Telekom Malaysia Berhad™ had announce that they have detected a fault on the Asia-America Gateway (AAG) submarine cable in Hong Kong segment linking to the United States and North Asia. During this maintenance, the internet users may experience such a slow browsing. So, with the development of the new software or circuit, the cable fault can be detected easily and also can save the energy, cost and life. Figure 2.2 shows a situation in industry when the cable fault occur.